



研究及知識轉移服務處  
Office of Research and  
Knowledge Transfer Services



**MINI-SYMPOSIUM**

Health Data For All 2024:

# **How to Utilize HA Health Data for Multidisciplinary Grant Applications**

**09 JANUARY 2024 (TUE)**  
**10:30 AM - 12:00 PM**  
**UGA, InnoPort**

## FOREWORD

To facilitate innovative research ideas and collaborations for healthcare policies and services, Hospital Authority Data Collaboration Laboratory (HADCL) has been set up to provide a collaboration platform between HA and external parties for conducting health data collaboration projects.

In order to promote the platform and the use of health data for multidisciplinary research, The Office of Research and Knowledge Transfer Services (ORKTS) invites three distinguished CUHK researchers who have been active users of HADCL platforms to share their insights of capitalizing on the health data supported by HADCL for their different research interests, and representatives from HADCL. The symposium aims to generate more future multidisciplinary collaborations and grant opportunities for all CUHK researchers.

## RUNDOWN

**10:30-10:35**

### OPENING REMARKS

Prof. ZEE Chung-ying Benny

Director, Office of Research and Knowledge Transfer Services, CUHK

**10:35-10:45**

### INTRODUCTION OF HADCL PLATFORM

Mr. SO Byron

Manager, HADCL

**10:45-11:05**

### SHARING THE JOURNEY OF A HADCL PROJECT: ARTIFICIAL INTELLIGENCE FOR DETECTION OF CRITICAL FINDINGS IN HEAD CT SCANS

Prof. DOU Qi

Assistant Professor, Department of Computer Science and Engineering, CUHK

**11:05-11:25**

### Leveraging machine learning and big data to dissect complex relationships: a case study of cardiovascular risk in rheumatoid arthritis

Prof. SO Ho

Assistant Professor, Division of Rheumatology, Department of Medicine and Therapeutics, CUHK

**11:25-11:45**

### Enhancing Joint Replacement Care: Leveraging Image Analysis for Improved Follow-up Assessment with HADCL Assistance

Prof. CHUI Chun-sing Elvis

Research Assistant Professor, Department of Orthopaedics and Traumatology, CUHK

**11:45-12:00**

### ROUNDTABLE DISCUSSION & Q&A SESSION

**12:00**

### END OF MINI-SYMPOSIUM



## SPEAKERS



### PROF. DOU Qi

**Assistant Professor, Department of Computer Science and Engineering, CUHK**

Prof. Qi DOU is an Assistant Professor with the Department of Computer Science & Engineering at CUHK. Her research interest lies in the interdisciplinary area of AI for healthcare with expertise in medical image analysis and robot-assisted surgery towards the goal of advancing disease diagnosis and intervention via machine intelligence. She has over a hundred publications with Google Scholar citations 20k+ and H-index 60. Her research outputs have won a number of distinguished best paper awards. She served as Program Co-Chair of the major conferences of MICCAI 2024, IPCAI 2023, MICCAI 2022, MIDL 2021, and Associate Editor of top journals including Media and IEEE TMI. Prof. Dou has been working with HADCL on AI projects for two years and has been invited to share research findings in HADCL steering group meeting.

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### PROF. SO Ho

**Assistant Professor, Division of Rheumatology,  
Department of Medicine & Therapeutics, Faculty of Medicine, CUHK**

Dr. SO studied at the University of Hong Kong and attained his Medical Degree in 2004. He became a fellow in Rheumatology in 2011. He received his Master of Science in Biostatistics and Epidemiology from the Chinese University of Hong Kong in 2014.

Dr. Ho SO is currently the assistant professor of the Rheumatology Unit, The Chinese University of Hong Kong. He is the honorary treasurer of the Hong Kong Society of Rheumatology.

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### PROF. CHUI Chun-sing Elvis

**Research Assistant Professor, Department of Orthopaedics and Traumatology,  
Faculty of Medicine, CUHK**

Professor Chui Chun-Sing, an expert in computer-assisted surgical planning and novel technologies, has secured 12 research grants. Appointed as Honorary Advisor by the Hospital Authority, he provides guidance for the 3D printing team and surgeons, contributing to surgery planning and design. With over 10 years of experience and 400 cases, he offers intra-operative support for navigation-guided surgeries. As head of the Computer Aided Surgical Modeling (CASM) Laboratory, he develops new surgery planning and diagnosis software. Internationally recognized, he won a gold medal and two bronze medals in the 48th Geneva International Exhibition of Inventions.

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## ABSTRACTS

### **Sharing the journey of a HADCL project: Artificial intelligence for detection of critical findings in head CT scans**

By Prof. DOU Qi

The project focuses on developing a method for detecting critical findings in head CT scans for intracranial hemorrhage (ICH) and then combining imaging and clinical data to achieve reliable treatment decision-making. In the early stages of the partnership with HADCL, the project's data and hardware/software requirements were determined through discussions. Subsequently, Prof. DOU's team engaged in close discussions and consultations with HADCL's technical staff during data organization and model deployment. Besides, intensive interdisciplinary discussions were initiated through medico-engineering cooperation. The models achieved ICH classification, midline shift estimation, and treatment decision-making. This project has ultimately produced fruitful outcomes with grant application, multiple publications and patent application.

### **Leveraging machine learning and big data to dissect complex relationships: a case study of cardiovascular risk in rheumatoid arthritis**

By Prof. SO Ho

Major adverse cardiovascular events (MACE) are the top causes of morbidity and mortality in patients with inflammatory arthritis. Due to the complex interplay of metabolic abnormalities, systemic inflammation and pharmacotherapies, risks of MACE are poorly predicted by the existing tools. Prognostic models using machine-learning techniques can help predict disease outcomes. Collaborating with computer engineers and data scientists, we have built machine-learning models capable of identifying identical risk factors associated with MACE compared with traditional statistical methods in a small cohort of patients with rheumatoid arthritis (RA). We go on to devise machine-learning prediction models of MACE in RA, factoring in multiple clinical variables including traditional cardiovascular risk factors, markers of systemic inflammation and different medications, using a large real-world database. The analysis will also include a causal inference model to treat the various factors as causes and effects in the form of a directed acyclic graph incorporating established knowledge from clinicians.

### **Enhancing Joint Replacement Care: Leveraging Image Analysis for Improved Follow-up Assessment with HADCL Assistance**

By Prof. CHUI Chun-sing Elvis

Loosening of joint prostheses is a significant concern in total knee arthroplasty (TKA) and total hip arthroplasty (THA), leading to revision surgeries. This study aimed to develop an image-based machine learning model using convolutional neural networks (CNN) to detect loosening. X-ray images from TKA/THA patients were used to train the CNN model, and class activation maps were utilized for interpretation. The image-based machine learning model achieved an accuracy of 89% for TKA and 81% for THA, demonstrating its potential in assisting clinicians. While this study contributes to the growing body of research on image-based machine learning for joint prosthesis loosening, further investigation is needed to ascertain its novelty in relation to previous reports.