

CONFERENCE ABSTRACT

2020 4TH

INTERNATIONAL CONFERENCE
ON MEDICAL AND HEALTH INFORMATICS

ICMHI 2020

KAMAKURA CITY, JAPAN
AUGUST 14-16, 2020



Co-organized by



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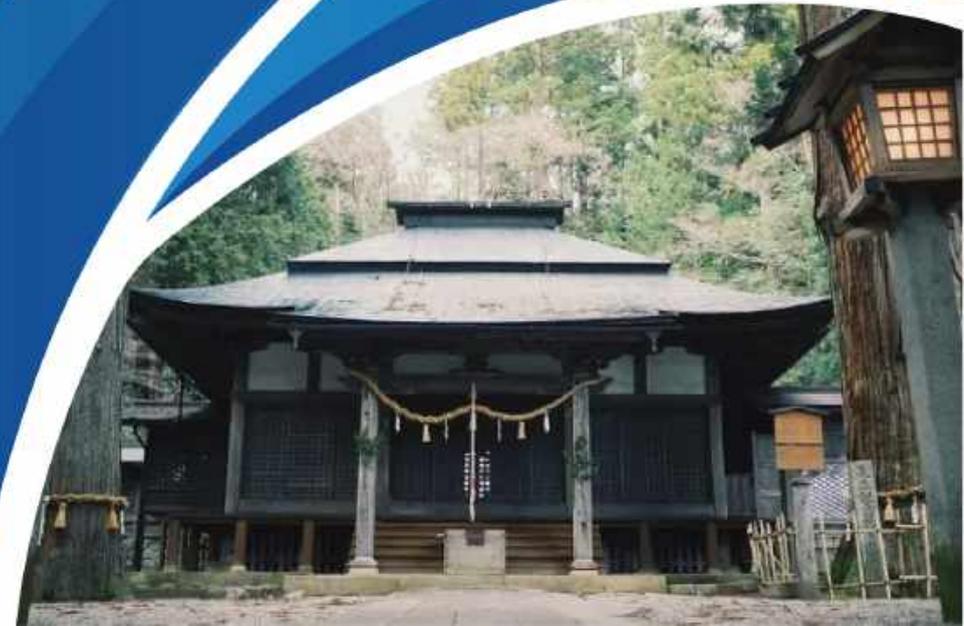


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2020 4th International Conference on Medical and Health Informatics (ICMHI 2020)

**Theme: Health Informatics Vision:
Empowering Ecosystem Services throughout the World**

August 14-16, 2020 | Kamakura City, Japan

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Welcome Address

It is our great pleasure to welcome all of you to attend 2020 4th International Conference on Medical and Health Informatics (ICMHI 2020), Kamakura City, Japan during August 14-16, 2020. Due to COVID-19 pandemic, conference committees made a decision to hold ICMHI 2020 online.

With the efforts of the whole committee, the evaluation of all the accepted papers will be performed based on the reports from anonymous reviewers, who are qualified in the field of Medical and Health Informatics. We wish to express our sincere appreciation to all the individuals who have contributed to ICMHI 2020 conference in various ways.

Special thanks to organizing committees and the volunteers who had dedicated their time and efforts in planning, promoting, organizing and helping the conference. We would like to express our sincere appreciation to all session chairs and the technical program committee members for their great efforts.

ICMHI 2020 is dedicated to building an overarching technology platform for researchers in academics. As part of the event, the ICMHI issue means to look far out enough in time, space and across disciplines and focusing on Medical and Health Informatics

This conference program is highlighted by four Keynote Speakers: Prof. Dr. Reinhold Haux from Peter L. Reichertz Institute for Medical Informatics of TU Braunschweig and Hannover Medical School, Germany, the President of International Academy of Health Sciences Informatics; President Tomohiro Matsuda from National Cancer Registry Section, Center for Cancer Registries, Center for Cancer Control and Information Services, National Cancer Center; Dr. Su-Hsin Chang from Department of Surgery, Washington University School of Medicine in St. Louis. Prof. Andrey Krylov from Lomonosov Moscow State University, Russia.

The conference is supposed to last for three days. We are going to have Sign-in & Zoom Function Test on the first day of the conference. Keynote speeches and authors' oral presentations will be arranged on the second day and third day of the conference.

We wish all of you enjoy ICMHI 2020 online conference and benefit a lot from it!



Prof. Taka-Aki Sato
Conference Chair



Prof. Chi-Chang Chang
Conference Chair

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Instructions for Online Presentations

Equipment Provided by the Presenters

1. A computer with an internet connection (wired connection recommended)
2. USB plug-in headset with a microphone (recommended for optimal audio quality)
3. Webcam (optional): built-in or USB plug-in

Environment requirement

1. Quiet Location and Proper lighting
2. Stable Internet Connection
3. Suitable Background

Duration of each Presentation

Keynote Speech: about 25 Minutes of Presentation and 5 Minutes of Question and Answer
Regular Oral Presentation: about 12 Minutes of Presentation and 3 Minutes of Question and Answer

How to use ZOOM

Step 1: Download Zoom from the link: <https://zoom.us/download>

Step 2: Sign up an account.

Step 3: Set up the languages and do some basic test.

Step 4: Get familiar with the basic functions: Rename, chat, raise hands, and screen share, etc.

1. **Rename:** Before you enter the conference room, please change your name to Paper ID + Name
2. **Chat and raise your hand:** During the session, if you have any questions about the operation of zoom, please let us know by clicking “raise your hands” and use “chat” to communicate with conference secretary

During the Question section, if you have any questions about keynote speakers or authors, you can also click “raise your hands” or “chat”

3. **Share Screen:** Please click “share screen” when it’s your turn to do the presentation.

Step 5: How to join the conference online

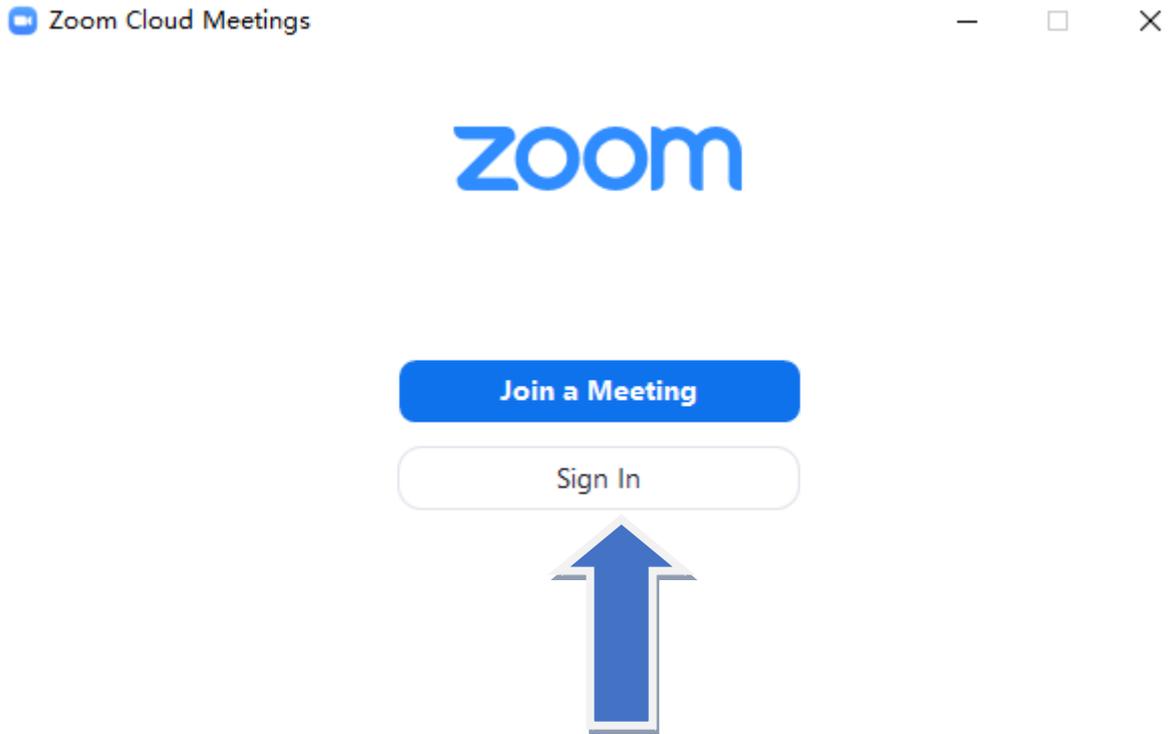
1. Find your paper ID and meeting ID on the conference program. Kindly informed that there are two **Meeting IDs, Test Meeting ID: 61440506927 & 64229029839, Conference Meeting ID: 61440506927 & 64229029839.**
2. Open the ZOOM, click the join, paste the meeting ID, then you can join the conference.
3. Click the share screen when it’s your turn to do presentation (Please open your video or power point before clicking the share screen)
4. Click the stop share after you finish your presentation.

GUIDELINES

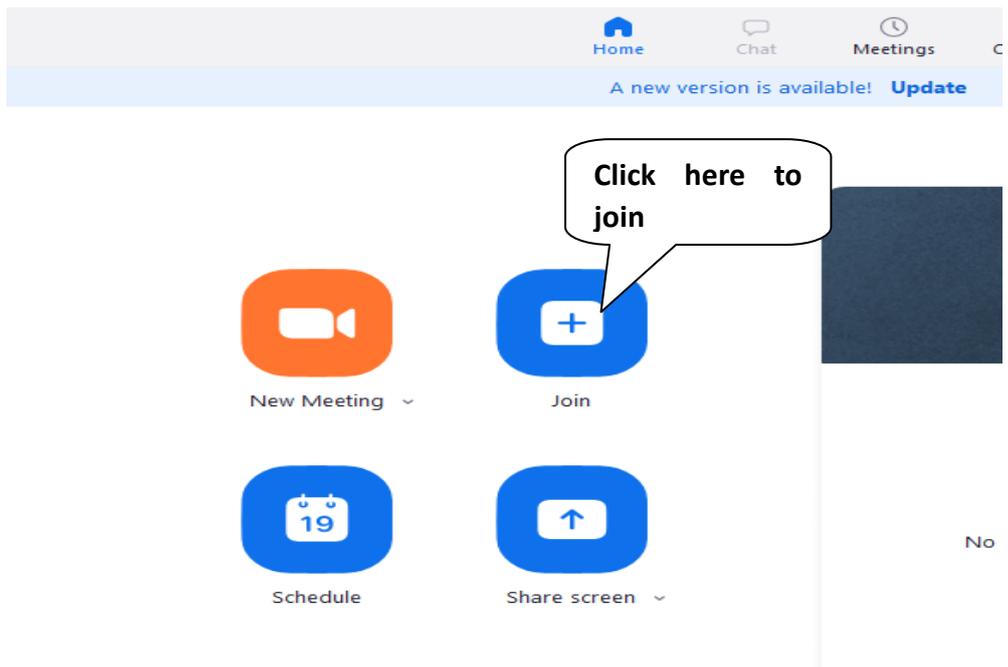
Detailed Instructions for Zoom Use

Step 1: Download Zoom from the link: <https://zoom.us/download>

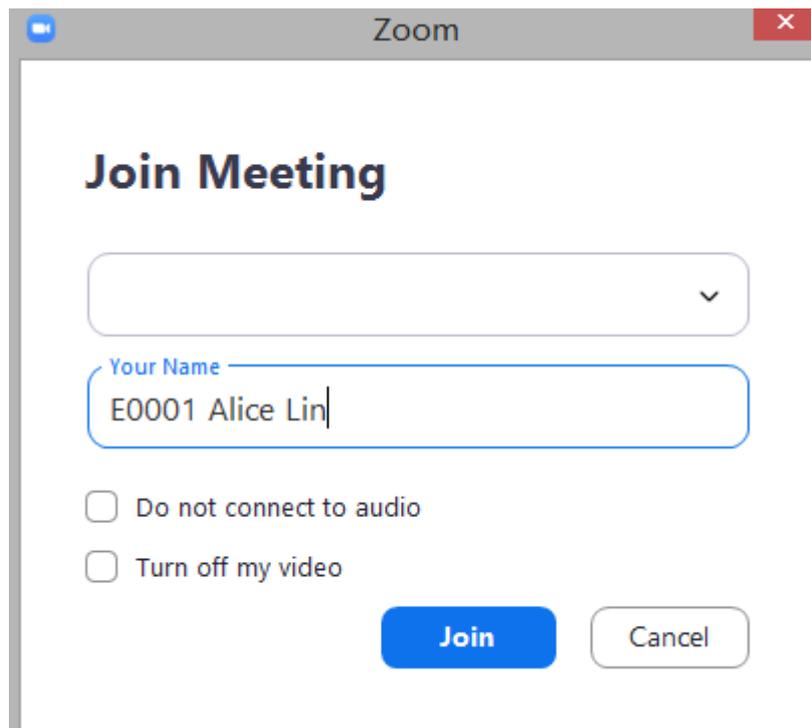
Step 2: Sign up an account.



Step 3: How to join the conference online



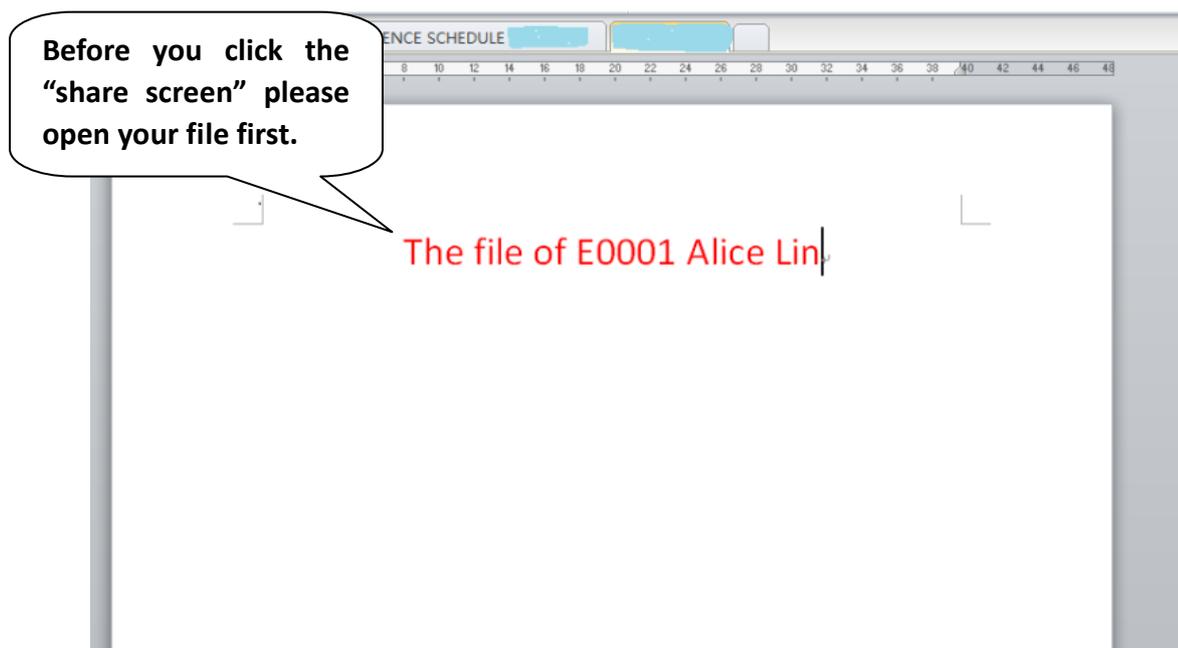
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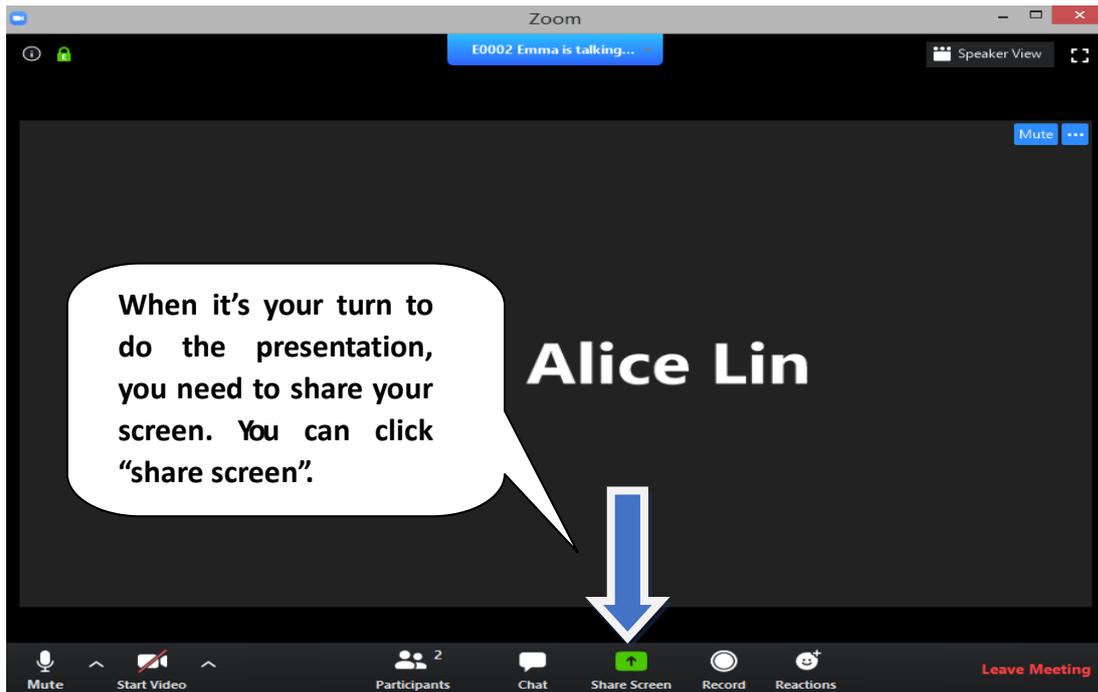
Tip: Join the meeting with session ID we provide in the program, input the name as paper ID + name, such as E0001 Alice Lin, then click "join"

Step 4: Basic functions (You can try to use the functions such as mute, open video, chat, reactions, raise hand, etc)

