



2022 International Workshop on Health Intelligence (W3PHIAI 2022)

Monday, February 28 – Tuesday March 1, 2022 Location: Virtual, all times are PST

Workshop Programme:

DAY 1: February 28, 2022 Time: 8:00am - 4:30 pm PST

8:00 am - 8:15 am Opening Remarks (Martin Michalowski)

8:15 am - 9:00 am (With Q/A)

<u>Keynote Speaker</u>: **Eran Halperin**, SVP of AI and Machine Learning in Optum Labs (United Health Group), and a professor in the departments of Computer Science, Computational Medicine, Anesthesiology, and Human Genetics at UCLA

Title: Whole-genome methylation patterns as a biomarker for EHR imputation

<u>Abstract</u>: Diagnosis and prediction of health outcomes using machine learning has shown major advances over the last few years. One of the challenges in applying machine learning models to electronic health records is that the data is sparse and often noisy. To address sparsity, imputation methods are typically applied. These approaches use the correlation structure between different medical features to impute the missing information. Arguably, genomic information can add a useful set of features that would improve the imputation accuracy of the medical records. It has been suggested that genetic information, and particularly polygenic risk, is often predictive, particularly for highly heritable conditions. In this talk, I will describe an evaluation of methylation patterns (modifications to the DNA) as a predictive tool that can be used for EHR imputation. We show that methylation provides a better imputation performance when compared to genetic or EHR data. Our approach uses a new tensor deconvolution of bulk DNA methylation to obtain cell-type-specific methylation that is in turn used for imputation.

9:00 am - 10:00 am (20 minutes per full, 15 minutes for short presentation)

<u>Session 1: Natural Language Processing I (2 full, 1 short presentations)</u> (Session Chair: Serguei Pakhomov)

- Unsupervised Numerical Reasoning to Extract Phenotypes from Clinical Text by Leveraging External Knowledge *Authors:* Ashwani Tanwar, Jingqing Zhang, Julia Ive, Vibhor Gupta and Yike Guo
- Domain-specific Language Pre-training for Dialogue Comprehension on Clinical Inquiry-Answering Conversations *Authors: Zhengyuan Liu, Pavitra Krishnaswamy and Nancy Chen*
- 3. Medication Error Detection Using Contextual Language Models (Short) *Authors:* Yu Jiang and Christian Poellabauer

10:00 am - 10:15 am

Break

10:15 am – **11:30** pm (20 minutes per full, 15 minutes for short presentation) Session 2: Prediction (3 full, 1 short presentations)

(Session Chair: Wojtek Michalowski)

- Latent Representation Weights Learning of the Indefinite Length of Views for Conception Diagnosis
 Authors: Bo Li, Mengze Sun, Yuan Yu, Yuanyuan Zhao, Qi Wang, Zhongliang Xiang, Liangxia Chen and Zhiyong An
- Phenotyping with Positive Unlabelled Learning for Genome-Wide Association Studies
 Authors: Andre Vauvelle, Hamish Tomlinson, Aaron Sim and Spiros Denaxas
- Out-of-Distribution Detection for Medical Applications: Guidelines for Practical Evaluation Authors: Karina Zadorozhny, Patrick Thoral, Paul Elbers and Giovanni Cinà
- 4. A Robust System to Detect and Explain Public Mask Wearing Behavior (Short) *Authors:* Akshay Gupta and Biplav Srivastava

11:30 pm - 12:30 pm

Lunch Break

12:30 pm - 1:15 pm (With Q/A)

<u>Keynote Speaker</u>: Irene Y. Chen, Massachusetts Institute of Technology (MIT) <u>Title</u>: Machine learning for equitable healthcare Abstract: Advances in machine learning and the explosion of clinical data have demonstrated immense potential to fundamentally improve clinical care and deepen our understanding of human health. However, algorithms for medical interventions and scientific discovery in heterogeneous patient populations are particularly challenged by the complexities of healthcare data. Not only are clinical data noisy, missing, and irregularly sampled, but questions of equity and fairness also raise grave concerns and create additional computational challenges. In this talk, I present two approaches for leveraging machine learning towards equitable healthcare. First, I demonstrate how to adapt disease progression modeling to account for differences in access to care. Using a deep generative model, we can correct for patient misalignment in disease onset time to learn more clinically useful disease subtypes. Second, I examine how to address algorithmic bias in supervised learning for cost-based metrics discrimination. By decomposing discrimination into bias, variance, and noise components, I propose tailored actions for estimating and reducing each term of the total discrimination. The talk concludes with a discussion about how to rethink the entire machine learning pipeline with an ethical lens to building algorithms that serve the entire patient population.

