2024 International Workshop on Health Intelligence (W3PHIAI 2024)

Monday, February 26 – Tuesday February 27, 2024
Location: Room 213, Vancouver Convention Centre – West Building, Vancouver BC Canada, all times are PST

Workshop Programme:
DAY 1: February 26, 2024
Time: 9:00am - 5:00 pm PST

9:00 am - 9:15 am
Opening Remarks (Martin Michalowski)

9:15 am - 10:00 am (With Q/A)
(Introduction: Simone Bianco)
Keynote Speaker: **Elizabeth Borycki, RN, PhD, FACMI, FCAHS, FIAHSI**, Professor, School of Health Information Science; Director, Global Laboratory for Digital Health Innovation, University of Victoria, Canada
Title*: The Safety of AI in Healthcare: Human and Healthcare Organizational Considerations*
Abstract: Managing health technology risk is an important part of technology design, implementation and evaluation in a modern digital, healthcare system. Digital systems of care have the ability to improve care processes while at the same time introducing new types of errors that have significant impacts for human stakeholders. With the exponential rise in the use of AI applications and systems in varying health settings (i.e., hospital, community, and home), there is an even greater need to ensure our digital health ecosystems of care are safe. This keynote will review the evolution of the field of technology safety. Some of the issues and considerations associated with health technology risk management across the software development lifecycle will be discussed. In addition, methods will be presented that can be used to assess and ensure safety in health environments as part of a healthcare organizational strategy for using and improving AI.

10:00 am - 10:30 am (20 minutes per full, 15 minutes for short presentation)
Session 1: Prediction + Optimization (2 short presentations)
(Session Chair: Martin Michalowski)

1. Towards Personalised Patient Risk Prediction Using Temporal Hospital Data
   Trajectories (Short)
   Authors: Thea Barnes, Enrico Werner, Jeffrey Clark and Raul Santos-Rodriguez

2. Ambulance Routing for Optimizing Stroke Patient Outcomes (Short)
   Authors: Emily Molins, Yasmine Alonso, Mykel Kochenderfer, Jeremy Heit and Benjamin Pulli

10:30 am - 11:00 am
Break

11:00 am – 12:15 pm (20 minutes per full, 15 minutes for short presentation)
Session 2: Generative AI and Imagery (3 full, 1 short presentations)
(Session Chair: Simone Bianco)

1. Navigating the Synthetic Realm: Harnessing Diffusion-based Models for
   Laparoscopic Text-to-Image Generation
   Authors: Simeon Allmendinger, Patrick Hemmer, Moritz Queisner, Igor Sauer, Johannes Jakubik, Michael Vössing and Niklas Kühl

2. Generation of Clinical Skin Images with Pathology with Scarce Data
   Authors: Andrea Borghesi and Roberta Calegari

3. MILFormer Weighted Dual Stream Random Class Centered Attention Multiple
   Instance Learning For Whole Slide Image Classification
   Authors: Hossein Jafarinia, Danial Hamdi, Alireza Alipanah, Nahal Mirzaie and Mohammad Hossein Rohban

4. Multi-Prompt Fine-Tuning of Foundation Models for Enhanced Biomedical Image
   Segmentation (Short)
   Authors: Xiangru Li, Yifei Zhang and Liang Zhao

12:15 pm - 2:00 pm
Lunch Break

2:00 pm - 2:45 pm (With Q/A)
(Introduction: Martin Michalowski)
Keynote Speaker: **Thomas Kannampallil, PhD**, Associate Professor of Anesthesiology &
Computer Science; Director, Acute Care Innovation Research, Washington University
School of Medicine
Title: *Implementing real-time clinical decision support for perioperative care*

Abstract: In this talk, I will describe the design, development, and implementation of machine learning-based clinical decision support for perioperative settings. Specifically, I will discuss a range of implementation projects (and associated pragmatic clinical trials) for remote intraoperative telemedicine, predicting surgical duration, and predicting surgical transfusion risk. The focus will primarily be on characterizing the current challenges of EHR-based implementations including available data pipelines, data issues, performance drift, and considerations for running pragmatic trials at the point-of-care.

2:45 pm – 3:30 pm (20 minutes per full, 15 minutes for short presentation)
Session 3: Deep Learning (3 short presentations)
(Session Chair: Arash Shaban-Nejad)

1. A Transformer Approach for Cognitive Impairment Classification (Short)
   Authors: Houjun Liu, Alyssa M. Weakley, Jiawei Zhang and Xin Liu

2. Deep Learning Approach to Identify Diabetic Retinopathy Severity and Progression Using Ultra-Wide Field Retinal Images (Short)
   Authors: Amber Nigam, Jie Sun, Varshini Subhash, Lloyd Aiello, Paolo Silva, Yixuan Huang and Guangze Luo

3. DOST - Domain Obedient Self-supervision for Trustworthy Multi Label Classification with Noisy Labels (Short)
   Authors: Soumadeep Saha, Utpal Garain, Arijit Ukil, Arpan Pal and Sundeep Khandelwal