1. Share screen:

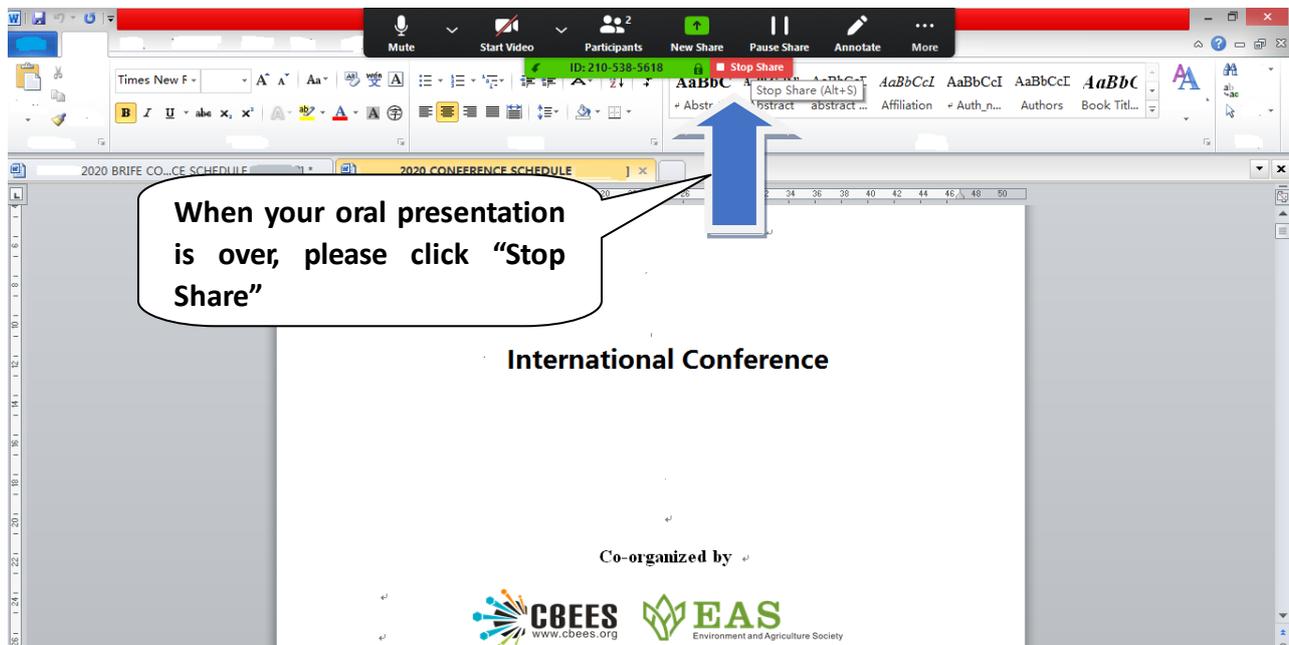


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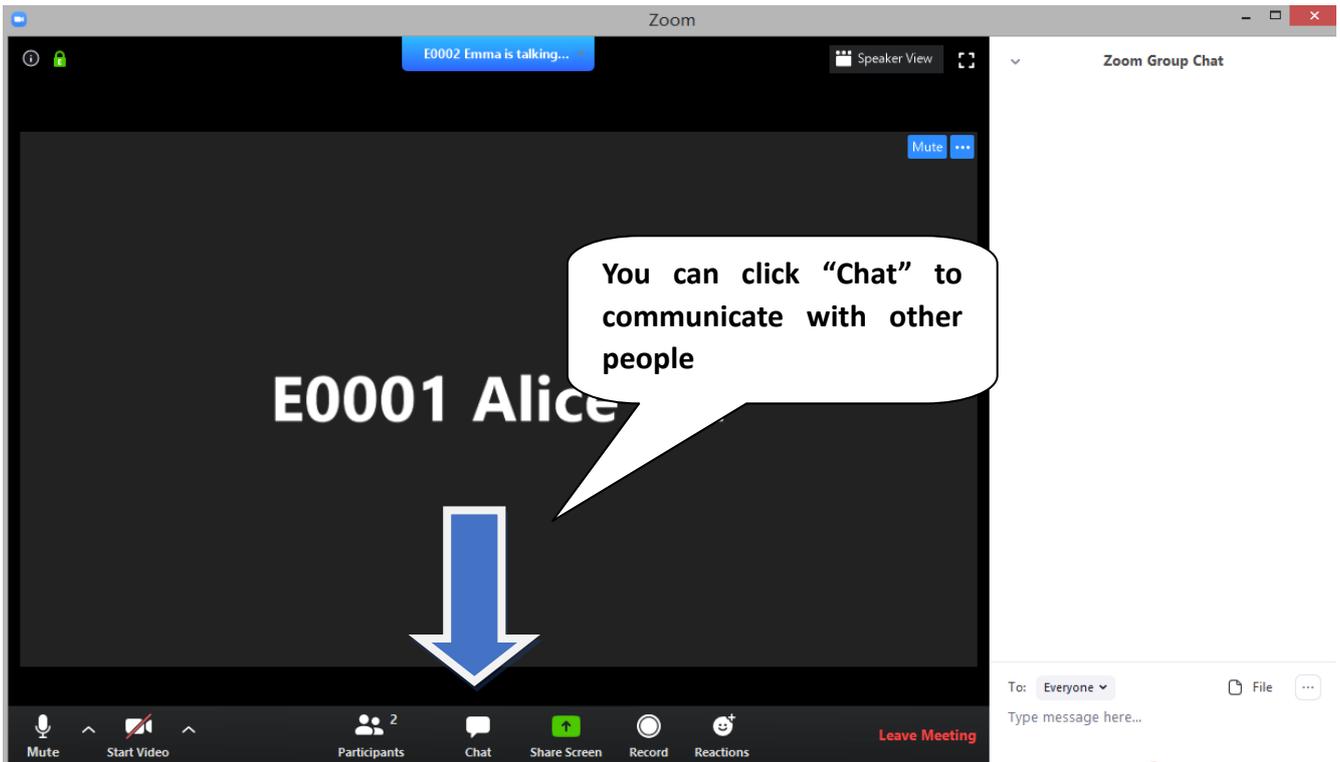
Tip: Open the file you want to share FIRST, then click "share screen", after you finish sharing, please click stop share.

2. Stop share

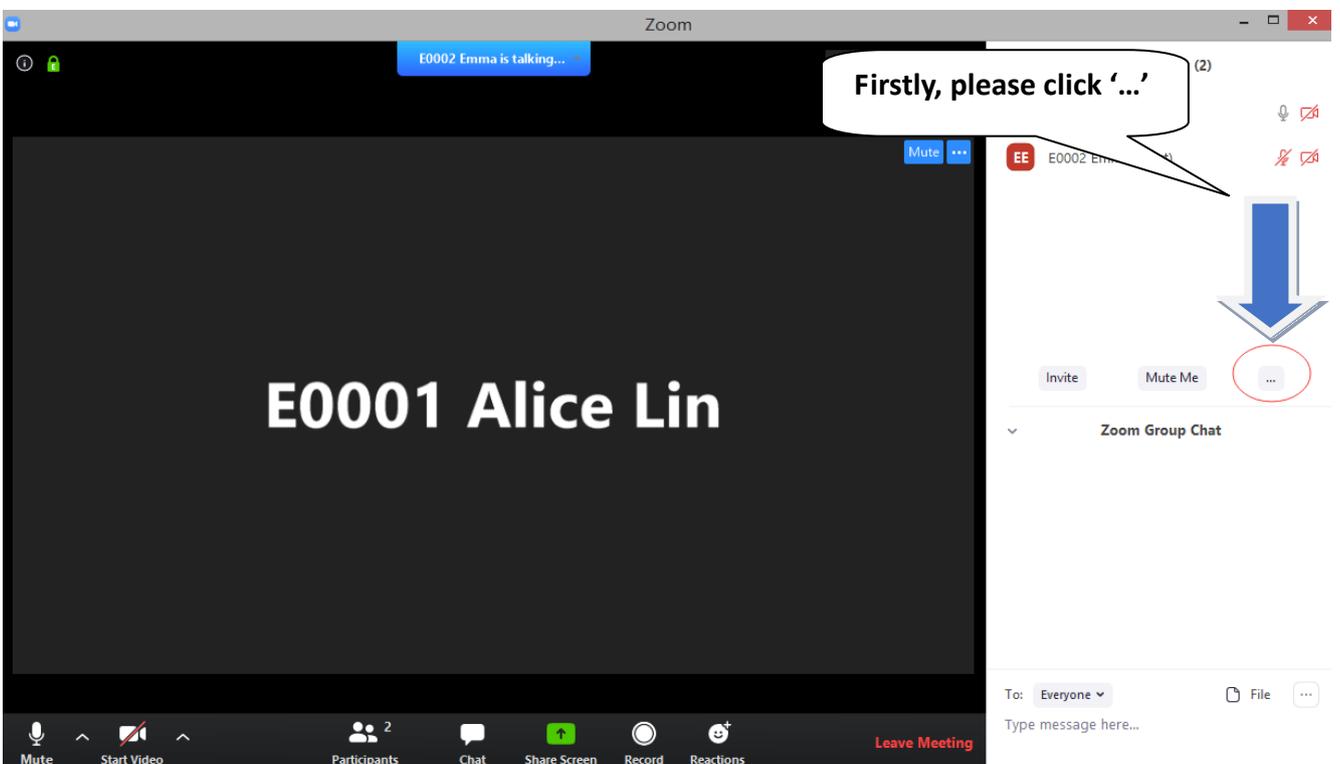


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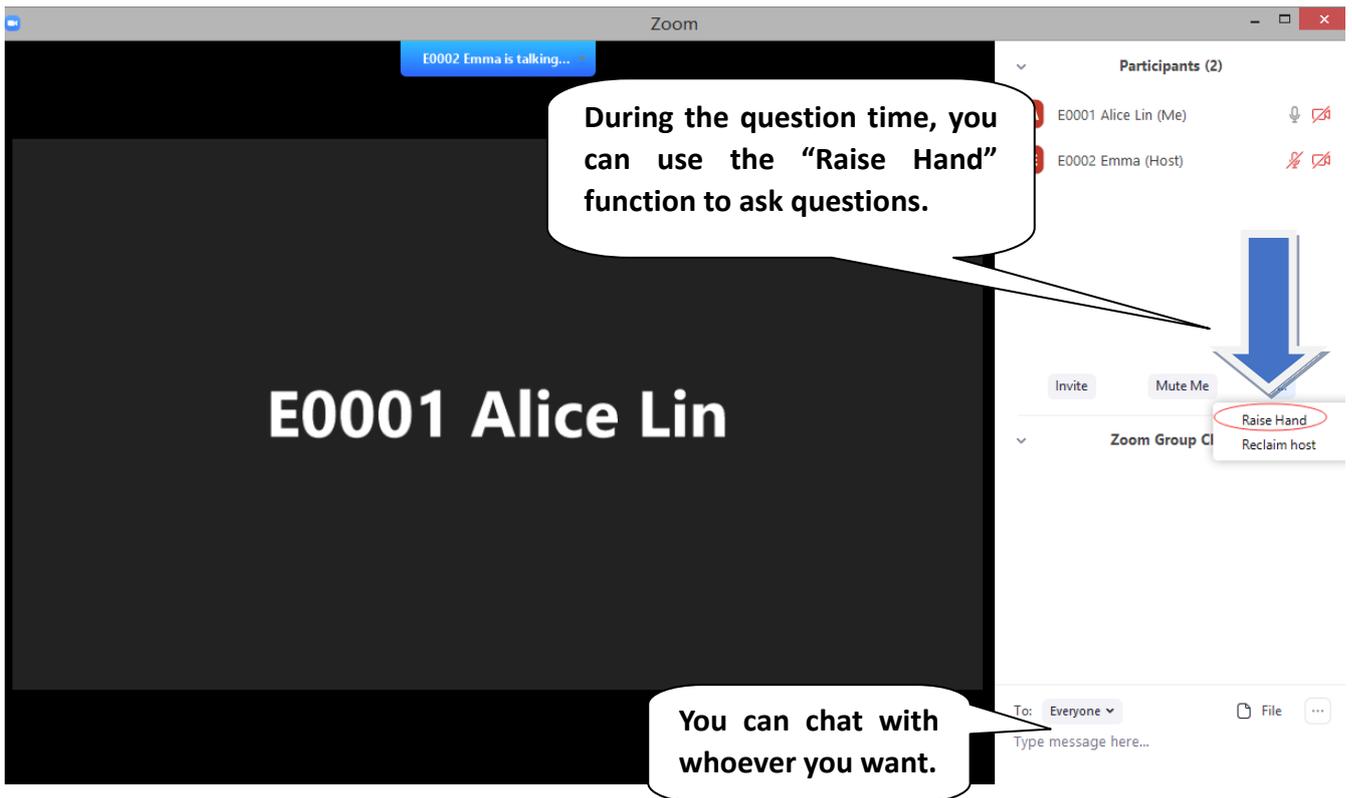
3. Chat:



4. Raise hand:



GUIDELINES



AGENDA

Brief Schedule of Kamakura City Conference

August 14, 2020 (Friday)

Sign-in & Test

Japan Time	Paper ID	Meeting ID
10:00-11:00	Prof. Taka-Aki Sato, Prof. Chi-Chang Chang, Prof. Chien-Lung Chan, Prof. Ming Che Tsai, Dr. Tomohiro Matsuda, Dr. Su-Hsin Chang, Prof. Tetsuya Sakurai, Prof. Chi-Jie Lu	61440506927
11:00-13:00	K0014, K0015, K0038, K0042, K0046, K0047-A, K1033, K1015, K1016, K1017, K1018, K1019, K8002-A, K8021, K8022, K8025	
14:00-16:00	Prof. Reinhold Haux, Prof. Ping Chen Chang, Prof. Tsu-Wang Shen, Prof. Tian-Fu Lee, Prof. Ting-Ying Chien, Dr. Hsien-Wei Ting, Prof. William.Yu Chung Wang, Prof. Yi-Ju Tseng, Prof. Wen-Wei Chang, Prof. Hsi-Chieh Lee	
16:00-18:00	Prof. Andrey Krylov, Assoc. Prof. Sugiono Sugiono, Prof. Lin Yao, S0001, S0015, S1002, S0002, S0004, S0005, S0011, S0013, S3002, S1001, S0014, S0007, S0017, S2003-A, S2001, S0009, S0012, S3005-A, S0003	
11:00-13:00	K1009, K0008, K0013, K0018, K0023, K0024-A, K0025-A, K0039, K0040, K0051, K0052, K0063, K0064, K8013, K8020, K8023	64229029839
14:00-18:00	K0002, K0022, K0032, K0044, K0045, K1005, K1010, K1023, K1032, K1034, K1035, K1036, K8026, K0019-A, K0021, K0029, K0036, K0041, K0050, K1004, K1007, K1029, K8004, K8015, K8017, K8024, K1027-A, K0035	

AGENDA

Formal Online Presentation

August 15, 2020 (Saturday)

Keynote Speeches and Conference Presentations

09:30-09:40	Opening Remarks	
09:40-10:10	<p>Keynote Speech I Dr. Tomohiro Matsuda National Cancer Registry Section, Center for Cancer Registries, Center for Cancer Control and Information Services, National Cancer Center</p> <p>Topic: “The Use of Medical Data and Cancer Research Across Specialties and Countries”</p>	<p>Meeting ID: 61440506927</p>
10:10-10:40	<p>Keynote Speech II Dr. Su-Hsin Chang Washington University School of Medicine in St. Louis, USA</p> <p>Topic: “Using Data from Multiple Databases to Conduct Population-based Studies”</p>	
10:40-10:50	Break Time	
Sub-Session (in Parallel)		
10:50-12:20	<p>Special Session Topic: “Deep Learning for Patient Safety and Hospital Management” Session Chair: Prof. Ping Chen Chang National Quemoy University, Taiwan 5 Presentations: K1015, K1016, K1017, K1018, K1019</p>	<p>Meeting ID: 61440506927</p>
	<p>Session 1 Topic: “ COVID-19” Session Chair: Prof. Hsi-Chieh Lee National Quemoy University, Taiwan 6 Presentations: K1033, K8022, K8025, K8015, K8017, K1032</p>	<p>Meeting ID: 64229029839</p>
12:20-13:30	Break Time	

AGENDA

13:30-14:00	<p style="text-align: center;">Keynote Speech III Prof. Reinhold Haux Peter L. Reichertz Institute for Medical Informatics of TU Braunschweig and Hannover Medical School, Germany President, International Academy of Health Sciences Informatics</p> <p style="text-align: center;">Topic: “On Extended Collaboration of Entities with Natural and with Artificial Intelligence: What is Possible and What is Appropriate?”</p>	<p style="text-align: center;">Meeting ID: 61440506927</p>
Sub-Session (in Parallel)		
14:00-16:00	<p style="text-align: center;">Session 2 Topic: Biomedical Data Analysis Session Chair: Prof. Wen-Wei Chang ChungShan Medical University, Taiwan 8 Presentations: K0008, K0013, K0029, K0025-A, K0039, K0064, K1029, K8026</p>	<p style="text-align: center;">Meeting ID: 61440506927</p>
	<p style="text-align: center;">Session 3 Topic: Healthcare Quality Management 1 Session Chair: Prof. Yi-Ju Tseng Chang Gung University, Taiwan 8 Presentations: K8002-A, K0015, K0038, K1009, K0024-A, K0040, K0052, K0063</p>	<p style="text-align: center;">Meeting ID: 64229029839</p>
16:00-16:10	Break Time	
Sub-Session (in Parallel)		
16:10-18:40	<p style="text-align: center;">Session 4 Topic: Medicine Information Systems Session Chair: Prof. William. Yu Chung Wang University of Waikato, New Zealand 10 Presentations: K0019-A, K0050, K1004, K0021, K0041, K1007, K0051, K0042, K0046, K0014</p>	<p style="text-align: center;">Meeting ID: 61440506927</p>
	<p style="text-align: center;">Session 5 Topic: Healthcare Quality Management 2 Session Chair: Prof. Chi-Jie Lu Fu Jen Catholic University, Taiwan 9 Presentations: K8020, K8023, K8013, K8024, K1005, K8004, K0002, K8021, K0035</p>	<p style="text-align: center;">Meeting ID: 64229029839</p>

AGENDA

Formal Online Presentation

August 16, 2020 (Sunday)

Keynote Speech and Conference Presentations

9:30-11:00	<p>Session 6 Topic: Computational Intelligence Method 1 Session Chairs: Prof. Ting-Ying Chien, Yuan Ze University, Taiwan and Dr. Hsien-Wei Ting, Taipei Hospital, Ministry of Health and Welfare, Taiwan 6 Presentations: K0047-A, K0018, K0023, K0032, K0036, K0044</p>	<p>Meeting ID: 61440506927</p>
11:00-11:10	<p>Break Time</p>	
11:10-13:10	<p>Session 7 Topic: Computational Intelligence Method 2 Session Chair: Prof. Tian-Fu Lee Tzu Chi University, Taiwan 8 Presentations: K1034, K1035, K1036, K0022, K1023, K0045, K1010, K1027-A</p>	
13:10-13:30	<p>Break Time</p>	
<p>Afternoon Conference</p>		
13:30-14:00	<p>Keynote Speech IV Prof. Andrey Krylov Lomonosov Moscow State University, Russia Topic: “ CNN Assisted Hybrid Algorithms for Medical Image Segmentation ”</p>	<p>Meeting ID: 61440506927</p>
14:00-16:15	<p>Session 8 Topic: Biomedical Imaging Session Chairs: Prof. Tsu-Wang Shen, Feng Chia University, Taiwan and Assoc. Prof. Sugiono Sugiono, Brawijaya University, Indonesia 9 Presentations: S0001, S0015, S1002, S0002, S0004, S0005, S0011, S0013, S3002</p>	

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16:15-16:30	Break Time	
16:30-19:00	Session 9 Topic: Image Analysis and Biological Application Session Chair: Prof. Lin Yao 10 Presentations: S1001, S0014, S0007, S0017, S2003-A, S2001, S0009, S0012, S3005-A, S0003	
Closing Ceremony		Meeting ID: 61440506927



Please join the test session on time. On August 14, 2020, we will have the test session and online sign-in. Please join the test session before the formal session.

- Please pay special attention to the **jet lag** and all schedules are arranged based on **Japan Time**. You can change the time on your watch and phone to Japan Time in advance in case you are confused with the jet lag.
- Please try to find a **quiet environment**. In addition to the presentation and question section, the host will mute your microphone all the way.
- Please get familiar with the basic functions: **Rename, Chat, Raise Hands, and Share Screen**.
- Please join the session 10 minutes earlier and attend the whole conference. **Official electronic receipt and certificate** will be sent to you via e-mail after the conference.
- To effectively control the time and avoid some unexpected situations, we advise you **record your presentation** ahead of time (12 minutes of presentation and 3 minutes of Question and Answer for each report) and send video to the conference mailbox.
- Only the organizer can record the video. Please **do not record** the video during the meeting.

AGENDA

Opening Ceremony & Keynote Speeches & Author Presentations

09:30-18:40 Japan Time | August 15, 2020 Saturday
Meeting ID: 61440506927

	Event	Name	Japan Time	Presenter's Local Time
Morning	Opening Ceremony		09:30-09:40	
	Keynote Speech I	Dr. Tomohiro Matsuda	09:40-10:10	09:40-10:10
	Keynote Speech II	Dr. Su-Hsin Chang	10:10-10:40	20:10-20:40
	Break Time: 10:40-10:50			
	Author Presentations	Special Session	10:50-12:05	Page 20-23
	Author Presentations	Session 1	10:50-12:20	Page 24-28
	Break Time: 12:20-13:30			
Afternoon	Keynote Speech III	Prof. Reinhold Haux	13:30-14:00	06:30-07:00
	Author Presentations	Session 2	14:00-16:00	Page 30-35
	Author Presentations	Session 3	14:00-16:00	Page 36-40
	Break Time: 16:00-16:10			
	Author Presentations	Session 4	16:10-18:40	Page 41-47
	Author Presentations	Session 5	16:10-18:25	Page 48-53



Please pay attention to the jet lag and the time is **Japan Time**

KEYNOTE SPEAKER

Keynote Speaker I



9:40-10:10 (Japan Time)

Dr. Tomohiro Matsuda, National Cancer Registry Section, Center for Cancer Registries, Center for Cancer Control and Information Services, National Cancer Center

Dr. Tomohiro Matsuda was born in Tokyo, Japan in 1973. After graduating Kobe University (1996) and Tokyo University (1998), he moved to France as a doctoral student in Paul Sabatier University in Toulouse. He joined Tam cancer registry, and received a doctoral degree in epidemiology (2003). Dr. Matsuda landed a position of researcher in the Division of Epidemiology in the National Institute of Public Health in Japan.

Currently Dr. Matsuda works in the National Cancer Center in Tokyo as chief of the national cancer registry section, while pursuing research in descriptive cancer epidemiology, especially in incidence and survival comparison. Since 2006, he has managed a project to standardize registration methods and played a key role in enacting the Act on Promotion of Cancer Registries (2013). Dr. Matsuda has been involved in international cancer registration training programs in Korea, China, Malaysia, Indonesia, Philippines, Myanmar, etc. and in the GICR project as the director of the IARC Collaborating Center in Japan. Dr. Matsuda has been the president of the International Association of Cancer Registries, IACR, since 2016 enhancing the capacity of cancer registries worldwide.

Topic: “The Use of Medical Data and Cancer Research Across Specialties and Countries”

Abstract—Cancer statistics for 2017 have been published in Japan, revealing that 974,000 cases are diagnosed annually. Nation-wide population-based cancer registries are developed in Western countries and in Asia such as Taiwan, Singapore and South Korea with the quality indicator, death certificates only (DCO) proportion of around 1%. Nationwide coverage and high quality mark the end of the curtain on the development of a cancer registry in a country, however, in the Nordic and North American countries, population-based cancer registry data are being organically linked to other medical statistical sources, ultimately making multiple databases seamless and changing the way data are maintained. Barriers to achieving such environment in other parts of the world would include introduction of personal identification number, negotiations with organizations responsible of each database, changes in legal rules and communication with the general public. Maximizing interest in the use of data goes beyond the intended use of medical information and does not advance by infrastructure development alone. Population-based data provide a means to inform cancer control planning and monitoring, but can also help organize, for example, clinical trials. Both clinical and epidemiological research requires regional cooperation. No matter how much we stimulate an expert in a field, the constraints of our expertise will limit our activities. There has also been a shift in focus to how to collaborate with academia and industry on intervention projects across disciplines, and a "matching site" of agencies has been created in the US. Collaborating across countries, specialties and industries is an available solution to globally tackle the increasing burden of disease.

KEYNOTE SPEAKER



Keynote Speaker II

10:10-10:40 (Japan Time) (St. Louis Time: 20:10-20:40)

Dr. Su-Hsin Chang, Washington University School of Medicine in St. Louis, USA

Dr. Su-Hsin Chang is Assistant Professor of Surgery in the Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine in St. Louis. Dr. Chang received an S.M. degree from MIT and a Ph.D. degree in Economics from the Johns Hopkins University. She received her post-doctoral training in Health Services Research from Washington University School of Medicine in St. Louis. Her research has focused on health and economic burden of obesity, obesity-related chronic diseases, malignancies, and multimorbidity. Her work also focuses on comparative effectiveness and cost-effectiveness of surgical treatment of obesity. She was a recipient of a Washington University Comparative Effectiveness Research K Award and an AHRQ K Award. She leads multiple projects funded by AHRQ and NIH. She serves as an Editorial Board member of the Medical Decision Making Journal and MDM Policy and Practice.

Topic: “Using Data from Multiple Databases to Conduct Population-based Studies”

Abstract—Unlike studies utilizing data from randomized controlled trials, which prospectively design and collect the data to evaluate the effectiveness of an intervention, population-based studies using existing data are vulnerable to bias resulting from confounding. Therefore, when conducting population-based studies, it is important to take into account all variables that are likely to influence the studied relationship. Oftentimes, this is difficult when only one database is available, due to the limited availability of the important variables in the database. One approach is to link the data in the database out to other databases to retrieve relevant variables and perform the analyses based on the linked data. If linking data is unlikely, then using synthesized data from each individual database may be an alternative approach to conduct the proposed research. In this talk, I will demonstrate several of my projects using the aforementioned approaches.

AGENDA

Special Session

Deep Learning for Patient Safety and Hospital Management

10:50-12:05 Japan Time | August 15, 2020 Saturday

Meeting ID: 61440506927

Chaired by: Prof. Ping Chen Chang

Paper ID	Japan Time	Presenter's Local Time
K1015	10:50-11:05	09:50-10:05
K1016	11:05-11:20	10:05-10:20
K1017	11:20-11:35	10:20-10:35
K1018	11:35-11:50	10:35-10:50
K1019	11:50-12:05	10:50-11:05



attention

Please pay attention to the jet lag and the time is **Japan Time**

AGENDA

<p>Special Session Presentation 1 10:50-11:05 K1015</p>	<p>Using Deep Learning Architecture to Detect Knee Osteoarthritis</p> <p>Ting-Ying Chien , Lung-Yi Chung, Yu-Hsun Yen and Hsien-Wei Ting Yuan Ze University, Taoyuan, Taiwan</p> <p><i>Abstract</i>—In recent years, many countries have moved into the position of an aging society, and therefore degenerative knee arthritis, or knee osteoarthritis (OA), accounts for the majority cases in orthopedic clinics. The common signs and symptoms of degenerative knee arthritis include joint pain and swelling, limited range of motion, and flexion contracture. Knee OA is generally believed to be caused by wear of knee joints over time, damaged knee cartilage, the presence of bone spurs, joint deformity and loss of elasticity, resulting in joint pain and stiffness. Several studies have indicated that the use of thermal imaging to measure skin temperature around the knee joint may reflect the internal inflammation level of the knee joint, and the severity of inflammation is directly correlated with the degree of pain felt by the patient. The results of these studies suggested that thermal imaging of the knee is a more powerful tool than X-ray imaging for the evaluation of pain caused by degenerative knee arthritis. Based on these findings, the present study utilized thermal imaging integrated with a CNN to develop an objective diagnostic tool for knee OA. This system enables rapid assessment and assists in decision-making by medical care providers, and the results demonstrated that the deep learning algorithm framework effectively determined whether patients had knee OA.</p>
<p>Special Session Presentation 2 11:05-11:20 K1016</p>	<p>A Hybrid Method for Vessel Detection in Images of Cardiac Catheterization</p> <p>Ting-Ying Chien, Hao-Wei Li (presenter) and Hsiao-Huang Chang Yuan Ze University, Taoyuan, Taiwan</p> <p><i>Abstract</i>—Clinical decision support systems are an important application of artificial intelligence in medical care, and the main supporting technology integrates clinical data within an expert system. Heart disease has long been one of the top 10 causes of death in Taiwan. Coronary heart disease is the main cause of death among all heart disease types. Cardiac catheterization is currently the most accurate method of diagnosing coronary artery disease. However, interpreting images of cardiac catheterization is difficult and complicated. Based on the physicians' accumulated knowledge, the shape of the blood vessel is the key indexes for diagnosing coronary artery disease. For this purpose, we proposed a hybrid method that combines different superpixel segmentation algorithms to identify the positions of blood vessels. In this hybrid method, the location of a blood vessel that has been identified as such by more than two superpixel algorithms is taken to be the final blood vessel position. To evaluate the performance of our model, we used precision, recall and the F1-score to measure the accuracy, and found that the optimal value of the F1-score was as</p>

AGENDA

	high as 0.97.
Special Session Presentation 3 11:20-11:35 K1017	<p>Object Detection in Cardiac Catheterization Images</p> <p>Ting-Ying Chien, Yu-Hsin Chang, Kai-Jung Chen and Wei-Yuan Chen Yuan Ze University, Taoyuan, Taiwan</p> <p><i>Abstract</i>—Heart disease has long been one of the top 10 causes of death in Taiwan. Coronary heart disease is the main cause of death among all heart disease types. The main cause of this disease is deposition of fatty substances in the innermost layer of the artery, leading to narrowing of the artery, which reduces blood flow through the coronary arteries. Cardiac catheterization is currently the most accurate method of diagnosing coronary artery disease. From the results of cardiac catheterization imaging, physicians can determine the best treatment option for the patient, which include medication, cardiac catheterization (balloon angioplasty, stenting) and vascular bypass. However, physicians need to have sufficient experience to assess the color of the angiography, shape of the blood vessel, and blood flow velocity as important indexes to effectively locate the narrowing or blockage of the coronary arteries. In other words, effective identification of the positions of blood vessels in the image is one of the important issues in this procedure. In this study, we used object detection package, YOLO, to identify different types of object in cardiac catheter images, including blood vessels, cardiac catheters, heart, bones and diaphragm. The results showed that YOLO can effectively detect those objects, and in the future, this technique can be used to improve the quality in the deep learning model based on the images of cardiac catheterization.</p>
Special Session Presentation 4 11:35-11:50 K1018	<p>Drug Name Similarity Analytics Based on Hierarchical Clustering</p> <p>Ting-Ying Chien, Jie-Ying Li, Chang-Hong He and Hsien-Wei Ting Yuan Ze University, Taoyuan, Taiwan</p> <p><i>Abstract</i>—The main purpose of medication is to improve the quality of life of patients, but drugs may possess many known and unknown risks, and potentially cause harm. The hazards caused by medications include adverse drug reactions (ADR) and medication errors. Medication errors represent the most common mistakes in medical error events, and refer to mistakes in prescribing, dispensing and administering medications. A pharmacist dispensing an incorrect medicine is one cause of medication error, and is often due to drug name confusion owing to look-alike and sound-alike products. Therefore, this study aimed to classify drugs into groups based on medicines often prescribed by physicians for the same types of diseases in order to identify look-alike and sound-alike products. There were three databases used in this study, the Clinical Classifications Software (CCS), the National Health Insurance Research (NHIRD), and the list of prescription drugs covered under the Taiwan National Health Insurance, obtained from the Ministry of Health and Welfare. And we used a hierarchical clustering algorithm to cluster</p>

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	<p>similar drug names in each CCS group. Our results showed that the method proposed in this study can effectively identify the drug names that most often cause confusion.</p>
Special Session Presentation 5 11:50-12:05 K1019	<p>An Object Detection Application for Images of Cardiac Catheterization</p> <p>Ting-Ying Chien, Yi-Chen Chen, Hung-Wen Lin, Chien-Yuan Huang and Chi-Ming Huang Yuan Ze University, Taoyuan, Taiwan</p> <p><i>Abstract</i>—Heart disease has long been one of the top ten causes of death in Taiwan. Coronary heart disease is the main cause of death from heart disease. Based on the image of the cardiac catheter, the physician can determine the best solution strategy, including medical treatment, cardiac catheter surgery (balloon dilatation, vascular stent placement), or vascular bypass surgery options. Nowadays, the combination of medical images with deep learning algorithms is a hot topic. However, to effectively find the narrow and obstructed position of coronary artery lesions based on deep learning algorithms, the preprocessing of cardiac catheter images is important. If too much noise (i.e., non-critical images) is present in the learning materials, it may lead to misjudgments in the prediction model. In this study, we use object detection package, YOLO, to perform object recognition for each image frame and based on it to determine the critical image. The results showed that the object detection method, YOLO, can effectively detect the vessel and catheter in the image of cardiac catheterization. In other words, using this method is effectively for finding out the critical image.</p>

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Session 1

COVID-19

10:50-12:20 Japan Time | August 15, 2020 Saturday

Meeting ID: 64229029839 | Chaired by: Prof. Hsi-Chieh Lee

Paper ID	Japan Time	Presenter's Local Time
K1033	10:50-11:05	09:50-10:05
K8022	11:05-11:20	09:05-09:20
K8025	11:20-11:35	09:20-09:35
K8015	11:35-11:50	10:35-10:50
K8017	11:50-12:05	05:50-06:05
K1032	12:05-12:20	04:05-04:20



Please pay attention to the jet lag and the time is **Japan Time**

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<p>Session 1 Presentation 1 10:50-11:05 K1033</p>	<p>Summarize the Etiology and Epidemiology Characteristics of the New Coronavirus</p> <p>Sicheng Shen Ravenscroft High School, Raleigh, United States</p> <p><i>Abstract</i>—Until May 16th, there are more than four million people who have been confirmed of the Covid-19 virus in the whole world and 311,739 of total deaths. The virus caused disastrous effects in the economy around the whole world, destroying small businesses and the stock market, ruining international transportation, devastating the morale of the people and prohibiting people from interacting and socializing. Considering these huge impacts that the virus made, on March, 12, 2020, the World Health Organization (WHO) characterized the Covid-19 caused by the Sars-CoV-2 virus as a global pandemic. There is not an effective vaccination or specific medicine to cure the disease. The most effective way to slow down the transmission is early detection, isolation of new carriers and operating proper treatment to patients. Thus, the research on the physical properties and clinical characteristics of the Covid-19 become significantly important. To prepare for the future prevention, this paper summarizes the overall treatment of the virus, mainly through the virus’s origin, etiology, epidemiology, and clinical symptoms to inform readers more about the Covid-19, eliminate misunderstanding and bias to the virus, invoke the sense of self-protection and finally use scientific and logical methods to overcome this world-wide pandemic.</p>
<p>Session 1 Presentation 2 11:05-11:20 K8022</p>	<p>Psychological Effect of the Covid 19 Pandemic on Hospital Health Personnel Based on Impact Scales</p> <p>Luis Huamán, Jocelyn Ramon, Ivonne Jara, Humberto Cancho, Flor Reyes and Mario Chauca Universidad Nacional del Callao, Callao, Peru</p> <p><i>Abstract</i>—Faced with pandemic events, health personnel on the front line of care for seriously ill patients with COVID-19 infection, turns out to be vulnerable to mental health problems. Objective: The objective of this review study is to identify the psychological effects of the Coronavirus pandemic on hospital health personnel and the different scales used to assess the psychological impact. Methodology: A systematic literature review was carried out on five search platforms such as PubMed, Elsevier, The Lancet, Google academic and Scielo. Then, apply selection criteria and methodological quality checklists, take 16 articles for data extraction and analysis. Results: All the recognized studies recognize the development of symptoms related to the mental health of the workers who are facing the care of patients with COVID-19, highlighting depression, anxiety and post traumatic stress as effects of greater impact. On the other hand, a diversity of scales used in the articles analyzed was found, the</p>

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	<p>Post-Traumatic Test and the Revised Event Impact Scale standing out. Conclusion: The pandemic caused by COVID-19 is having a negative impact on the mental health of health personnel and there are a variety of validated scales to measure the psychological effect.</p>
<p>Session 1 Presentation 3 11:20-11:35 K8025</p>	<p>Psychosocial Well-Being of Public University Students, Based on the GHQ-28 Scale</p> <p>Mercedes Ferrer, Vanessa Mancha, Melina Chumpitaz, Jaqueline Begazo and Mario Chauca Universidad Nacional del Callao, Callao, Peru</p> <p><i>Abstract</i>—Globally we are going through a difficult situation due to this pandemic due to COVID-19, one of the most effective measures implemented by most governments has been social isolation, which can cause psychosocial risk; The objective of this study is to evaluate the psychosocial well-being of the students of a Peruvian public university during the 90 days of social isolation; the method we have used is descriptive - cross-sectional, with a non-probability sample of 285 university students, who filled out an online survey to detect psychosocial symptoms, using the General Health Questionnaire (GHQ-28); finding that 72.6% of students exposed to a medium-high level of psychosocial risk. In conclusion, an association was found between a medium-high level of psychosocial risk and the variables: cohabiting with people at risk for COVID-19 ($\chi^2 = 9,661$ and $p < 0.05$); present symptoms compatible with COVID-19 ($\chi^2 = 28,957$ and $p < 0.05$) and cohabit with COVID-19 patients ($\chi^2 = 8,803$ and $p < 0.05$).</p>
<p>Session 1 Presentation 4 11:35-11:50 K8015</p>	<p>Covid-19 Chest Radiography Images Analysis Based on Integration of Image Preprocess, Guided Grad-CAM, Machine Learning and Risk Management</p> <p>Tsung-Chieh Lin and Hsi-Chieh Lee National Quemoy University, Kinmen County, Taiwan</p> <p><i>Abstract</i>—The novel coronavirus has infected more than 3.6 million people and killed at least 252,366 worldwide as of May 5, 2020. The most threat is there is no effectively developed vaccine or treatment to control this illness spread. In this paper, we describe a potential methodology, integration of image preprocess, Guided Grad-CAM, machine learning and risk management based on chest radiography images, as one of workable alarm and analysis systems to support clinicians against COVID-19 outbreak threat. Artificial intelligence CNN has been proved as a good tool in image classification, object detection and segmentation that can help human on massive data analysis. We leverage those pre-trained models as backbone with further transfer learning to analyze public open source composed of 5851 poster-to-anterior chest radiography images, facilitated with steps of ROI and mask, and CNN layer visualization of guided grad-CAM to help CNN focused on critical infection focus. The classification accuracy, average sensitivity, average precision, and sensitivity of COVID19 for benchmark, single</p>

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	<p>ResNet50, and our second bagging ensemble model are (70%,/69.3%/72.5%/91.3%),(77.2%/78.8%/81.9%/100%),and(81.5%/81.4%,86.8%/100%), respectively. Ensemble way of several CNNs and other machine learning methods used here is to contribute about 4% accuracy improvement on top of best single CNN (ResNet50). The key performance of COVID 19 category, sensitivity, is promising as 100%, based on our limited sample volume. Beside to accuracy-oriented model, a cost minimization approach is suggested here to provide clinicians options of different risk consideration flexibility by trade off among different categories and performance rates more than just accuracy.</p>
<p>Session 1 Presentation 5 11:50-12:05 K8017</p>	<p>Knowledge and Attitudes of Ajman University Dentists towards the Coronavirus (COVID-19)</p> <p>Afraa Salah Hussain, Hashim, R, Khalid, A., Salah and S. and Khamees, A. Ajman University, Kurukshehra, United Arab Emirates</p> <p><i>Abstract</i>—Background: in December, 2019 corona virus discovered in Wuhan, china as a new viral infection affect respiratory system. It is then distributed throughout the whole word causing death and sickness for huge number of people in most of the countries. This study evaluate Ajman university dental professionals’ knowledge and attitudes towards corona virus and the applied strategies for its prevention and treatment.</p> <p>Material and methods: The study done by online questionnaire which distributed to the participants through emails. The questionnaire consists of three parts (demographic, knowledge, and attitudes) towards corona virus which was filled by 297 dentists. Data analyzed by (SPSS, 22V) to revealed study results.Results: study showed that (100%) know the main rout of virus transmission through close contact with the patient and sharing things with patients. However, there is a loss of information towards other way of virus transmission. (78%) of the participants do not know about any medication for corona virus nor a vaccination for it. (76%) they are willing to treat patients with corona however they prefer to do it in hospitals or specialized centers. (95%) of the participants ask for more precautions and preventive measures for dental treatment of corona virus patients. The majority of dental professionals had anxiety towards dental treatment of corona virus.Conclusions: study findings revealed that dental professionals showed good knowledge towards virus transmission, however there are missing information of other ways of transmission. This finding indicates that providing information strategies by health institutions should be updated to enhance information needed for the medical staff. Study showed that infection control should be applied in all dental clinics and high quality of dental materials and instruments for preventive measures should be provided. To avoid dental staff anxiety towards dental treatment of corona virus patients’ high standard staff preparation should be provided during dental treatment.</p>
<p>Session 1 Presentation 6</p>	<p>A Spatio-GraphNet Model for Real-time Contact Tracing of CoVID-19 Infection in Resource Limited Settings</p>

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12:05-12:20 K1032	<p>Moses Ekpenyong, Ifiok Udo, Faith-Michael Uzoka and Kingsley Attai University of Uyo, Uyo , Nigeria</p> <p><i>Abstract</i>—Placing contact tracing tool in the hands of all is certain to enhance contact identification—as individuals can perform self-tests to discover in real-time, frequently associated contacts, ultimately instilling caution and adherence to recommended local and international guidelines. It can also assist epidemiologists and policymakers to formulate appropriate policies as well as proffer cost-effective solution for containing disease outbreaks. A Spatio-GraphNet model for real-time contact tracing of CoVID-19 infection is proposed in this paper for real-time crowd source of contacts—using a WiFi-like soft-robot enabled on mobile phones. Once enabled, useful contact tracing parameters can be captured and stored. Using knowledge of Graph Theory, production traces of stored contacts are filtered for efficient contact tracing, practical disease surveillance and prompt medical/healthcare intervention. Simulation results reveal the contact tracing dashboard with appropriate parameters thresholds, application and evaluation of various statistical kernels as well as practical implications of the study.</p>
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KEYNOTE SPEAKER



Keynote Speaker III

13:30-14:00 (Japan Time) (Hannover Time: 06:30-07:00)

Prof. Reinhold Haux, Peter L. Reichertz Institute for Medical Informatics of TU Braunschweig and Hannover Medical School, Germany;
President, International Academy of Health Sciences Informatics

Reinhold Haux is Professor for Medical Informatics at the Peter L. Reichertz Institute for Medical Informatics of TU Braunschweig and Hannover Medical School, Germany. From 2007 to 2017 he has served as Executive Director of this institute.