3:30 pm – 4:00 pm
Break

4:00 pm – 4:55 pm (20 minutes per full, 15 minutes for short presentation)
Session 4: Large Language Models (2 full, 1 short presentation)
(Session Chair: Simone Bianco)

1. Using Large Language Models for Generating Smart Contracts for Health Insurance from Textual Policies
   Authors: Inwon Kang, William Van Woensel and Oshani Seneviratne

2. Can GPT Improve the State of Prior Authorization via Guideline Based Automated Question Answering?
   Authors: Shubham Vatsal, Ayush Singh and Shabnam Tafreshi

3. Designing Retrieval-Augmented Language Models for Clinical Decision Support (Short)
   Authors: Keegan Quigley, Teddy Koker, Jonathan Taylor, Vincent Mancuso and Laura Brattain

4:55 pm – 5:00 pm
Closing remarks – Day 1

9:00 am - 9:45 am (With Q/A)
(Introduction: Arash Shaban-Nejad)
Keynote Speaker: **Dimitris Spathis, PhD,** Senior AI Researcher, Nokia Bell Labs
Title*: Multimodal AI for real-world signals and the role of language*
Abstract: The limited availability of labels for machine learning on multimodal data hampers progress in the field. In this talk, I will discuss our recent efforts to address that, building on the paradigm of self-supervised multimodal learning. With models such as CroSSL, Step2Heart, and SelfHAR, we put forward principled ways to learn generalizable representations from high-resolution physiological and behavioural signals and show how these models can be applied to various high-stakes tasks in health and wellbeing. At the same time, due to data constraints, these models are limited in size and generalization capabilities compared to popular generative models such as GPT. What if we could use Large Language Models (LLMs) as data-agnostic pre-trained models? I will close the talk by highlighting LLMs' challenges in processing signals like text and some ideas on how to address this critical "modality gap."

9:45 am – 10:30 am (7 minutes per poster, poster session after presentations)
Session 5: Poster Session (7 poster presentations)

1. Co-morbidity Representation in Artificial Intelligence: Tapping into Unused Clinical Knowledge
   Authors: William Bolton, Pantelis Georgiou, Alison Holmes and Timothy Rawson

2. Denoising Diffusion Probabilistic Models as a Model-Agnostic Defense against Adversarial Attacks
   Authors: Lars Ankile, Anna Midgley and Sebastian Weissharr

3. Can GPT Redefine Medical Understanding? Evaluating GPT on Biomedical Machine Reading Comprehension
   Authors: Shubham Vatsal and Ayush Singh

4. MedBlindTuner: Towards Privacy-preserving Fine-tuning on biomedical images with Transformer and Fully Homomorphic Encryption
   Authors: Prajwal Panzade, Daniel Takabi and Zhipeng Cai

5. Knowledge-Grounded Medical Dialogue Generation for Genetic Counseling Regarding Alzheimer's Risk
   Authors: Hita Kambhamettu, Yidi Huang, Kevin Johnson and Angela Bradbury

6. Interpretable Classification of Early Stage Parkinson's Disease from EEG
   Authors: Amarpal Sahota, Zahraa Abdallah, Raul Santos-Rodriguez, Amber Roguski, Matthew Jones, Alan L Whone and Michal Rolinski

10:30 am - 11:00 am
Break + Poster Session

11:00 am – 12:00 pm (20 minutes per full, 15 minutes for short presentation)
Session 6: Machine Learning (3 full presentations)
(Session Chair: Arash Shaban-Nejad)

1. Semi-parametric Expert Bayesian Network Learning with Gaussian Processes and Horseshoe Priors
   Authors: Yidou Weng and Finale Doshi-Velez

2. Semantic and Visual Attention-Driven Multi-LSTM Network for Automated Clinical Report Generation
   Authors: Cheng Huang, Junhao Shen, Beichen Hu, Mohammad Ausaf Ali Haqqani and Jia Zhang

3. Hierarchical Multi-Label Classification of Online Vaccine Concerns
   Authors: Chloe Qinyu Zhu, Rickard Stureborg and Bhuwan Dhingra

12:00 pm - 1:30 pm
Lunch Break + Poster Session

1:30 pm – 2:20 pm (20 minutes per full, 15 minutes for short presentation)
Session 7: Prediction + Speech (1 full, 2 short presentations)
(Session Chair: Simone Bianco)

1. A Semantic Architecture for Health Risk Prediction and Decision Making Using Heterogeneous Data: The Case of Atrial Fibrillation
   Authors: Mbithe Nzomo and Deshendran Moodley

2. On The Feasibility of Multimodal Dialog Based Remote Balance Assessment (Short)
   Authors: Nikhil Sukhdev, Oliver Roesler, Michael Neumann, Meredith Bartlett, Doug Habberstad and Vikram Ramanarayanan

3. SAIC: Integration of Speech Anonymization And Identity Classification (Short)
   Authors: Ming Cheng, Xingjian Diao, Shitong Cheng and Wenjun Liu

2:20 pm - 3:00 pm
Closing remarks + Award Ceremony
(Martin Michalowski, Arash Shaban-Nejad, Simone Bianco)