His current research fields are health-enabling technologies, health information systems and management, medical data management (analysis and representation of medical data), as well as synergy and intelligence: extended interaction of living and non living entities.

Dr. Haux is author and editor of more than 400 publications. He has supervised about 50 doctoral theses.

For the term 2007-2010 he was President of the International Medical Informatics Association (IMIA), an NGO of the World Health Organisation. From 2001-2015 he was editor of the journal *Methods of Information in Medicine*, where he is now senior consulting editor. He has, from 2001 to 2007, co-edited the IMIA Yearbook of Medical Informatics.

Reinhold Haux is, among others, elected member of the Braunschweig Scientific Society and of the International Academy for Health Sciences Informatics, where he since 2018 serves as the Academy's President.

Details at "www.plri.de".

Topic: "On Extended Collaboration of Entities with Natural and with Artificial Intelligence: What is Possible and What is Appropriate?"

Abstract—This keynote lecture is dealing with future forms of collaboration and with its (hopefully existing) extended synergies, which may now will come in our era of digitization. Entities in this collaboration are we, the human beings, and other living entities such as animals with ‘natural intelligence’ as well as non-living entities, in particular functionally comprehensive machines, with ‘artificial intelligence’. These new, future forms of collaboration with all its potential opportunities and risks became more and more part of my research during the last years, in particular in the field of medicine and health care. As a follow-up to my lecture at ICIMTH 2019 ([5]) there will be in this keynote a specific focus on what is realistically possible in the context of extended collaboration as well as what can be regarded as really appropriate and not just technically feasible.

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Session 2

Biomedical Data Analysis

14:00-16:00 Japan Time | August 15, 2020 Saturday

Meeting ID: 61440506927 | Chaired by: Prof. Wen-Wei Chang

Paper ID	Japan Time	Presenter's Local Time
K0008	14:00-14:15	13:00-13:15
K0013	14:15-14:30	13:15-13:30
K0029	14:30-14:45	11:30-11:45
K0025-A	14:45-15:00	13:45-14:00
K0039	15:00-15:15	14:00-14:15
K0064	15:15-15:30	15:15-15:30
K1029	15:30-15:45	09:30-09:45
K8026	15:45-16:00	14:45-15:00



Please pay attention to the jet lag and the time is **Japan Time**

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<p>Session 2 Presentation 1 14:00-14:15 K0008</p>	<p>Correlation Between Pharmacokinetic Analysis of DCE-MRI and Breast Image Reporting and Data System (BIRADS) Classification</p> <p>Xia Wu, Yulong Qi, Fei Fen, Guanxun Cheng and Na Zhang 1. Wuhan University Of Technology, Wuhan, China 2. Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China</p> <p><i>Abstract</i>—To determine if pharmacokinetic information derived from dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) could improve the diagnostic value of breast disease. A total of thirty-six female patients (range, 30–70 years, mean 48.1 ± 12.6 years) confirmed BIRADS 3~6 underwent DCE-MRI were retrospectively recruited to this study. Modified two-compartment Tofts model and Brix mode were used to obtain relevant tracer kinetic parameters. Mann-Whitney U-test was used to compare the parameters between the BIRADS 3 and 4, BIRADS 4 and 5, BIRADS 5 and 6, respectively. A P value of less than 0.05 was considered to indicate a significant difference. In evaluating significance between BIRADS 3 and BIRADS 4, the statistical analysis showed that Brix-k_{ep} ($P=0.014$), A_{Brix} ($P<0.001$), TTP ($P=0.022$) were independent factors associated with the discrepancy. All kinetic parameters we calculated were independent factors associated with the discrepancy between BIRADS 4 and BIRADS 5. A_{Brix} ($AUC=0.915$) do have a good discriminative power between BIRADS 3 and 4. Tofts-k_{ep} ($AUC= 0.952$), A_{Brix} ($AUC= 0.990$) do have a good discriminative power between BIRADS 4 and 5. The numeric values of Brix-k_{ep}, Brix-k_{el}, A_{Brix}, Tofts-k^{trans}, Tofts-k_{ep} and Slope were higher in high grades (BIRADS 5 and BIRADS 6) than in low grades (BIRADS 3 and BIRADS 4) tumors. A_{Brix} have a good discriminative power between BIRADS 3 and 4. Tofts-k_{ep}, A_{Brix} do have a good discriminative power between BIRADS 4 and 5. No significant difference between BIRADS 5 and 6.</p>
<p>Session 2 Presentation 2 14:15-14:30 K0013</p>	<p>Deformable Deep Network Atherosclerotic Coronary Plaque Recognition of Oct Imaging</p> <p>Chaoyu Sun, Hai Huang and ZhaoLiang Wan Harbin Engineering University, Harbin, China</p> <p><i>Abstract</i>—Cardiovascular disease results great life and economics threat to the patients and their family members around the world. Optical coherence tomography (OCT) image not only obtains higher resolution and faster image modality to assess coronary vessels, but also provides safer guidance for micro scale medical interventions. Deep learning network frameworks have been considered as a promising approach for pathology feature classification and segmentation of computerized diagnosis. In compare with universal dataset for object recognition, atherosclerotic coronary plaque of different patients usually</p>

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	<p>involves different pathology character and formation modality. Limited samples and weakly labeling always cause plaque mis-classification and evaluation. In order to improve recognition accuracy, a novel regional based fully convolutional network with deformable deep networks has been developed to realize plaque object recognition for OCT images. The deformable convolution and regional of interest pooling can adapt to the anchor scales and offsets change to improve classification precision for different pathology character and formation modality of different patients. Recognition experiments from atherosclerotic coronary plaque image have validated the effectiveness and performance of proposed method.</p>
Session 2 Presentation 3 14:30-14:45 K0029	<p>Coronary Artery Disease Classification from Photoplethysmographic Signals</p> <p>Shibabroto Banerjee, Pourush Sood, Sujoy Ghose and Partha Pratim Das Indian Institute of Technology, Kharagpur, India</p> <p><i>Abstract</i>—Photoplethysmography is a non-invasive and low-cost modality for assessing blood oxygen and volume variations. It is used extensively by physicians for basic monitoring tasks. These signals, however, as prior work has shown, have a plethora of interesting features and can be used for the diagnosis of several cardiovascular diseases. In this article, we aim to detect Coronary Artery Disease (CAD) using Photoplethysmographic signal features. We outline a simple signal processing method to extract these features. Machine learning-based approaches are then used to train classifiers that detect the presence of cardiac distress based on these features. We observe that the proposed method is effective in detecting CAD in a MIMIC-III, a benchmark data set. The technique can be used for low-cost monitoring of early signs of cardiac diseases.</p>
Session 2 Presentation 4 14:45-15:00 K0025-A	<p>Association of Genetic Variants in RspOs/Lgr Signaling and Trace Elements with Osteoporosis Risk in Chinese Han Elderly</p> <p>Muhong Wei and Qi Wang Huazhong University of Science and Technology, Wuhan, China</p> <p><i>Abstract</i>—Background: Osteoporosis is a common complex disease, the pathogenesis of which is still unclear. The genetic variants in RSPOs/LGR signaling and trace elements associated with osteoporosis risk were explored in this study so as to provide more evidence for the disease etiology.</p> <p>Methods: A total of 1235 Chinese Han elderly were enrolled. Next-generation sequencing technology was used to identify osteoporosis-related genetic variants, which were genotyped using the SNPscan method. The iron, copper, zinc and manganese concentrations in plasma were measured using the inductively coupled plasma mass spectrometer. Logistic regression modeling was mainly used for statistical analysis. And the relative excess risk due to interaction (RIRE) was used to assess the joint effect of the genetic variants and trace elements on osteoporosis risk.</p>

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	<p>Results: The rs10920362 polymorphism in the LGR6 gene was associated with osteoporosis; and the TT and CT carriers had higher osteoporosis risk compared with the CC carriers (OR = 1.43; 95% CI: 1.11, 1.83). The osteoporosis cases had lower plasma iron levels than the controls ($P = 2.04 \times 10^{-4}$). Multivariable adjusted regression revealed that low plasma iron concentrations were associated with elevated osteoporosis risk (OR = 1.72; 95% CI: 1.17, 2.53). The additive interaction of rs10920362 and plasma iron concentration on osteoporosis was significant (RERI = 1.17; 95% CI: 0.21, 2.13).</p> <p>Conclusion: The rs10920362 polymorphism in the LGR6 gene and plasma iron concentration is associated with osteoporosis risk in Chinese Han elderly. Interaction effect on osteoporosis risk is revealed between the rs10920362 and plasma iron concentration. Further studies are needed to elucidate the underlying mechanism.</p> <p>This work has been funded by the National Natural Science Foundation of China [Grant no. 81573235].</p>
<p>Session 2 Presentation 5 15:00-15:15 K0039</p>	<p>DeepFCA: Matching Biomedical Ontologies Using Formal Concept Analysis Embedding Techniques</p> <p>Guoxuan Li 1 Institute of Mathematics, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, China 2 University of Chinese Academy of Sciences, Beijing, China</p> <p><i>Abstract</i>—Biomedical ontologies contain target domain knowledge. In many cases, multiple ontologies are created independently for different purposes in the same biomedical domain. To fuse and extend existing knowledge, we need to find the corresponding entities (i.e. classes and properties) from different ontologies. Formal Concept Analysis (FCA) is a mature mathematical tool for biomedical ontology matching tasks and has achieved competitive performance. The FCA-based method mainly matches the ontologies through lexical tokens and structural information. This method ignores the inherent semantics of entities. On the other hand, representation learning techniques are widely used in different NLP tasks to capture the semantic similarity of words. In this paper, we propose a novel biomedical ontology matching method which we dub DeepFCA. We use pre-trained word vectors to initialize the vector representations onto which semantic information is inscribed. FCA embedding techniques are used to refine these vectors. DeepFCA combines FCA and word2vec methods to enhance the performance of biomedical ontology matching. To the best of our knowledge, this is the first attempt to apply FCA embedding techniques to biomedical ontology matching. Experiments on real-world biomedical ontologies show that DeepFCA improves the recall and F1-measure compared with the traditional FCA-based algorithm. It also achieves competitive performance compared with several state-of-the-art systems.</p>

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<p>Session 2 Presentation 6 15:15-15:30 K0064</p>	<p>Online Spectral Classification for Long-Term Spike Sorting</p> <p>Kotaro Sakamoto, Keiichi Morikuni, Tetsuya Sakurai and Kaspar Vogt University of Tsukuba, Tsukuba, Japan</p> <p><i>Abstract</i>—In this paper, we explore online spike sorting for chronic extra-cellular recording. A challenge is to track drifts of clusters across time. In our proposed approach, time-series data of neural spikes are batched into sliding time frames, and a Laplacian eigenproblem corresponding to each time frame is efficiently solved using iterative methods with an initial guess provided by the previous time frame. The labels are obtained by comparing the eigenvectors of successive time frames. This approach is capable of classifying data points from time-varying but locally stationary distributions.</p>
<p>Session 2 Presentation 7 15:30-15:45 K1029</p>	<p>Evaluation of Intravenous Contrast Agents Timing and Enhancement in Non-Traumatic Abdomen and Pelvis CT Exams</p> <p>Moath Al-Makhamreh, Murad Abusamra and Mohammad Hjoui Al-Quds University, Yatta, Palestine</p> <p><i>Abstract</i>—Achieving the optimal enhancement is the desired goal of any computed tomography (CT) scan with intravenous (IV) contrast medium (CM). The aim of this study is to assess IV timing and other CM related factors when different enhancement phases were used and their deviation to the recommended standards in non-traumatic Abdomen Pelvic (A/P) CT scan with IV CM. 80 patients from different medical institutions underwent Abdomen, and Pelvis CT scans with IV CM; the process of CM timing and other CM related factors were evaluated. The attenuation values in the Hounsfield Unit (HU) for liver and aorta were measured. The average HU was compared between the groups. Widely varying aortic and hepatic enhancement resulted from random use and wide range of timing and other CM factors. Aortic enhancement ranged from 98-361HU, and hepatic enhancement ranged from 13-76 HU, respectively. Mean \pm SD of maximal aortic enhancement was 264.25 \pm60.23, 213.45 \pm50.83, 200.85 \pm39.2, and 164.2 \pm48.27. Mean \pm SD of maximal enhancement of the liver was 53.4 \pm10.3, 44.9 \pm12, 45.8 \pm10, 34.6 \pm10.1 for institutions 1, 2a, 2b and 3, respectively. Random use of CM timing and protocols will result in a widely varying range of enhancement, and peak parenchymal enhancement with less homogeneous enhancement. CM administration and scan timing need to be optimized CM interrelt.</p>
<p>Session 2 Presentation 8 15:45-16:00 K8026</p>	<p>Behavioural Understanding of Hospital Service Quality: Organisational Learning and Organisational Innovativeness</p> <p>Thilageswary Arumugam and Shamini Arumugam Asia Pacific University of Technology and Innovation, Kuala Lumpur, Malaysia</p>

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Abstract—This study aims to identify the effect between organizational learning and service quality in public hospitals. The theoretical framework is derived based on Behavioral Theory of Firm by Cyert and March (1963) and Donabedian's Healthcare Quality Model. Service quality is discussed as endogenous construct. The Schwandt's organizational learning system model is evaluated as exogenous construct. The unit of analysis consists of clinical and clinical support departments with a sample size of 221 from 23 public hospitals in Peninsula Malaysia. Patients' perception on the departments' service quality is evaluated, and organizational learning and organizational innovativeness are assessed by the department heads in public hospitals. Patients' response data from 884 were aggregated to match the 221 responses of the department head. Structural equation modeling with AMOS and SPSS was applied to analyze data. Findings reveal that all hypotheses are supported. Organizational innovativeness shows a partial mediating effect between learning activity and service quality, and between performing actions and service quality. Service quality provides the organizational performance feedback to improve the learning activity for the human resource development. Thus, this study implies that the need for human resource development is imperative in contributing towards service performance to patients in the public hospitals.

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Session 3

Healthcare Quality Management 1

14:00-16:00 Japan Time | August 15, 2020 Saturday

Meeting ID: 64229029839 | Chaired by: Prof. Yi-Ju Tseng

Paper ID	Japan Time	Presenter's Local Time
K8002-A	14:00-14:15	14:00-14:15
K0015	14:15-14:30	13:15-13:30
K0038	14:30-14:45	13:30-13:45
K1009	14:45-15:00	13:45-14:00
K0024-A	15:00-15:15	14:00-14:15
K0040	15:15-15:30	14:15-14:30
K0052	15:30-15:45	13:30-13:45
K0063	15:45-16:00	14:45-15:00



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<p>Session 3 Presentation 1 14:00-14:15 K8002-A</p>	<p>Forecasting Outpatient Visits with S-ARIMA for General Hospital</p> <p>Jong Soo Choi, KiChul Yoon, Seung-Yon Lee, Seyong Jekal and Seungyeob Doo Samsung Medical Center / Sungkyunkwan University, Seoul, South Korea</p> <p><i>Abstract</i>—Objectives: Recently, because of changes in healthcare system in Korea, demands of medical care are ever-increasing. This medical demand is also subsequently increasing the number of outpatient visits at several big tertiary general hospitals, causing problems with long waiting at clinic lobbies and staff resource planning and allocation. The purpose of this study is to predict the number of outpatient visits based on time series analysis for improving resource efficiency. Methods: Latest 3-year data of outpatient visits were extracted from a tertiary general hospital's Department of Gastroenterology in Seoul, Korea. Predictive models were established using 142 weeks of the data. The final predictive model was selected by verifying the data from the last 34 weeks. In addition, the final selected model was used to predict the number of outpatient visits over the next four weeks. The s-ARIMA method was used as the time series analysis technique, and MAPE was used to evaluate the accuracy of the prediction. Results: The final selected predictive model forecasted the number of outpatient visits during the upcoming four weeks. The MAPE was 5.59%, showing a relatively accurate prediction compared to previous studies. Conclusion: Predicting the number of outpatient visits more accurately, even though it is a social phenomenon, which cannot be fundamentally solved by predicting the number of patients, is that hospitals are able to manage resource planning and allocation more efficiently. And it is expected to provide services in a more timely manner and allow patients to receive care in a more pleasant environment.</p>
<p>Session 3 Presentation 2 14:15-14:30 K0015</p>	<p>Understanding Adoption of Electronic Medical Records: Application of Process Mining for Health Worker Behavior Analysis</p> <p>Dennis Andrew R. Villamor, Christian E. Pulmano and Maria Regina Justina E. Estuar Ateneo de Manila University, Quezon City, Philippines</p> <p><i>Abstract</i>—In the Philippine Health Insurance Company (PHIC) Advisory 04-2016, Primary Care Providers were given until the end of the year to adopt any of the certified electronic medical record providers for submission of patient profiling and patient consultations. With much emphasis on how electronic medical records can pave the way for better health care, this study presents finding on one-year usage of a certified electronic medical record in selected areas in the Philippines. The study uses a novel approach in understanding technology adoption through process mining - technique often used in Business Process Analysis (BPA). A total of 8.8 million system-generated usage logs including: Session ID, Timestamp, URL Visited, URL Source, User ID were extracted as part</p>

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	<p>of the dataset. Pre-processing techniques were performed on the data set prior to process mining. In using process mining to understand user behavior based on system-generated usage logs, one must consider: how to identify a case (i.e. how to group activities together), and how to structure your data in a way that allows the inference of real world activities and processes. Using standard adoption models shows us that adoption of early implementation of EMRs remain at basic usage with only a few users fully embracing the technology. However, use of process mining in understanding user behavior depicts actual workflow and presents adoption at a more advanced level.</p>
<p>Session 3 Presentation 3 14:30-14:45 K0038</p>	<p>Research on Social Responsibility Evaluation of Pharmaceutical Enterprises in China--Take Some International Enterprises in China as an Example</p> <p>Cheng Lang and Qian Hui Zhejiang University, Hangzhou, China</p> <p><i>Abstract</i>—In recent years, the social responsibility problems of pharmaceutical enterprises occur frequently, more enterprises have begun to pay attention to and assume social responsibility. However, there is little research on the issue of international pharmaceutical enterprises in China performing social responsibility in China from the perspective of consumers. This article builds a SIP model of social responsibility evaluation of international pharmaceutical enterprises in China from the perspective of consumers to evaluate the performance of consumer-related social responsibility of international pharmaceutical enterprises in China. The entropy method was used to obtain the comprehensive evaluation of consumer social responsibility of 16 pharmaceutical enterprises in China. Expanded the theoretical research on the social responsibility evaluation model of international pharmaceutical enterprises in China from the perspective of consumers, provided guidance and suggestions for international pharmaceutical enterprises in China to fulfill their social responsibilities, and provided consumers with an intuitive ranking of international social enterprises in China.</p>
<p>Session 3 Presentation 4 14:45-15:00 K1009</p>	<p>Personal Life Styles and Willingness to Pay on Salt Consumption</p> <p>Hsu-Ju Teng and Chi-Feng Lo Chihlee University of Technology, New Taipei City, Taiwan</p> <p><i>Abstract</i>—This study aims to investigate the relationship of personal lifestyles and willingness to pay on salt consumption. Focus groups and the survey on a sample of 649 valid Taiwanese consumers, who had purchased Himalayan salt within 1 month. Results indicated that when consumers were more concerned about luxury attribute of salt consumption, their willingness of pay is even higher; product knowledge contributes insignificant moderating effects on personal lifestyles and willingness to pay. The main contribution of this study applied the theory of food imprinting and revealed that short-term external forces (e.g., product knowledge) are ineffective in making any changes when consumers recognize a product as</p>

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	<p>high-priced. And consumer perceived the “Luxury” delivered based on their personal lifestyles and further influenced their willingness to pay on salt consumption.</p>
<p>Session 3 Presentation 5 15:00-15:15 K0024-A</p>	<p>Widespread Presence Of 2,4-D in Urine From 0-7 Years Old Children in the Central and Southern China: Concentrations, Seasonal Variation and Estimated Daily Intake</p> <p>Wenjing Song and Qi Wang Huazhong University of Science and Technology, Wuhan, China</p> <p><i>Abstract</i>—Herbicide 2, 4-Dichlorophenoxyacetic acid (2, 4-D) is widely used in agriculture and residential environments. Despite the exposure of 2, 4-D was reported in many countries, the data in China is still scarce. Particularly the data about children exposure was not reported yet. In this study, 2, 4-D was detectable in all the 492 urine samples (mostly contained 3 urine samples within 3 days) collected from children under 7 years enrolled from Wuhan, central China and Shenzhen, southern China. The geometric mean (GM) urinary concentrations of free and total 2, 4-D were 0.09 and 0.14 µg/L after specific gravity corrected. Spatial differences were found for the mean urinary total concentration between urban and rural areas in Wuhan (0.14 µg/L vs. 0.07 µg/L, $p < 0.05$). No difference was found for it between Wuhan and Shenzhen (0.14 µg/L vs. 0.16 µg/L, $p > 0.05$). Seasonal variations of the urinary total concentrations were found in Wuhan urban children, while not in Shenzhen children. There was a fair to good reproducibility within individuals with intraclass correlation coefficient was 0.68 of SG-adjusted total 2, 4-D. The GM estimated daily intake (EDI) of 2, 4-D was 5.47 ng/kg bw/day, far below the reference dose (RfD) of 2,4-D. To our knowledge, this is the first study to describe the distribution and temporal variability of urinary 2, 4-D in children from China.</p>
<p>Session 3 Presentation 6 15:15-15:30 K0040</p>	<p>Moderately Boiled Garlic Consumption Reduced Blood Pressure of Prehypertensive Adults in 5 days</p> <p>Adam Linoby, Sharifah M. S. M. Puad, Suhaila Mohamed, Stephen Bailey, Anni Vanhatalo and Andrew Jones Universiti Teknologi MARA, Shah Alam, Malaysia</p> <p><i>Abstract</i>—Recent study shows that moderately cooked garlic caused polysulfide-enhancement that increased the hydrogen sulfide bioavailability, to improve various physiological processes including blood pressure regulation. We investigated the effects of short-term cooked polysulfide-enhanced garlic (PEG) consumption on resting blood pressure (BP) in prehypertensive human adults. Following baseline BP and fractional exhaled hydrogen sulfide (FeH₂S) tests, 18 prehypertensive adults were assigned in a balanced crossover design to receive PEG (4g) and placebo (aspartame) daily for 5-days. The systolic BP, mean arterial pressure and FeH₂S levels were significantly lower ($p < 0.01$; $p < 0.02$; $p < 0.01$),</p>

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	<p>following 5 days PEG supplementation (126 ± 5 mmHg; 95 ± 4 mmHg; 8.5 ± 5.4 ppb), compared to the baseline (129 ± 4; 97 ± 3; 5.8 ± 2.3 ppb) and placebo treatment (130 ± 4; 95 ± 4 mmHg; 5.2 ± 2.6 ppb), respectively. The greater vasorelaxation responses were observed in participants with higher baseline systolic BP ($r^2 = -0.37$, $p < 0.01$). These results indicate that PEG supplementation, with dose equivalent to average-sized garlic clove, lowers BP in prehypertensive adult within a week, possibly through improving hydrogen sulfide bioavailability.</p>
<p>Session 3 Presentation 7 15:30-15:45 K0052</p>	<p>A Study of Individual Human Mobility Patterns Related to Malaria Transmission Along the Thai-Myanmar Border</p> <p>Chaitawat Sa-ngamuang, Peter Haddawy, Thomas Barkowsky, Saranath Lawpoolsri and Patiwat Sa-angchai Mahidol University, Nakhon Pathom, Thailand</p> <p><i>Abstract</i>—Malaria elimination remains a major challenge worldwide largely because human mobility can result in importing cases from areas of high incidence to areas of low incidence. Thus, understanding the role of human mobility in malaria transmission is essential. In this study, we collect mobility data from 88 participants over ten months using a smartphone application. Our study area is in northern Thailand along the border with Myanmar, from which malaria may be imported. We analyze amount of time spent in Thailand/Myanmar in areas of various land cover types, spatial distribution of movement, and network patterns of movement. We find significant differences between villages in amounts of time spent in forest areas and in Myanmar, with most travel to Myanmar occurring from two villages. We find significantly higher spatial distribution of movement in the dry season than the wet season. Our results provide important insight to help target surveillance and intervention.</p>
<p>Session 3 Presentation 8 15:45-16:00 K0063</p>	<p>Exploring the Attractive Factors of Floricultural Therapy-A Case Study on Nurses</p> <p>Wen-hui Chen, Chun-chin Chen and Chun-chin Chen Tungfang University of Design, Kaohsiung, Taiwan</p> <p><i>Abstract</i>—Since the National Health Insurance system was implemented in Taiwan in 1995, fierce competition in the health care market has led to a shortage of front-line nurses. Such nurses are frequently tasked with an overwhelming amount of complex work, which causes them to experience constant mental stress that elicits anxiety, depression, and negative emotions. Art therapy and horticultural therapy are common stress alleviation methods. Therefore, this study explored the effectiveness of floricultural therapy on relieving the mental stress of nurses. The evaluation grid method of Miryoku engineering was employed in combination with in-depth interviews to compile the attractive factors of floricultural courses. Accordingly, this study examined the experiential cognition and preferences regarding floricultural courses and the perceived therapeutic effect of such courses in highly stressed nurses. The results can be a reference for designing future floricultural therapy courses and promotion.</p>

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Session 4

Medicine Information Systems

16:10-18:40 Japan Time | August 15, 2020 Saturday

Meeting ID: 61440506927

Chaired by: Prof. William. Yu Chung Wang

Paper ID	Japan Time	Presenter's Local Time
K0019-A	16:10-16:25	10:10-10:25
K0050	16:25-16:40	12:25-12:40
K1004	16:40-16:55	13:40-13:55
K0021	16:55-17:10	09:55-10:10
K0041	17:10-17:25	16:10-16:25
K1007	17:25-17:40	16:25-16:40
K0051	17:40-17:55	15:40-15:55
K0042	17:55-18:10	04:55-05:10
K0046	18:10-18:25	05:10-05:25
K0014	18:25-18:40	04:25-04:40



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Please pay attention to the jet lag and the time is **Japan Time**

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<p>Session 4 Presentation 1 16:10-16:25 K0019-A</p>	<p>Geo-enablement of Electronic Medical Records for Type 2 Diabetes Mellitus Research</p> <p>Saad Alsharrah, Mark Daniel, Neil Coffee and Faisal Alrefaei 1 Dasman Diabetes Institute, Dasman, Kuwait 2 University of Canberra, Canberra, Australia</p> <p><i>Abstract</i>—Geographic Information Systems (GIS) has been increasingly utilized to solve public health issues through the spatial understanding of health problems and the formulation of effective policies. The geo-enablement of Electronic Medical Records (EHRs) provides the capacity to integrate health data with socio-demographic and environmental data and apply geospatial analytics for more informed understanding of the interplay between chronic disease such as Type 2 Diabetes Mellitus (T2DM), its complications and features of the social and environmental contexts where disease is most prevalent. In this study, EHR data from the Dasman Diabetes (DDI) Institute in Kuwait were geocoded. Patient data were anonymized, and a geo-masking process was used, moving patients randomly within the boundaries of their respective blocks, thus protecting privacy. The geocoded data included socio-demographics and biomarkers for approximately 8000 patients. These included data such as age, gender, height, weight, heart rate, blood glucose levels, and HbA1c. Geocoding allows for spatial associations between patients and built environment variables. In addition, detailed food purchased data was sourced from selected cooperatives to understand spatial patterns in purchasing behaviour. The food purchasing data is at the household level enabling linkage with the geocoded patient data. Early results demonstrate broad-level associations between DDI patients and physical activity infrastructure and unhealthy food purchasing behavior. Suburb level food purchasing data highlighted spatial variations in food choices. The geo-enablement of EHRs for T2DM research demonstrated the potential for understanding the spatial dimension of the problem and the capacity for detailed localized interventions, impossible without a spatial lens.</p>
<p>Session 4 Presentation 2 16:25-16:40 K0050</p>	<p>Disease Predictive Modeling for Healthcare Management System</p> <p>Khulood Nakhat, Fatima Khalique and Shoab Ahmed Khan National University of Sciences And Technology (NUST), Islamabad, Pakistan</p> <p><i>Abstract</i>—This study attempts to perform predictive analytics for decision makers in healthcare management systems using surveillance data from multiple sources for formulating intervention programs based on the results. With the availability of big data in health from multiple sources including electronic health records, it is possible to integrate data and perform near real-time predictive analysis for incoming streams of disease incidences. We use a temporal predictive Auto-Regressive Integrated Moving Averaging model (ARIMA) in combination</p>

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	<p>with a minimum size moving window to forecast the disease incidences over a data collection and integration framework. We applied our model for predictive analysis of Hepatitis C incidences in Vehari District of Punjab province in Pakistan. Model performance is evaluated based on Mean Absolute Error (MAE) and Root Mean Square Error (RMSE). The model is capable of finding trends of any disease to aid timely decision making in the healthcare management context.</p>
<p>Session 4 Presentation 3 16:40-16:55 K1004</p>	<p>Predicting Diabetes Mellitus and its Complications through a Graph-Based Risk Scoring System</p> <p>Madurapperumage A.Erandathi, William Y.C.Wang and Michael Mayo University of Waikato, Hamilton, New Zealand</p> <p><i>Abstract</i>—It is vital to estimate and predict the chronological risk rate of individuals of diabetes mellitus and its complications through non-invasive or minimally invasive methods. Data mining and machine learning techniques are applied to health data repositories to achieve this goal. Although past studies have used various combinations of technologies for the assessment and prediction of diabetes and its complications, there is a lack of attention to combining temporal data with a visual representation assessment technique, which can be widely accepted. Further, prediction of risk throughout the lifetime of an individual in a chronological manner by considering their future changes with respect to the characteristics of a similar cohort is something worth contemplating for accurate risk prediction models. We aim to introduce a simple, powerful visualization technique to self-monitoring, which will be highly beneficial in enhancing the health care management sector through empowering self-care management and policymaking. The system will effectively impact the progression of diabetes and its complications by early forecasting the risk without the aid of professional physician knowledge which would help to reduce the burden of the disease while saving the expenditures of diabetes mellitus.</p>
<p>Session 4 Presentation 4 16:55-17:10 K0021</p>	<p>Integrated Rescue System and the Use of Unmanned Aerial Vehicle Not Only for the Population Protection</p> <p>Katerina Vichova, Martin Hromada, Jarmil Valasek and Frantisek Paulus Tomas Bata University, Zlín, Czech Republic</p> <p><i>Abstract</i>—The Integrated Rescue System plays a vital and significant role in dealing with emergencies. Today, various information technologies are used to deal with emergencies, which will streamline, speed up, and simplify the intervention itself. For this purpose, this article deals with Unmanned Aerial Vehicle (UAV) = drone problematics and describes their application possibilities for the Integrated Rescue System (IRS) individual components. Drones can be used for technologies that could help all IRS entities. As a result, besides the advantages mentioned above, the safety and security of interveners will be ensured. The aim of the paper is to introduce IRS in the context of critical</p>

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	<p>infrastructure. Furthermore, the individual entities are analyzed, and their primary purpose is described. Unique activities were analyzed, and events that could be replaced by drones were determined. Based on this analysis, recommendations for individual IRS bodies were proposed in the final part.</p>
<p>Session 4 Presentation 5 17:10-17:25 K0041</p>	<p>Forecasting Tuberculosis Incidence in China using Baidu Index: A Comparative Study</p> <p>Xinyue Liang, Qinneng Xu and Ruoxi Guan Shenzhen College of International Education, Shenzhen, China</p> <p><i>Abstract</i>—Background: Tuberculosis is a common infectious disease primarily targeting the lungs and of high morality and prevalence. Efficient prediction of tuberculosis is important to counter epidemics and successfully allocate recourse. This study’s main objective is to investigate the effectiveness of using web search queries in predicting the incidence of tuberculosis in China. We conduct a comprehensive comparison on data driven methods for predicting the incidence of tuberculosis.</p> <p>Methods: Several data mining models are implemented in our study, including stepwise linear regression and SVM incorporating Baidu index (a recording of search queries on Baidu, the main search engine in China). The two methods are compared with traditional time series methods of autoregressive integrated moving (ARIMA) and seasonal ARIMA (SARIMA). In addition, to further investigate the reliability of prediction, the effectiveness of integrating the individual models is explored in our study, a hybrid model of SARIMA and SVM and Bayesian model averaging (BMA) are adopted to maximize the predictive utility of the models.</p> <p>Results and Conclusion: The experiment results show that Internet queries provide effective data sources for predicting tuberculosis, with comparable predicting ability to that of traditional time series models. It also shows that combining two or models using BMA or hybrid models can improve the prediction ability, with BMA showing by far the best results in prediction in terms of both MAPE and RSME in the 5 areas studied (Guangdong, Beijing, Tianjin and Shanghai). The findings from this study pave the way for developing accurate and timely prediction of tuberculosis cases, which is important for allocating healthcare recourses and developing strategies to counter possible future outbreaks in real practice.</p>
<p>Session 4 Presentation 6 17:25-17:40 K1007</p>	<p>Research and Design of Atrial Fibrillation Early Warning Service System Based on Mobile Internet</p> <p>Ling Yan, Zuojian Zhou, Xuhao Sun, Yihua Song and Yamei Bai Nanjing University of Chinese Medicine, Nanjing, China</p>

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	<p><i>Abstract</i>—Atrial fibrillation is closely related to hypertension. In view of the few studies on the combination of atrial fibrillation and blood pressure, an atrial fibrillation sphygmomanometer which can measure both atrial fibrillation and blood pressure simultaneously is developed. Meanwhile, a cloud platform for atrial fibrillation early warning service and a discriminant model for atrial fibrillation are built. Supported by mobile Internet, Internet of Things and cloud computing, with atrial fibrillation and hypertension as the research object, an atrial fibrillation model was established by mixing circulating neural network (RNN) and short-term memory network (LSTM). Then we applied the model to MIT-BIH Atrial Fibrillation Database and results verified that the accuracy is as high as 98.9%. Finally, to make the system more comprehensive, we developed patient-side and physician-side APPs, including atrial fibrillation recognition, physician teleservice and health care recommendations, and doctors monitor patient synopsis in real time and provide personalized medical services.</p>
<p>Session 4 Presentation 7 17:40-17:55 K0051</p>	<p>A Study of Expert/Novice Perception in Arthroscopic Shoulder Surgery</p> <p>Myat Su Yin, Peter Haddawy, Benedikt Hosp, Paphon Sa-ngasoongsong, Thanwarat Tanprathumwong, Madereen Sayo, Supawit Yangyuenpradom and Akara Supratak Mahidol University, Nakhon Pathom, Thailand</p> <p><i>Abstract</i>—Arthroscopic shoulder surgery is an advanced orthopedic surgical procedure, which is particularly challenging due to the complex anatomy of the shoulder, and tight spaces for navigation, which also limits the view from the arthroscope. In carrying out arthroscopy, the ability to quickly and effectively navigate through the joint to reach a desired location is essential. Novices often experience confusion in trying to triangulate the information from arthroscopy output with the background knowledge of anatomy while orienting and navigating the instruments. In this paper, we report on the results of the first cadaveric eye-tracking study of arthroscopic surgery in which we investigate differences in perception between experts and novices. Novices’ perception is analyzed with cognitive load analysis throughout the procedure and specifically, during the portions of the procedure in which subjects are observed to be confused. In investigating such portions, the gaze data analysis is supplemented with head rotations and acceleration information from gyroscope and accelerometer sensors from the eye tracker. We also use the gathered eye tracking metrics to construct a model to classify subjects into expert/novice. We find statistically significant relations between head movement as well as pupil diameter and periods of confusion. We identify a subset of the metrics that we use to build a simple classifier that is able to distinguish between novices and experts with accuracy of 84%.</p>
<p>Session 4 Presentation 8 17:55-18:10</p>	<p>A Cloud Based Big Data Health-Analytics-as-a-Service Framework to Support Low Resource Setting Neonatal Intensive Care Unit</p>

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K0042	<p>Meghana Bastwadkar, Carolyn McGregor and S. Balaji Ontario Tech University, Oshawa, Canada</p> <p><i>Abstract</i>—Critical care patients are monitored by a range of medical devices collecting high frequency data. New computing frameworks and platforms are being proposed to review and analyze the data in detail. The application of these approaches in a low resource setting is challenged by the approaches used for data acquisition. Software as a Service (SaaS) is a form of cloud computing where a cloud-based software application enables the storage, analysis and visualization of data within the cloud. A subset of SaaS is Health Analytics as a Service (HAaaS), which provides software to support health analytics in the cloud. The objective of this study is to design, implement, and demonstrate an extendable big-data compatible HAaaS framework that offers both real-time and retrospective analysis where data acquisition is not tightly coupled. A data warehousing framework is presented to facilitate analysis within a low resource setting. The framework has been instantiated in the Artemis platform within the context of the Belgaum Children Hospital (BCH) case study. Initial end-to-end testing with the Nellcor monitor (bedside monitor at BCH), which was not connected to any human, was completed. This testing confirms the functionality of the new Artemis cloud instance to receive data from test device using an alternate data acquisition approach.</p>
Session 4 Presentation 9 18:10-18:25 K0046	<p>Dengue Spread Information System (DSIS)</p> <p>Karan Bhanot, Dominic Schroeder, Isaac Llewellyn, Nicholas Luczak and Thilanka Munasinghe Rensselaer Polytechnic Institute (RPI), Troy, USA</p> <p><i>Abstract</i>—Mosquitoes are responsible for transfer of many vector-borne diseases including Malaria, Zika and Dengue. These amount to 17% of the total infectious diseases across the globe, leading to a death toll approximately 700,000 annually. Dengue is a preventable viral infection transmitted by Aedes mosquitoes. However, over the past 50 years, the number of dengue cases has increased by a whopping 30-fold. Every year an approximately 500,000 people are admitted with severe dengue, with an estimated 40,000 deaths. In several countries in south American continent and Asia, dengue is one of the leading causes of death. It is mainly found in tropical and sub-tropical regions, particularly surrounding urban and semi-urban areas. Historically, there has been an intensive increase in the number of dengue cases from 2000-2010 and, if adequately explored, essential information can be retrieved.</p> <p>Our work involves the development of the Dengue Spread Information System (DSIS), a geographic-health information system designed to highlight the spread of dengue cases in Iquitos, Peru, and San Juan, Puerto Rico from 1990 to 2013. The application is aimed at citizens, travelers, policymakers and researchers to analyze and interpret the change in risk factors leading to dengue outbreaks and</p>

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	develop essential early warning applications and policies to counter future dengue outbreaks.
Session 4 Presentation 10 18:25-18:40 K0014	<p>Implementation of a Health Information System to Support the Screening and Surveillance of Suicidal Behaviours</p> <p>Juan Martínez-Miranda, Fernando López-Flores, Antonio Palacios-Isaac, Liliana Jiménez, Luis García Medina, Rosa M. Moreno-Robles and Giovanni Rosales</p> <p>Centro de Investigación Científica y de Educación Superior de Ensenada, T epic, Mexico</p> <p><i>Abstract</i>—Suicidal behaviour is one of the leading causes of injury and death worldwide. In order to design and implement effective suicide’s prevention strategies, it is important the timely identification of individuals at risk, as well as the systematic collection and analysis of suicide-related data. In this paper, we describe the main functionalities of a health information system developed to support general practitioners and mental health specialists with the screening of suicidal behaviours, the management of the follow-up process and the analysis and visualisation of the collected data for surveillance purposes. We also present the initial results obtained after the deployment of the system in six public health care institutions during the first eight months of use.</p>

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Session 5

Healthcare Quality Management 2

16:10-18:25 Japan Time | August 15, 2020 Saturday

Meeting ID: 64229029839 | Chaired by: Prof. Chi-Jie Lu

Paper ID	Japan Time	Presenter's Local Time
K8020	16:10-16:25	15:10-15:25
K8023	16:25-16:40	15:25-15:40
K8013	16:40-16:55	15:40-15:55
K8024	16:55-17:10	09:55-10:10
K1005	17:10-17:25	09:10-09:25
K8004	17:25-17:40	15:25-15:40
K0002	17:40-17:55	09:40-09:55
K8021	17:55-18:10	03:55-04:10
K0035	18:10-18:25	10:10-10:25

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<p>Session 5 Presentation 1 16:10-16:25 K8020</p>	<p>An Evolutionary Analysis of Hospital Payment System Strategies Based on County Hospitals-Purchasers Game</p> <p>Yufei Hu and Lianghua Chen Southeast University, Nanjing, China,</p> <p><i>Abstract</i>—Providing rural residents with effective and affordable health services and financial protection against health risks are more or less problematic for developing countries with massive rural populations. The retrospective payment system (RPS) incurs excessive treatments, causes extreme waste of scarce medical resources and whether the payment system reform by converting to the prospective payment system (RPS) could achieve a desirable triple-win status. In this paper, a county hospital/rural medicare agency evolutionary game theoretical model in NW small-world network with EWA learning model and a corresponding computer model is formulated. We study the diffusion, conversion, and optimization of PPS and RPS, and hospitals' selection of treatments. The results show that PPS itself is a triple-win payment system that could eliminate excessive treatments, but cannot guide hospitals to choose the right intensity of treatments. The conversion from RPS to PPS relies on agencies' strict supervision, hospitals' expectation adjustment speed, and emphasis on future purchaser reimbursement. In order to optimize payment systems, the more hospitals emphasize patients' welfare, the more likely they are to provide appropriate treatments in intensity and moderation. It suggests a further need for developing countries to pursue various payment system reforms from PPS to RPS to pave the way for attaining mutual interests of three parties, especially providing appropriate treatments for rural residents.</p>
<p>Session 5 Presentation 2 16:25-16:40 K8023</p>	<p>Accessibility Analysis of Hospitals Medical Services in Urban Modernization</p> <p>Ying Sun and Tao Fan Wuhan University of Technology, Wuhan, China</p> <p><i>Abstract</i>—The construction of medical infrastructure is a significant part of urban modernization. The accessibility of medical resources reflects the ability to respond and decentralize control in emergency management of public health emergencies. An improved gravity model is used to evaluate the accessibility of urban medical services based on the hospital and population distribution in a typical metropolis, and conducts a spatial analysis of control areas of urban public health emergency management, so as to identify risk points and propose improvements.</p>

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<p>Session 5 Presentation 3 16:40-16:55 K8013</p>	<p>The High-end Health Screenings Process Optimization to Improve Healthcare Service Quality</p> <p>Ming-Shu Chen and Kun-Chih Wu Oriental Institute of Technology, Taipei, Taiwan</p> <p><i>Abstract</i>—In this age of global aging, issues about health care and health management have attracted growing attention. Currently, the number of the elderly in Taiwan exceeds 12% of the total population, almost up to 14% which is defined as the indicator of an “aged society” by the World Health Organization (WHO). On the other hand, health care was listed as one of the four newly emerging industries according to the Executive Yuan’s visions on economic development in 2015. It was estimated that the health care service industry would have an annual growth rate higher than 17% and a maximum output value of 18 billion USD. On this account, this study collects the actual high-level health examination data and applies different strategies to analyze the data. To find the best scheduling in the high-end health screening process to improve service quality is very important. The aim of this study focuses on static problems. With the actual limits of health examination considered, all customers’ high-level health screening schedules of the day are planned before health examination every day to minimize the waiting time of both physicians and customers. Through algorithm-based calculation, the order for seeing the doctor is shown to customers to avoid unnecessary waiting and enhance customer satisfaction.</p>
<p>Session 5 Presentation 4 16:55-17:10 K8024</p>	<p>On Architecture of Body in Numbers Exercise and Wellness Health Strategy Framework</p> <p>Petr Brůha, Roman Mouček and P. Volf, L. Šimečková and O. Šťáva University of West Bohemia, Pilsen, Czech Republic</p> <p><i>Abstract</i>—They are many risk factors decreasing overall human physical and cognitive performance and increasing incidence of chronic diseases. It is very beneficial for any society to map, discuss and cope with these factors. This can be supported and evaluated by designing, developing, testing and using suitable self-management health systems. One of these systems is the BodyInNumbers exercise and wellness health strategy framework that allows experimenters to collect various heterogeneous health related data in a highly organized and efficient way. Thanks to its success and daily use, new requirements related to better security, scalability and maintainability of its architecture have emerged. The aim of this work is to present advances and changes in the architecture of the BodyInNumbers health strategy framework mainly focusing on new definition of user roles, optimization of the system deployment, and orchestration of the system components. As a proof of concept, a Kubernetes cluster prototype has been used to demonstrate the improved architectural solution.</p>

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<p>Session 5 Presentation 5 17:10-17:25 K1005</p>	<p>Improving Emergency Healthcare Response using Real-Time Collaborative Technology</p> <p>Ifiok J. Udo and Moses E. Ekpenyong University of Uyo, Uyo, Nigeria</p> <p><i>Abstract</i>—Harnessing geospatial technologies (GPS, GIS, internet mapping and remote sensing) can promote collaboration of humans, environmental, and healthcare resources—for real-time decision support in emergency healthcare scenarios. Oftentimes, high death rates are recorded by emergency rescue workers due to infrastructure deficit and sparsity of ambulatory services within the patients’ location. Also, acute shortage of health personnel may pose great risk to patients requiring emergency healthcare services, as limited knowledge of healthcare data can prevent proactive, just-in-time response to emergency, and dearth of appropriate healthcare policies. This study therefore proposes a geospatial recommender framework that connects (in the loop) patients, with healthcare providers and other relevant stakeholders; to exploit and filter in context, emergency healthcare information and knowledge—for enhanced response strategy that minimizes fatalities among patients. We examine case study data within the African context and discuss infrastructural challenges, opportunities and design implications, to demonstrate the feasibility of our framework. The immediate benefit of the framework is enhanced specialty care for home-bound patients or in emergency cases where distance appears prohibitive. Our strategy can certainly scale up complex healthcare interventions to large populations, as a new paradigm for evidence-based intervention with state-of-the-art technology for optimized services is guaranteed.</p>
<p>Session 5 Presentation 6 17:25-17:40 K8004</p>	<p>Related Factors of Discontinue Kangaroo Mother Care at Home after NICU discharge</p> <p>Suni Hariati, Retno Sutomo, Lely Lusmilasari and Andi Dwi Bahagia Febriani Universitas Hasanuddin/Pediatric Nursing, Makassar, Indonesia</p> <p><i>Abstract</i>—Background: LBW infant suffered a health problem in the early days after birth and continue after hospital discharge. Continued KMC implementation is needed to enhance neonatal survival. This study is aimed to know the description and the influence factors in KMC implementation at home after hospital discharge. Method: A prospective cohort study is used in this study. 49 mothers of LBW infant were participated in this study using a convenience sampling method during the study period August 2018 to March 2019 on one largest hospital in one city in Indonesia. Result: several significant factors that influenced a continuing KMC implementation at home in the first day after hospital discharge were mother KMC skill competency before discharge (p 0.006 and OR 6.250), Infant discharge weight (p 0.001 and OR 8.914) and length of hospital stay (p 0.015 and OR 4.433). Several stop reason by 36 mothers on 14</p>

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	<p>days after hospital discharge included baby uncomfortable and fussy 8 (16.33%), the baby weight enhanced 9 (18.37%), the baby health going well 2 (4.1), busy 9 (18.37%), and never did KMC since at hospital 8 (16.33%). Conclusion: the education, health care provider support and continue follow-up at home are needed for enhanced the mother's responsibility and awareness to doing KMC at home.</p>
<p>Session 5 Presentation 7 17:40-17:55 K0002</p>	<p>Hybrid Collaborative Model for Evidence-Based Healthcare Practice</p> <p>Moses E. Ekpenyong, Samuel S. Udoh, Mercy E. Edoho, Ifiok J. Udo, Edward N. Udo, Temitope J. Fakiyesi and Samuel B. Oyong University of Uyo, Uyo , Nigeria</p> <p><i>Abstract</i>—Incorporating evidence-based healthcare practice would improve patients' response and safety and make patients partners in current healthcare practice. This partnership offers patients the opportunity to guide safety initiatives through data access by clinicians and encourage accurate healthcare while alleviating potential medical errors. In this paper, we promote a collaborative model that integrates interrelated concepts for responsive healthcare services that target patient-centred healthcare—with healthcare providers and relevant stakeholders in the loop. The implementation strategies for fulfilling the desired healthcare outcomes as well as design implications are also provided. The model is expected to offer transformative impact that would drive our weak healthcare system for improved healthcare, to complement the huge dearth in healthcare services. The outcome is shared prosperity and health, and a mainstream of the people into healthcare decision making for informed policy planning and implementation.</p>
<p>Session 5 Presentation 8 17:55-18:10 K8021</p>	<p>Characterization of Risk Factors Associated with Extensively Multidrug-Resistant Tuberculosis in Public Health Institutions</p> <p>Mauricio Mamani, Mario Chauca and Edward Huamani Barranco Universidad Privada San Juan Bautista, San Borja, Peru</p> <p><i>Abstract</i>—Objective: To determine the risk factors associated with extensively multidrug-resistant tuberculosis in multidrug-resistant patients in the DIRIS Lima Sur, 2017. Type and design: The type of research was observational and analytical, retrospective case and control. The population consisted of a total of 158 patients who received treatment for MDR-TB between 2016 and 2017. The sample consisted of 24 cases diagnosed with extensively resistant pulmonary tuberculosis (XDR-TB) and 48 controls with MDR-TB. The data collection technique was the survey and the instrument was a questionnaire for both groups (case-controls). Results: 5 internal and external risk factors associated with XDR-TB were identified. Among the internal factors associated at the bivariate level were: drug consumption, having received TB/MDR-TB treatment previously, having received TB/MDR-TB treatment less than one year, having</p>

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	<p>failed to the primary and individualized scheme for TB/MDR-TB ($p < 0.05$); and the multivariate analysis confirmed the influence of the factor "having failed to the primary and individualized scheme for TB/MDR-TB". Among the most associated external factors at the multivariate level were: having relatives who died of XDR/TB-MDR and having neighbors or friends in the neighborhood who died of TB ($p < 0.05$). Conclusion: It was concluded that the factors: "failure to the primary and individualized scheme for TB-MDR-TB" and "having relatives who died of XDR-TB-MDR-TB" are of risk associated with the presence of extensively resistant TB, controlling the effect of risk factors prevents the development of TB.</p>
<p>Session 5 Presentation 9 18:10-18:25 K0035</p>	<p>Challenges of Assimilation of e-Health Systems in Healthcare: Insights into Activity Theory</p> <p>Patrick Shabaya, Ismail Ateya and Gregory Wanyembi Strathmore University, Nairobi, Kenya</p> <p><i>Abstract</i>—Healthcare organisations often adopt electronic health (e-Health) systems with the hope that they can improve the quality and reduce the cost of providing healthcare services. However, literature has shown mixed results concerning the benefits of e-Health systems for healthcare providers. In order for organisations to achieve the benefits of e-Health systems, they need to first adopt and assimilate these technologies into their work practices. Past studies have indicated limited assimilation of e-health systems and have associated it to the complex collaborative nature of clinical workflow processes. This paper presents challenges that inhibit the assimilation of e-Health systems in an emerging economy explored in terms of context and contradictions within the Activity Theory framework. The study explored four healthcare organisations in Nairobi city in Kenya. Results obtained indicated that assimilation is hindered by unresolved contradictions brought about by the interaction between different components in the clinical activity. In order for healthcare organisations to improve the assimilation and subsequent benefits of e-Health systems, they will need to identify and resolve these contradictions.</p>

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Keynote Speech&Author Presentations

09:30-19:00 Japan Time | August 16, 2020 Sunday

Meeting ID: 61440506927

	Event	Name	Japan Time	Presenter's Local Time
Morning	Author Presentations	Session 6	09:30-11:00	Page 55-59
	Break Time: 11:00-11:10			
	Author Presentations	Session 7	11:10-13:10	Page 60-66
Break Time: 13:10-13:30				
Afternoon	Keynote Speech IV	Prof. Andrey Krylov	13:30-14:00	07:30-08:00
	Author Presentations	Session 8	14:00-16:15	Page 68-72
	Break Time: 16:15-16:30			
	Author Presentations	Session 9	16:30-19:00	Page 73-79
	Closing Ceremony			



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Session 6

Computational Intelligence Method 1

09:30-11:00 Japan Time | August 16, 2020 Sunday

Meeting ID: 61440506927

Chaired by: Prof. Ting-Ying Chien and Dr. Hsien-Wei Ting

Paper ID	Japan Time	Presenter's Local Time
K0047-A	09:30-09:45	20:30-20:45
K0018	09:45-10:00	08:45-09:00
K0023	10:00-10:15	09:00-09:15
K0032	10:15-10:30	10:15-10:30
K0036	10:30-10:45	09:30-09:45
K0044	10:45-11:00	09:45-10:00



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<p>Session 6 Presentation 1 09:30-09:45 K0047-A</p>	<p>A Novel Pupillometric-Based Application for the Automated Diagnosis of ADHD Using Machine Learning</p> <p>William Das and Shubh Khanna Hunter College High School, New York, USA</p> <p><i>Abstract</i>—Attention-deficit/hyperactivity disorder (ADHD) is the most pervasive neurobehavioral disorder among children and adolescents. ADHD affects more than 6 million children and adolescents across the world, with a prevalence rate of 5-8%. It is severely debilitating for affected individuals, as it hinders socio-emotional development and impairs academic and occupational outcomes. The timely and accurate diagnosis of ADHD is critical in order to mitigate its neurobehavioral effects. However, current clinical diagnosis is subjective, time-consuming, and inaccurate, as assessments are based solely on qualitative observations of perceived behavior and often last multiple hours. This subjectivity results in inaccurate diagnoses: a 2010 study found that more than 20% of children are annually misdiagnosed with ADHD. A more accurate and accessible method of detection is therefore critical to ensure that all children can be properly diagnosed and given necessary treatment regimens. Oculomotor paradigms, particularly pupil-size dynamics, have recently proven adept in tracking the state of the brain norepinephrine system, where neurotransmissions are heavily disrupted by ADHD. This research proposes a novel machine learning-based method to analyze pupil-size dynamics data from ADHD positive and negative subjects as an objective biomarker to characterize the disorder. Pupillometric features incorporating variation in pupil dilation velocity and acceleration were engineered and found to be statistically significant in discriminating between ADHD positive and negative subjects. An evaluation of state-of-the-art machine learning algorithms determined that the Naive Bayes classifier yielded the greatest accuracy and cross-validation rate. The model was tested on an isolated testing set, classifying ADHD with 0.9412 accuracy, 0.9679 average precision-recall rate, 0.8867 5-fold cross-validation rate, and .9545 AU-ROC. A web application that implements this classifier and utilizes the standard camera of a computer was then developed to administer an automated test to diagnose ADHD. As a subject completes a visuospatial working memory task, the pupil is captured in real-time using convolutional neural networks, circle hough transform methods, and custom ray tracing algorithms. Pupil biometrics are then inputted into the optimal Naive Bayes classifier, outputting a probability of diagnosis and medical advice. This innovative application is the first to use pupil dynamics as a biomarker to assess and recognize ADHD in subjects. Incorporating machine-learning based analyses of pupillometrics, the developed diagnostic application offers a time-efficient, accurate, and accessible technical solution to an issue that prevents many from receiving proper treatment for ADHD, paving the path for equitable and effective diagnoses.</p>
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<p>Session 6 Presentation 2 09:45-10:00 K0018</p>	<p>A Low-Cost Method for Designing and Updating a DRGs Classifier Based on Machine Learning</p> <p>Chenhao Fang, Zhenzhou Shao and Chao Wu Zhejiang University, Hangzhou, China</p> <p><i>Abstract</i>—Diagnosis-related groups (DRGs) is a payment system that can effectively solve the problem of excessive increases in health care costs. When DRGs was implemented in China, due to the complex medical environment, the design and update cost of traditional rules-based DRGs classifier became extremely high. In this paper, we proposed a low-cost method for designing and updating a DRGs classifier based on machine learning. This method first uses a rule-based classifier to classify cases roughly according to their major clinical features. With the assistance of the decision tree algorithm, this rule-based classifier can be easily designed and updated by experts. Then, an XGBoost (Extreme Gradient Boosting) classifier based on the one-vs-all (OVR) strategy is trained by a large number of cases labeled by experts or existing DRGs classifier, which will classify cases to each DRG. In the experiments, we proved that the method can utilize cases generated and labeled by China Healthcare Security Diagnosis Related Groups (CHS-DRG) classifier to design a classifier with the performance similar to the CHS-DRG classifier. Updated by low cost, the classifier performance can constantly improve after putting into use.</p>
<p>Session 6 Presentation 3 10:00-10:15 K0023</p>	<p>Applying Deep Learning for Prediction Sleep Quality from Wearable Data</p> <p>Dinh-Van Phan, Chien-Lung Chan and Duc-Khanh Nguyen Yuan Ze University, Taoyuan, Taiwan</p> <p><i>Abstract</i>—Sleep is not only very important for physical health but also the mental health of human, that was addressed by many previous studies. Today, with the development of technology, which opens in the application for improving quality of sleep, such as wearable devices, artificial intelligence, neural network. In this study, we applied deep learning (DL) neural networks and smart wearable devices to predict the quality of sleep. The data was collected on students (mean age = 20.79) during 106 days by Fitbit Charge HR™ device. The results showed DL models could predict sleep quality base on physical activities in awake time.</p>
<p>Session 6 Presentation 4 10:15-10:30 K0032</p>	<p>Applying Propensity Score and Support Vector Machine to Construct a Predictive Model for Heart Disease</p> <p>Hsueh-Yi Lu National Yunlin University of Science and Technology, Douliou, Taiwan</p> <p><i>Abstract</i>—Exercise ECG is currently the best way for diagnosing heart disease, but it is not suitable for everyone. This study used data mining to establish a model to predict the risk of heart disease. Maximum oxygen uptake (VO₂max)</p>

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	<p>was used as an indicator of determine that the person was a high-risk or low-risk heart disease patient. Data of the National Health and Nutrition Examination Survey from the United States were used in this study. Due to scattered distribution of the data, which diminished the prediction performance, this study proposed a novel method to stratify data with the propensity scores. The subsets of data were trained by the support vector machine to establish the prediction model. The results of this study showed that the model had an AUC of 0.899. Our model can make a more accurate prediction to identify whether a patient has a higher risk in heart disease.</p>
<p>Session 6 Presentation 5 10:30-10:45 K0036</p>	<p>Performance Evaluation of Convolutional Neural Network Architectures for Diagnosis of Childhood Pneumonia</p> <p>Christian Michael C. Qui and Patricia Angela R. Abu Ateneo de Manila University, Quezon City, Philippines</p> <p><i>Abstract</i>—Pneumonia, a bacterial or viral infection of the lungs that causes the inflammation of the air sacs, is one of the leading causes of mortality of children in the world. Chest x-rays, one of the golden standard tools in determining pneumonia, is mainly used to detect malignancy in the lungs. However, the process of analyzing may be time-consuming for the radiologist, and costly to hospitals. Inter-observer variability with the diagnosis is very high since childhood pneumonia can be difficult to diagnose amongst radiologists. Considering that the design of convolutional neural networks makes it suited to process spatially distributed input such as images, the application of convolutional neural networks trained with chest X-rays to automate the diagnosis of pneumonia is viable. This study evaluates the performance of four well known architectures in literature using a childhood pneumonia dataset: (1) VGGNet, (2) ResNet, (3) DenseNet, and (4) AlexNet. Based on our simulations, VGGNet obtained the highest accuracy and sensitivity, followed by ResNet, which obtained the highest specificity, DenseNet, and AlexNet. Using gradient-weighted class activation to validate the learnt features, we observed that sufficiently deep architectures can effectively learn the features of pneumonia. In addition, the increase in depth improves the information flow at the cost of computational time, which is evident in DenseNet.</p>
<p>Session 6 Presentation 6 10:45-11:00 K0044</p>	<p>Selection Range of the Control Weighting Parameter for A Closed-Loop Artificial Pancreas Based on Generalized Predictive Control</p> <p>Wenping Liu, Ting Chen and Haoyu Jin Guangdong Food and Drug Vocational college, Guangdong, China</p> <p><i>Abstract</i>—The artificial pancreas (AP) system is a promising approach to maintain the blood glucose concentration (BGC) of type 1 diabetes (T1D) patients in a euglycemic range (70–180 mg/dl). We have developed an AP based on generalized predictive control (GPC) and found that its parameter settings should</p>

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be different for adult and adolescent patient groups, like softening factor. Here, the selection range of another important factor, control weighting parameter (λ), was studied for adult and adolescent group, respectively. Tests with the UVA/Padova type 1 diabetes mellitus simulator (T1DMS) approved by the US Food and Drug Administration (FDA) showed that the valid and safe range of λ for the GPC controller with the adult patient group was 2 to 8. But it should be cautious to select a λ value for a GPC-based AP with adolescent patients because their hypoglycemia risks rapidly increased with the increasement of λ . There was a much smaller selection range of λ for the GPC controller with the adolescent patient group and 2 was proposed as a valid and safe value here. Those results are helpful to the AP design and diabetes treatment, especially for adolescents with T1D.

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Session 7

Computational Intelligence Method 2

11:10-13:10 Japan Time | August 16, 2020 Sunday

Meeting ID: 61440506927 | Chaired by: Prof. Tian-Fu Lee

Paper ID	Japan Time	Presenter's Local Time
K1034	11:10-11:25	10:10-10:25
K1035	11:25-11:40	10:25-10:40
K1036	11:40-11:55	10:40-10:55
K0022	11:55-12:10	09:55-10:10
K1023	12:10-12:25	09:10-09:25
K0045	12:25-12:40	08:55-09:10
K1010	12:40-12:55	04:40-04:55
K1027-A	12:55-13:10	11:55-12:10



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<p>Session 7 Presentation 1 11:10-11:25 K1034</p>	<p>A Cryptanalysis of Trustworthy Electronicvoting using Adjusted Blockchain Technology Ming-Te Chen, Chia-Chu Chen and Tsung-Hung Lin National Chin-Yi University of Technology, Taichung, Taiwan</p> <p><i>Abstract</i>—The voting process and results and the trust of voters are very important issues in current modern society. When voters could trust that the voting results are valid, people are willing to trust this voter will serve for them dealing with issues such as national security, education, and economics in the future. Electronic voting is an efficient method that could help people who could not vote in a limited period. Besides, it also solves the problem of long voting time due to many voters or more complicated voting steps. Although the voting machine could perform a record of votes and voting calculations, it does not require humans to handle a lot of above voting works. Nowadays, electronic voting has become important research. However, there are too many assumptions and institutions which are often added in this research area. It might become to be unpractical when this voting research is applied to real society. Hence, we thought that blockchain might be a good solution for electronic voting research. Nevertheless, how to apply blockchain to protect people's privacy, anonymity, and voting rights still needs to be discussed in current days. In this paper, we proposed cryptanalysis on a trustworthy electronic voting scheme with blockchain and find out that there are some problems in their proposed scheme.</p>
<p>Session 7 Presentation 2 11:25-11:40 K1035</p>	<p>Efficient Signature Scheme Using Extended Chaotic Maps for Medical Imaging Records Tian-Fu Lee, Ting-Shun Kung and I-Pin Chang Tzu Chi University, Hualien, Taiwan</p> <p><i>Abstract</i>—Digital security issues such as medical records, diagnostic certificates, medical images, etc. in the medical community have gradually been paid attention to. Nowadays, encrypting and signing electronic medical records including medical imaging records still have to rely on time-consuming exponential computations. Generally, medical image files are often larger and quite different from electronic medical text record file in characteristic, size and format. Recently, the chaotic map operation has been discovered to be superior to modular exponential or scalar multiplications on an elliptic curve. The extended chaotic maps also provide the characteristics of semi-group, commutative property, and the discrete logarithm problem, and thus are suitable for the development of asymmetric cryptosystems. This study develops a signature scheme based on extended chaotic maps that is suitable for medical imaging records. The proposed signature scheme not only provides the properties of digital signatures, including authentication, unforgeability and non-repudiation, but also is more efficient than</p>

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	the related signature mechanism used in medical institutions today.
Session 7 Presentation 3 11:40-11:55 K1036	<p>Cross-domain Design of Blockchain Smart Contract for Library and Healthcare Privacy</p> <p>Yu-Jie (Jessica) Kuo and Jiann-Cherng Shieh National Taiwan Normal University, Taipei, Taiwan</p> <p><i>Abstract</i>—The blockchain technology designed by information security experts empowers in library service and healthcare service via smart contracts. Advanced blockchain technology provides a mechanism for smart contracts. Through intelligent threshold design and the open and tamper-proof nature of the blockchain, smart contracts have become a new generation of information security technology. In the next-generation library services, traditional borrowing materials from the library have evolved into a limited-time sharing service for electronic materials. These electronic materials have various loan periods and sharing time-varying by different borrower privileges. To disseminate library information more effectively and collect accurate library data, this study designs a smart contract of a patron centric account. The smart contract automatically triggers the loan period and extends this mechanism to the design of a personal health privacy sharing protocol for improving the one-time authorization sharing mechanism. As a result, this study may provide blockchain smart contract designs shared by library information and healthcare through cross-domain consideration and scheme.</p>
Session 7 Presentation 4 11:55-12:10 K0022	<p>The Association of Sodium Intake on Sleep Quality and Quality of Life of Hill Tribes in Chiang Rai Province, Northern Thailand</p> <p>Phatcharin Winyangkul, Anusara Pongjanta and Watcharapong Ruankham Chiang Mai University, Chiang Mai, Thailand.</p> <p><i>Abstract</i>—Cross-sectional research aimed to assess the prevalence and identifying the association between sodium intake, sleep quality and the Quality of Life (QoL) among hill tribes in Chiang Rai Province. Stratified Random Sampling was used to recruit 2,831 participants from eight hill tribes group. The prevalence of sodium intake more than 2,000 mg/day found that 90.67%. The Pittsburgh Sleep Quality Index (PSQI) reported that half of them (50.6%) had poor sleep quality and most of them had a medium level of quality of life 72.5% (2,054 persons). The univariate analysis found that four factors were significantly associated with sodium intake: Adding sauce, adding seasoning powder, PSQI, QOL respectively. The multiple logistic regression analysis revealed the only low quality of life can predict sodium consumption. This research shows that they should have to receive intervention to reduce sodium intake and emphasize hill tribe population of the low quality of life to find health care alternatives.</p>
Session 7 Presentation 5	<p>Enhancing Decision Making with Deep Reinforcement Learning in a Context of Novel Coronavirus Outbreak - an Example in Emergency Department</p>

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<p>12:10-12:25 K1023</p>	<p>Honwei Jiang, William Yu Chung Wang, Tiong-Thye Goh and Jie Zhu University of Waikato, Hamilton, New Zealand</p> <p><i>Abstract</i>—Physicians in hospitals are expected to improve treatment outcome and reduce health care costs. Information systems have been widely adopted in hospitals but not been properly integrated to provide information for decision support. The objective of this research is trying to validate the feasibility of enhancing hospital resource planning system in decision support by utilizing data stored in multiple systems in the hospital with a deep reinforcement learning approach to assist medical practitioner making a more accurate and efficient decision. Following the Design Science Research Method, this research is going to build an artefact to utilize data from electronic health record (EHR) and hospital resource planning (HRP) to provide medical decision support in the emergency department setting.</p>
<p>Session 7 Presentation 6 12:25-12:40 K0045</p>	<p>Multi-label Topic Classification of Patient Generated Content in a Breast-cancer Community Forum</p> <p>Athira Balakrishnan, Sumam Mary Idicula and Josette Jones Cochin University of science and Technology, Kochi, India</p> <p><i>Abstract</i>—The research community has been noticing the importance of the online forums in healthcare in understanding the nuances of health-related problems. Breast Cancer is the most common malignance among women worldwide and its survival rate is steadily increasing thanks to early diagnosis and timely and effective treatment. Still how they manage the disease and maintain the quality of daily life are worth understanding. And it is in this context that the online posts of patients with breast cancer, discussing several topics, become patient generated content. The multi-label nature with these posts arising out of the combined contents of these posts can bring out a multitude of divulging conclusions. The resulting classification issues of these online posts under various categories of topics is examined in the present work. A semi-supervised multi-label classification, followed by refinement of multiple assignments of labels based on fuzzy logic and a neighborhood technique is proposed in the paper. Multiplicity of labels, occurs during the assignment of labels to clusters based on proximity. While extending the refined label set to a greater number of unlabeled posts clustered on the basis of proximity, it is observed that the proposed method could bring out more information on the description of posts. The results thus convey that the most discussed topic in the posts is about diagnosis, along with tangential reference to adverse drug effect, presumably to offer support in terms of information or viewpoint. The results show how the diverse nature of multiple labels can be effectively harnessed to draw conclusion from the potential of social media posts of patients' experience in critical health problems.</p>

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<p>Session 7 Presentation 7 12:40-12:55 K1010</p>	<p>Mining the Human Metabolome for Precision Oncology Research</p> <p>Mercy E. Edoho, Moses E. Ekpenyong, Aliu B. Momodu and Geoffery Joseph University of Uyo, Uyo, Nigeria</p> <p><i>Abstract</i>—Access to clinical data is critical for advancing translational research; but regulatory constraints and policies surrounding the use of clinical data often challenge data access and sharing. Mixed medical datasets (structured and unstructured) are increasingly dominating the clinical information space, hence, demanding AI-driven techniques such as Natural Language Processing—to re-organize them for effective usage. This paper excavates the HMDB (Human Metabolome Database), for efficient knowledge mining, supported by diversely certified oncology physicians and pharmacists’ contributions. We propose a novel taxonomy for knowledge representation and establish a universe of discourse for disease clustering and prediction. Excavated data include metabolites and their respective concentration values, age, gender, as well as gene and protein sequences, of normal and abnormal patients. These data were then merged to form an AI-ready ‘Omic’ technology datasets. Preliminary results reveal that the proposed AI-ready datasets would aid precision oncology research by adding quality analysis to the present HMDB, and for explaining the variations in concentration values of cancer patients.</p>
<p>Session 7 Presentation 8 12:55-13:10 K1027-A</p>	<p>Using Machine Learning Classification Methods for Predicting Hepatocellular Carcinoma</p> <p>Mao-Jhen Jhou, Tian-Shyug Lee, Chi-Jie Lu, Chih-Te Yang and Chien-Chih Wang Fu Jen Catholic University, New Taipei City, Taiwan</p> <p><i>Abstract</i>—Background: Hepatocellular carcinoma (HCC) is the most frequent malignant neoplasm, and early detection can improve people's chances of surviving HCC. But the early diagnosis of HCC is difficult and the true cause of liver cancer-relevant risk factors is not as clear as other cancers. HCC is common cancer treated with multi-modality. The combinations of modalities are numerous and complex. Clinical practice guidelines and rules have already been proven in many studies. However, the hypotheses of these studies came from physicians’ and experts’ experiences and observations. To date, there are no standardized screening programs. The literature emphasizes that a delay in diagnosis increases mortality rates, recurrence rates, and metastasis. Data mining, which involves the retrieval and analysis of large amounts of data from a data warehouse, has been successfully used to uncover hidden patterns (or rules) among data in a variety of fields. As data mining can capture delicate underlying patterns and relationships contained in empirical data, and provide promising medical diagnosis results, it has been widely used to construct a systematic method to diagnosis the incidence of specific diseases, such as diabetes, heart</p>

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diseases, cancers, and more.

Methods: In this study, we used multiple data mining approaches including traditional logistic regression (LR), novel extreme Gradient Boosting (xgboost) for ensemble learning methods. In addition to were traditional and novel compare considered in this study that other types of approach for nonparametric statistics Multivariate Adaptive Regression Splines (MARS) and statistical learning theory Support vector machine (SVM) for predicting HCC. As the real-world medical datasets usually have class imbalance problems because they are often composed of a much larger number of normal instances with only a small percentage of abnormal ones, lead to the sample size of the data and the ratio of the number of training samples to the number of test samples will affect the performance of the constructed model, therefore In order to compare estimate the performance of the prediction models generated by each classification technology and the stability of the accuracy rate in prediction to derive a more accurate estimate of model prediction performance. A solution that was used in this study is 10-fold cross-validation (CV for short), and the best parameters can be determined by CV grid search techniques, to make the model fit the training data as well as possible were used in this study to reduce the effect of the class imbalance problem. This study integrated four data mining approaches and CV methods to propose data mining classification schemes for predicting HCC.

Results: In this study, the HCC dataset provided by University Hospital in Portugal is used to verify the feasibility and effectiveness of the proposed four data mining classification schemes. Each patient in the dataset contains 50 predictor variables, namely, Gender, Symptoms, Alcohol, Hepatitis B Surface Antigen, Hepatitis B e Antigen, Hepatitis B Core Antibody, Hepatitis C Virus Antibody, Cirrhosis, Endemic, Smoking, Diabetes, Obesity, Hemochromatosis, Arterial Hypertension, Chronic Renal Insufficiency, Human Immunodeficiency Virus, Nonalcoholic Steatohepatitis, Esophageal Varices, Splenomegaly, Portal Hypertension, Portal Vein Thrombosis, Liver Metastasis, Radiological Hallmark, Age at diagnosis, Grams of Alcohol per day, Packs of cigarets per year, Performance Status, Encefalopathy degree, Ascites degree, International Normalised Ratio, Alpha-Fetoprotein, Haemoglobin, Mean Corpuscular Volume, Leukocytes, Platelets, Albumin, Total Bilirubin, Alanine transaminase, Aspartate transaminase, Gamma-glutamyl transferase, Alkaline phosphatase, Total Proteins, Creatinine, Number of Nodules, Major dimension of nodule, Direct Bilirubin, Iron, Oxygen Saturation, Ferritin. And the response variable is diagnosis or no.

There are a total of 165 patients in the dataset. Among them, 80% were used to construct the models, and the remaining 20% withheld for model testing. 132 datasets with respect to the ratio of diagnosis and non-diagnosis patients (the prior probabilities or simply priors) were randomly selected as the training sample (estimating the parameters of the corresponding built classification models) while the remaining 33 will be retained as the testing sample (evaluating the classification capability of the built models). Table 1 shows the classification results of the 4 proposed schemes. From the Table, it can be seen that the xgboost,

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which is first used CV to deal the issue with the best parameters can be determined and apply xgboost as a classification method, is the best model as it generates the best Auc values and provides the relatively high Accuracy, Precision, and Kappa values, and reasonable Sensitivity, Specificity, Recall, and F1-Score value(Accuracy = 0.7879; Sensitivity = 0.7500; Specificity = 0.8462; Auc = 0.8192; F1-Score = 0.8108; Kappa = 0.5730), representing the effectiveness of the proposed method and the selected disease risk factors, it can be said that this The best analysis mode of HCC, and the more important features selected by the classifier are ranked according to importance as Haemoglobin, Age, Alpha-Fetoprotein, Ferritin, Direct Bilirubin, Symptoms, Alkaline phosphatase, Packs of cigarettes per year, etc. The above characteristics are the risk factors that affect HCC. Therefore, it is recommended to use xgboost as the classification mode when constructing the HCC analysis mode. The classification results have a better recognition rate.

KEYNOTE SPEAKER



Keynote Speaker IV

13:30-14:00 (Japan Time) (Russia Time: 07:30-8:00)

Prof. Andrey Krylov, Lomonosov Moscow State University, Russia

Andrey Krylov received the M.S., Ph.D., and Dr. Sc. degrees from the Faculty of Computational Mathematics & Cybernetics, Lomonosov Moscow State University (CMC MSU) in 1978, 1982 (supervisor – academician Andrey Tikhonov), and 2009, respectively. He was a member of scientific staff (1981-1988), senior researcher (1988-1998), head scientist (1988-2003), associated professor (2003-2009) CMC MSU and he is currently professor, head of the Laboratory of Mathematical Methods of Image Processing (<http://imaging.cs.msu.ru>). During his career he worked in applied mathematics in areas of nuclear physics, physical chemistry of liquid systems, multimedia and biomedical imaging. In 1989 he received the Leninsky Komsomol Scientific Prize - the highest prize for scholars in the USSR. He has authored or coauthored over 150 published papers. He served as a reviewer for several international journals and conferences; he was in the board of international and national conferences. For a long period of time he is one of the organizers of the GraphiCon conference - the main international computer graphics, computer vision and image processing conference in Russia. He is Editor-in-Chief of the Springer journal "Computational Mathematics and Modeling" <https://www.springer.com/journal/10598> (Scopus).

Topic: “CNN Assisted Hybrid Algorithms for Medical Image Segmentation”

Abstract—In this report we focus on hybrid CNN assisted methods for histological image segmentation. We propose a CNN assisted interactive segmentation tool with weakly-supervised learning to accelerate the process of manual image annotation. The core of our annotation tool is a classical KNN classifier using parameters that are predicted by CNN. User annotates an image with scribbles of two types corresponding to glands and non-glands histological structures. Next the model performs label propagation to all unlabeled pixels providing user a fully annotated image build from his scribbled-based input. The user can interact with the annotation tool and add new scribbles to correct the result. The algorithm allows to reduce one image annotation time from 150 to 25-30 minutes for PATH-DT-MSU dataset(<http://imaging.cs.msu.ru/en/research/histology/path-dt-msu>). It seriously increases the number of fully annotated histological images necessary for the development of real diagnostic algorithms. We also present a hybrid approach to segment adjacent glands. We consider a modification of trainable active contour model with the variational parameters predicted by CNN trained in terms of structured prediction. Both hybrid approaches can be applied to a wide variety of biomedical image segmentation problems. The report reflects the BRICS2019-394 project research.

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Session 8

Biomedical Imaging

14:00-16:15 Japan Time | August 16, 2020 Sunday

**Meeting ID: 61440506927 | Chaired by: Prof. Tsu-Wang Shen
and Assoc. Prof. Sugiono Sugiono**

Paper ID	Japan Time	Presenter's Local Time
S0001	14:00-14:15	14:00-14:15
S0015	14:15-14:30	13:15-13:30
S1002	14:30-14:45	13:30-13:45
S0002	14:45-15:00	13:45-14:00
S0004	15:00-15:15	14:00-14:15
S0005	15:15-15:30	14:15-14:30
S0011	15:30-15:45	14:30-14:45
S0013	15:45-16:00	09:45-10:00
S3002	16:00-16:15	15:00-15:15



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Session 8 Presentation 1 14:00-14:15 S0001	<p>A Supervoxel Classification Based Method for Multi-organ Segmentation from Abdominal CT Images</p> <p>Jiaqi Wu, Guangxu Li, Huimin Lu and Tohru Kamiya Kyushu Institute of Technology, Kitakyushu, Japan</p> <p><i>Abstract</i>—Multi-organ segmentation is a critical step in computer-aided diagnosis (CAD) system. We proposed a novel method for automatic abdominal multi-organ segmentation by introducing spatial information in the process of supervoxel classification. Supervoxels with boundaries adjacent to anatomical edges are separated from the image by using the simple linear iterative clustering (SLIC) from the images. Then a random forest classifier is built to predict the labels of the supervoxels according to their spatial and intensity features. Thirty abdominal CT images are used in the experiment of segmentation task for spleen, right kidney, left kidney, and liver region. The experiment result shows that the proposed method achieves a higher accuracy of segmentation compares to our previous model-based method.</p>
Session 8 Presentation 2 14:15-14:30 S0015	<p>Pre-cue EEG Rhythms Associated with MI-BCI Performance Variation</p> <p>Qing Zhou, Yingyan Jiang, Jiafan Lin, Lin Yao and Kedi Xv Zhejiang University, Hangzhou, China</p> <p><i>Abstract</i>—In recent years, Motor Imagery (MI) based Brain-Computer Interface (BCI) has been proven to be a promising approach for stroke neurorehabilitation. However, the potential therapeutic benefit was limited by BCI performance variation and the ‘BCI-illiterate’ problem, in which a non-negligible portion of users cannot reach adequate BCI control. In this paper, we investigated the MI-BCI performance variation across subjects (inter-subject) and within-subjects over an extended period (intra-subject). Eight subjects were recruited for a 7-session MI-based BCI intervention. The results showed that pre-cue theta and beta power were significantly correlated with BCI performance both inter and intra-subject aspects. The pre-cue rhythmic dynamic as a neurophysiological index would provide a way for future predicting and neurofeedback training to improve BCI performance.</p>
Session 8 Presentation 3 14:30-14:45 S1002	<p>BG-CNN: A Boundary Guided Convolutional Neural Network for Corneal Layer Segmentation from Optical Coherence Tomography</p> <p>Lei Wang, Meixiao Shen, Qian Chang, Qian ChangCe Shi, Yuheng Zhou and Jiantao Pu Eye Hospital, Wenzhou Medical University, Wenzhou, China</p>

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	<p><i>Abstract</i>—Precise segmentation of corneal layers depicted on optical coherence tomography (OCT) images plays an important role in detecting corneal diseases, such as keratoconus and dry eye. In this study, we present a boundary guided convolutional neural network (BG-CNN) to extract different corneal layers. The developed network uses three convolutional blocks to construct two network modules derived from the classical U-Net network. This network was trained based on a dataset consisting of 1712 OCT images. The segmentation results demonstrated the developed network achieved an average dice similarity coefficient (DSC) of 0.9599 and an intersection over union (IOU) of 0.9253 on an independent testing set from our dataset, and it outperformed some available segmentation networks.</p>
Session 8 Presentation 4 14:45-15:00 S0002	<p>Multimodal Image Fusion Based on Random Projection and Joint Sparse Representation</p> <p>Yanping Li, Yinmei He and Linfeng Du Shanghai Maritime University, Shanghai, China</p> <p><i>Abstract</i>—In this paper, a novel multimodal medical image fusion algorithm based on compressive sensing (CS) is provided, which combines random projection and joint sparse representation. First, the medical image data is encoded with random projection and joint sparse representation. Second, the images are fused by using sparse representation coefficients in the compression domain. The experimental results demonstrate that our algorithm can obtain the same image fusion quality with a much smaller compression ratio and fewer samples when compared to existing CS-based image fusion algorithms. In addition, our algorithm achieves flexible quality and computational complexity control by adjusting the compression ratio.</p>
Session 8 Presentation 5 15:00-15:15 S0004	<p>A Novel Hybrid Network for H&N Organs at Risk Segmentation</p> <p>Ze Sen Cheng, Tian Yu Zeng, Si Juan Huang and Xin YANG Sun Yat-sen University Cancer Center; State Key Laboratory of Oncology in South China, Guangzhou, China</p> <p><i>Abstract</i>—In this paper, we find a network which can achieve better result than the state of the art for Head and Neck Organ at Risks (OARs) segmentation. At first, we enumerate the popular networks, and sum up their characteristic. We extract the main components from these popular networks and we design experiment to evaluate these components. We split the experiment into two stage. At the first stage experiment, we try to find out which components and constructions can let the network achieve better result than baseline model, Unet, for H&N OAR segmentation. After finding out the useful components and constructions, we try to mix them up to build a novel network which absorbs all their merits. At last, we get a hybrid network, Attention-W-net which gets the best result and defeat the state of the art. All networks are evaluated on 16th CSTRO</p>

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	conference H&N OAR segmentation competition dataset.
Session 8 Presentation 6 15:15-15:30 S0005	<p>Full Tooth Contour Recognition and Model Reconstruction Method Based on CT Images</p> <p>KaiLe Song, SongHua Ma and ZhaoHui Wang Shandong University, Jinan, China</p> <p><i>Abstract</i>—It is of great significance for the treatment of oral diseases to establish a digital 3d model of teeth based on oral CT images. In order to establish a 3d digital model of teeth by using oral CT images, the contour segmentation, coordinate transformation and surface model reconstruction of oral CT images are required. The structure tensor information can reflect the local structure information of the image by using the multi-channel information, and many models constructed by using the local tensor information have the de-noising effect. Therefore, the area term fused with structural tensor information was added to the (Local Gaussian Distribution Fitting) LGDF model to segment the contour of a single tooth. The segmentation results show that the improved model can be segmented into ideal contours without Interference noise area and false boundary. After the segmentation of all the contours was completed, all the contours were converted from two-dimensional CT coordinates to three-dimensional coordinate forms, and the surface model was obtained by surface reconstruction of three-dimensional scattered point cloud using Crust algorithm. The surface model construction method proposed in this paper has better surface quality.</p>
Session 8 Presentation 7 15:30-15:45 S0011	<p>A Robust Optic Disc Localization Algorithm in Retinal Images Based on Support Vector Machine</p> <p>Zhiwei Zhou, Jun Yao and Ling Wang Shanghai University, Shanghai, China</p> <p><i>Abstract</i>—Optic disk (OD) localization is a significant step when processing the retinal images in computer-aided diagnosis. In order to determine the location of OD precisely and robustly, an OD localization algorithm based on support vector machine (SVM) is proposed in this paper. According to some structural and intensity features of the bright regions in the retinal images, the SVM classifier is trained to recognize bright OD candidate regions. A convex hull is created on the basis of these candidate regions to locate the center of OD. Compared with OD localization methods in literatures, this proposed approach can locate the center of OD with higher accuracy because the application of machine learning algorithm improves the classification accuracy of bright regions. Three public databases with total 259 images were tested to evaluate the performance. The proposed method can achieve an accuracy of 100%, 96.9%, 97.8% for DRIVE database, DIARETDB0 database and DIARETDB1 database respectively.</p>

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<p>Session 8 Presentation 8 15:45-16:00 S0013</p>	<p>Hybrid Method for Biomedical Image Poisson Denoising</p> <p>Valeriy E. Karnaukhov and Andrey S. Krylov Lomonosov Moscow State University, Moscow, Russia</p> <p><i>Abstract</i>—Last time convolutional neural networks (CNN) became the main tool for the problem of biomedical image denoising. Nevertheless CNN-based methods strongly depend on the used training set and even small differences in the input data can cause output disturbance. One of the possible ways to tackle this problem is to use hybrid denoising methods that include combinations of CNN and "classical" image denoising algorithms. In this paper we present a hybrid iterative DeepRed algorithm for Poisson and mixed Poisson-Gaussian denoising with an automatic choice of the number of iterations. The choice is based on the control of biomedical image structures. Here we analyze presence of regular structures in the ridge areas at the difference between noisy and filtered images by a multiscale ridge based approach. It was also found that applying the Anscombe transform in the hybrid method improves denoising results. Test results for retinal image dataset DRIVE and Set12 natural images show practical applicability of the method.</p>
<p>Session 8 Presentation 9 16:00-16:15 S3002</p>	<p>The Clinical Application Value of Cta and Cmr in Diagnosis and Evaluation of Coronary Heart Disease</p> <p>Binhua Ren and Changjiang Xiao Hunan University of Chinese Medicine Integrated Chinese and Western Medicine Affiliated Hospital, Changsha, China</p> <p><i>Abstract</i>—Coronary heart disease (CHD) is one of the most common heart diseases in clinic. Clinical diagnosis relies on coronary angiography (CAG) as the main diagnostic tool. However, CAG is an invasive diagnostic method with contraindications and adverse reactions, and the diagnosis of coronary heart disease can not effectively detect the adhesion plaque after coronary arteriosclerosis. The limitations are large and often bring unnecessary trouble to patients. There are also some difficulties in treatment. It can not effectively evaluate the clinical stages of coronary heart disease and have a certain impact on the patient's body, etc., which will promote the continuous innovation of new diagnostic technology and equipment. The rapid development of CT Multi-slice Spiral CT (MSCT) and Magnetic Resonance Imaging (MRI) technology. CT Angiography (CTA) and Cardiovascular Magnetic Resonance (CT Cardiovascular).CMR) the continuous emergence of technology has provided new ideas and methods for the clinical diagnosis of coronary heart disease. This article will rely on the technology of coronary CT angiography and magnetic resonance angiography to analyze the diagnosis and treatment of coronary heart disease under the two technologies. I hope this chapter can help clinical diagnosis and treatment of coronary heart disease.</p>

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Session 9

Image Analysis and Biological Application

16:30-19:00 Japan Time | August 16, 2020 Sunday

Meeting ID: 61440506927 | Chaired by: Prof. Lin Yao

Paper ID	Japan Time	Presenter's Local Time
S1001	16:30-16:45	15:30-15:45
S0014	16:45-17:00	15:45-16:00
S0007	17:00-17:15	16:00-16:15
S0017	17:15-17:30	11:15-11:30
S2003-A	17:30-17:45	11:30-11:45
S2001	17:45-18:00	16:45-17:00
S0009	18:00-18:15	17:00-17:15
S0012	18:15-18:30	17:15-17:30
S3005-A	18:30-18:45	17:30-17:45
S0003	18:45-19:00	11:45-12:00



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<p>Session 9 Presentation 1 16:30-16:45 S1001</p>	<p>Nonrigid Registration of Multimodal Images Using Local Structural Descriptors</p> <p>Lei Wang, Shenghai Huang, Qian Chang, Qinxiang Zheng and Hao Chen Eye Hospital, Wenzhou Medical University, Wenzhou, China</p> <p><i>Abstract</i>—Nonrigid registration plays an important role in reducing potential intensity and geometric differences across individual images with varying modalities. In this paper, we propose a new registration method by introducing two local structural descriptors and a similarity measure. The descriptors are used to highlight small intensity variations and represent the texture characteristics of desirable objects, while the measure estimates image differences based on the introduced descriptors. With these descriptors and measure, multimodal images can be aligned in the free form deformation (FFD) registration framework. Experimental results on two public magnetic resonance (MR) image datasets demonstrated that the developed method can achieve reasonable registration accuracy, and outperformed some existing methods.</p>
<p>Session 9 Presentation 2 16:45-17:00 S0014</p>	<p>Analysis and Application of Optical Illusion Images</p> <p>Dan Wang and Peng Cao Beijing Institute of Graphic Communication, Beijing, China</p> <p><i>Abstract</i>—An optical illusion image has a variety of "illusion image" characteristics under the human visual feeling, which is frequently used in some special application scenarios. This paper through the study of its imaging principle, and then this paper studie its innovative application. First of all, based on the research of visual illusions in various fields, such as neurology, psychology, vision and design, a rotating illusion image is constructed, and the influencing factors of rotation illusion are analyzed. Then, the optical flow constraint equation, the visual perception spatial frequency sensitivity function and the mathematical relationship between the image spatial frequency and the visual spatial frequency are studied. The visual perception gradient sensitivity function is calculated, and the influence of various characteristic parameters of the basic image elements on the visual illusion is tested. The experimental results show that the motion of visual illusion image is related to six factors, such as, the visual distance, vector gradient and saccade speed.</p>
<p>Session 9 Presentation 3 17:00-17:15 S0007</p>	<p>Asymmetric and Square Convolutional Neural Network for SAR Ship Detection from Scratch</p> <p>Long Han, Xi Zhao, Wei Ye and Da Ran Space Engineering University, Beijing, China</p> <p><i>Abstract</i>—Despite there have been little research on synthetic aperture radar (SAR) ship detection from scratch, the transfer learning-based studies are still the</p>

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mainstream. Due to some limitations of the fixed structures of the backbone, it is hard to improve and optimize these parts of networks and there is between domain mismatch which restricts the performance of the convolutional neural network (CNN) to some extent. Addressing the issue, we design an asymmetric and square convolution block (A-S CB) which is easy to be embedded into any CNNs and helps to significantly reduce the number of parameters and computations without serious damages to detection accuracy. We integrated the proposed A-S CB to the classic SSD, namely A-S SSD, which can be trained from scratch. Experiments on RDISD_SAR proves our approach reaches competitive performance in both accuracy and detection speed compared with the typical DSOD, and in contrast with SSD, it holds some superiorities in aspects of accuracy, speed, number of parameters, and computations.

Session 9
Presentation 4
17:15-17:30
S0017

A Method for Automatic Tracking of Cell Nuclei With Weakly-Supervised Mitosis Detection in 2D Microscopy Image Sequences

Alexandr Yu. Kondratiev, Andrey S. Krylov and Dmitry V. Sorokin
Lomonosov Moscow State University, Moscow, Russia

Abstract—Due to a high interest in microscopic cell migration analysis for biological research, numerous cell segmentation and tracking algorithms has emerged. The main tasks of cell tracking methods are to segment each cell and establish individual cell lineages over time, accounting for possible cell disappearance and division events. In some datasets, cells can drastically change their appearance during the mitosis stage, thus making division detection a challenging problem. The most prominent methods exploit different neural network architectures for at least one of these tasks. We propose a method that uses a single UNet topology network to solve both tasks of cell nuclei instance segmentation and detection of mitotic events. For instance segmentation, the network is learned to segment primary masks and object centroids that are used by watershed transform to obtain individual nuclei regions. For mitotic events detection, we first manually mark cells entering and finishing mitosis. Then, previously trained network is used to generate weak nuclei segmentation labels for all data images in sequences with marked mitotic events. We add an additional output to the trained network for segmentation of mitotic events. The training is resumed for both tasks on initial ground truth segmentation, generated weak labels, and crude mitotic events markers. For tracking, we use generalized nearest neighbour method that can greedily search the best 1-to-1 and 1-to-2 instance connections over multiple frames. Segmentation of the mitotic events produced by the trained model is incorporated into the tracking algorithm to improve cell division detection. We evaluate the results of the proposed method and compare it with the previously developed algorithm, achieving better performance on our dataset. We assume it is possible to upgrade other existing segmentation frameworks to also learn the task of segmenting mitotic events and enhance division detection using the proposed pipeline.

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<p>Session 9 Presentation 5 17:30-17:45 S2003-A</p>	<p>Expression pattern of Epithelial to Mesenchymal Transcription Factors and Cancer Stem Cell Marker CD133 Expression in Hepatocellular Carcinoma Poor Differentiated Cell Lines</p> <p>Pelin Balcik-Ercin Gebze Technical University, Gebze-Kocaeli, Turkey</p> <p><i>Abstract</i>—Hepatocellular carcinoma (HCC) is the seventh most common cancer worldwide and hepatocellular carcinoma is the major type of liver cancer. Liver cancer is the second most lethal tumor with an 18% rate of 5-year survival. Only a small number of patients diagnosed in the early stages of the disease but most of the patients are diagnosed at an advanced stage of HCC and treatment options are limited. Epithelial to mesenchymal transition is a crucial process in embryonic development and its reactivated in carcinogenesis. EMT transcription factors activated in poor-differentiated but repressed in well-differentiated HCC cell lines. To this aim, we characterized the differentiation status of poorly-differentiated HCC cell lines and compared their expression status of EMT major transcription factors, ZEB1, TWIST1, SNAI1, and cancer stem cell marker CD133. EMT transcription factors ZEB1, TWIST1, and SNAI1 and cancer stem cell marker CD133 differential gene expression profiles were assessed in poorly-differentiated HCC cell lines SNU398, SNU182, and SK-Hep1 by RT-qPCR. SNU182 was the positivity for four gene expressions compared to other cell lines. SNAI1 and CD133 expressions were the highest in SNU182, TWIST1 expression was high in SNU398, and the ZEB1 was high in SK-Hep1 comparison in poorly-differentiated cell lines. Differential expression of EMT markers and cancer stem cell marker in poorly-differentiated HCC cells is enlightened the future studies selection parameters.</p>
<p>Session 9 Presentation 6 17:45-18:00 S2001</p>	<p>Derivation and Progress of Non-Enzymatic RNA Replication</p> <p>Xinyu Wu Beijing Jingshan School Caofeidian Branch National Department, Tangshan, China</p> <p><i>Abstract</i>—Molecular replication has branched into two parts, on one hand, it involves the non-informational copying of polymers which provides a replication environment indirectly, and on the other hand, the informational copying, including DNA or RNA replication, is a direct replication system. On account of the central dogma of molecular biology, after the transcription from DNA to mRNA, some living organisms require a specific RNA polymerase to catalyse and control the reaction of RNA self-replication. Based on the RNA world hypothesis, the self-replication of RNA at the earlier stage of the origin of life occurred under an enzyme-free condition. RNA replication process needs three steps: (a) separation of the duplex, (b) monomer extension of each strand, and (c) the end to end propagation of RNA strand. It was suggested that non-enzymatic RNA</p>

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	<p>copying could take place in the presence of metal ions, like Mg²⁺ or Fe²⁺. Strand separation can be achieved by pH or temperature oscillation, and the RNA monomer extension could be attainable with the involvement of two activated nucleotides. This review gives a brief summary of the accomplishments scientists have made, and also concerns about several impediments in this process as well as their solutions.</p>
Session 9 Presentation 7 18:00-18:15 S0009	<p>iNOA: An Improvement of Network Ontology Analysis with GO Semantic Similarity</p> <p>Yaohua Chang and Zhi-Ping Liu Shandong University, Jinan, China</p> <p><i>Abstract</i>—Gene Ontology (GO) consortium provides the largest functional annotations of genes, and GO enrichment analysis is almost regarded as a standard-like analytical method in computationally biomedical researches. Network biology reveals that molecular interactions rather than individual genes perform their functions in cells, which makes network ontology analysis (NOA) of gene functions come into being. In NOA, the edge of a biomolecular network is annotated by the shared GO terms of interacting genes that proved to be better in function enrichments. However, semantic similarity is ubiquitous between GO terms. The annotations that simply endue edges without considering semantic relationship will deprive lots of crucial information of GO terms. Here, we explore an improvement of NOA with GO semantic similarity (iNOA). iNOA first retrieves the functions of all involved genes from the GO database, and then calculates the semantic similarity of the annotated terms in two genes as that in NOA. We further implement the semantic similarity based on GO graph in the measurement. The semantic similarity value calculated for two GO terms replaces the original counting number of the same GO terms annotated to the two genes of an edge. Then we apply a hypergeometric test to enrich important functions in a network. To prove the effectiveness of iNOA, a specific endometrial cancer gene network is constructed. The enriched results indicate iNOA can obtain more effective and more specific GO functions than NOA and the other gene list methods.</p>
Session 9 Presentation 8 18:15-18:30 S0012	<p>Design of Medical Image Hardware Acceleration Platform by SDSoC for ZYNQ SoC</p> <p>Liang Mu, Tao Wei, Yuyu Tao, Chan Liang and Xuejun Zhang Guangxi University, Nanning, China</p> <p><i>Abstract</i>—In this paper, a design scheme of hardware acceleration for ZYNQ SoC programming and medical image processing using SDSoC development software is introduced and compared with traditional hardware language programming and Vivado HLS programming. In SDSoC, developers can use C/C++ language for hardware development as well as OpenCV and xfOpenCV library. OpenCV is a</p>

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	<p>widely used image processing library, which can not only shorten the development cycle and reduce the difficulty of hardware development, but also take up more FPGA resources. Similar to OpenCV usage, XfOpenCV is a Xilinx-optimized OpenCV library. In this paper, several typical image processing algorithms are used to test medical image data in DICOM format, and the design of the proposed scheme and the traditional scheme are compared from the perspectives of processing speed comparison, power consumption, and development cycle. Sobel filter, Gaussian smoothing, and Harris corner detection are chosen for comparison study for their widely usages in image processing. Finally performance on four platforms - CPU, ARM, ZYNQ and GPU are compared and evaluated to our method.</p>
<p>Session 9 Presentation 9 18:30-18:45 S3005-A</p>	<p>Molecular Engineering of Anti-PD-L1 Peptide and Photosensitizer for Immune Checkpoint Blockade Photodynamic-Immunotherapy</p> <p>Ningning Wang, Yue Jiang and Yuxia Luan Shandong University, Jinan, China</p> <p><i>Abstract</i>—Immune checkpoint blockade (ICB) strategy based on suppressing programmed death-1 (PD-1)/programmed death-ligand 1 (PD-L1) pathway has been proved to be promising and effective in cancer immunotherapy. However, its potential risk of immune-related adverse events (irAEs) places stringent requirements on the precise loading of anti-PD-L1 agent in nanomedicine. Precise control of the loading content of anti-PD-L1 antibody is a difficult task since physical encapsulation has inevitable drawbacks like batch-to-batch variation and chemical modification is limited by the low stability of the antibody. Herein, we proposed a molecular engineering strategy to develop the nanomedicine with precise control of anti-PD-L1 agent content by using anti-PD-L1 peptide (APP) as the substitute to anti-PD-L1 antibody. The APP was chemically bonded with a photosensitizer IR780 to obtain IR780-M-APP, a molecule able to self-assemble into nanoparticles (NPs) with a precise APP loading (48.4 wt %) determined by the molecular structure. Specifically, the IR780 moiety in IR780-M-APP NPs endows the nanoparticles with photodynamic therapeutic effect as well as the ability to trigger immunogenic cell death (ICD), while the APP moiety can block the PD-1/PD-L1 pathway for promoting immunotherapy. The proposed photodynamic-immunotherapy nanoplatform not only killed primary tumors directly but also eradicated the metastatic and invasive tumors effectively. The present molecular engineering strategy combined with anti-PD-L1 peptide might provide more opportunities for the design of advanced nanoplatforms for cancer therapy.</p>
<p>Session 9 Presentation 10 18:45-19:00 S0003</p>	<p>Real-time Fluorescent Image Analysis of SlipChip-based Microfluidic Devices</p> <p>Daniel Garc ía-Alonso, Haijun Qu, Lei Xu and Feng Shen Shanghai Jiao Tong University, Shanghai, China</p>

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Abstract—This paper presents a real-time fluorescence analysis method for the characterization of nucleic acid amplification on SlipChip. SlipChip is a microfluidic device that can generate and manipulate aqueous droplets by the relative slipping movement of top and bottom microfluidic plates. This real-time fluorescence analysis method can perform background correction, retrieve the fluorescence signal from droplets, and provide kinetic analysis of fluorescence intensity over time on the SlipChip device. As a proof of concept, we demonstrated the efficacy of this fluorescence analysis method for analyzing polymerase chain reaction (PCR) kinetics with intercalation dye on the SlipChip device. An integrated fluorescence imaging instrument with a small footprint was developed and will be presented elsewhere. The integration of the SlipChip device, hardware instrument, and fluorescent analysis algorithm provides a powerful tool for nucleic acid analysis and in situ quality control by monitoring amplification kinetics. The fluorescence analysis methodology proposed in this paper can also potentially be used for image analysis on other microfluidic systems.