1:15 pm – 2:30 pm (20 minutes per full, 15 minutes for short presentation)

Session 3: Deep Learning (2 full, 2 short presentations)

(Session Chair: Arash Shaban-Nejad)

- 1. A Federated Cox Model with Non-Proportional Hazards *Authors:* D. Kai Zhang, Francesca Toni and Matthew Williams
- 2. A Step Towards Automated Functional Assessment of Activities of Daily Living *Authors:* Bappaditya Debnath, Mary O'Brien, Swagat Kumar, Ardhendu Behera
- Nuances of Interpreting X-ray Analysis by Deep Learning and Lessons for Reporting Experimental Findings (Short) *Authors: Steinar Valsson and Ognjen Arandjelovic*
- Predicting Drug Functions from Adverse Drug Reactions by Multi-Label Deep Neural Network (Short)
 Authors: Pranab Das and Dilwar Hussain Mazumder

2:30 pm – 3:00 pm Break

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3:00 pm – 4:15 pm (15 minutes per short, 7 minutes for poster presentation) <u>Session 4: Computer Vision & Posters (3 short, 4 poster presentations)</u> (Session Chair: Simone Bianco)

1. Improving Radiology Report Generation with Adaptive Attention (Short) *Authors:* Lin Wang and Jie Chen

- 2. Instantaneous Physiological Estimation using Video Transformers (Short) *Authors:* Ambareesh Revanur, Ananyananda Dasari, Conrad S Tucker, Laszlo Jeni
- 3. Automated Vision-Based Wellness Analysis for Elderly Care Centers (Short) *Authors: Xijie Huang, Jeffry Wicaksana, Shichao Li and Kwang-Ting Cheng*
- Benchmarking Uncertainty Quantification on Biosignal Classification Tasks under Dataset Shift (Poster) Authors: Tong Xia, Jing Han and Cecilia Mascolo
- 5. Mining Adverse Drug Reactions from Unstructured Mediums at Scale (Poster) *Authors:* Hasham Ul Haq, Veysel Kocaman and David Talby
- 6. Predicting infections in the Covid-19 pandemic lessons learned (Poster) *Authors:* Sharare Zehtabian, Siavash Khodadadeh, Damla Turgut, Ladislau Bölöni
- Efficient Extraction of Pathologies from C-Spine Radiology Reports using Multi-Task Learning (Poster)
 Authors: Arijit Sehanobish, Nathaniel Brown, Ishita Daga, Jayashri Pawar, Danielle Torres, Anasuya Das, Murray Becker, Richard Herzog, Benjamin Odry, Ron Vianu

4:15 pm – 4:30 pm

Closing remarks – Day 1 (Arash Shaban-Nejad)

4:30 pm – 5:30 pm

Poster Session

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Poster Presentation Guideline:

Below please find the location where your posters will be displayed:

session_name	poster_location	paper_id
W20_part1	R6E	W20-1
W20_part1	R6F	W20-2
W20_part1	R6G	W20-3
W20_part1	R6H	W20-4

Workshop Poster Assignment

B1A means Blue Building, Section 1, Poster stand A. The posters were scheduled as much as possible right around the room where your session is taking place, so you can come out of your session room into the poster session. Some posters may be at adjacent blocks for overflow.

Virtual assistants will be in the venue to help you set up for your session. Have a good workshop.



<u>DAY 2: March 1, 2022</u> <u>Time: 8:30am - 3:15 pm PST</u>

8:30 am - 9:15 am (With Q/A)

Keynote Speaker: Michal Rosen-Zvi, Director, AI in Healthcare, IBM Research, and Visiting Professor, Faculty of Medicine, The Hebrew University <u>Title</u>: Acceleration of biomarker discovery in multimodal data of cancer patients promising results <u>Abstract</u>: TBD

9:15 am - 10:15 am (20 minutes per full paper, 15 minutes short paper)

<u>Session 5: Natural Language Processing II (2 full, 1 short presentations)</u> (Session Chair: Martin Michalowski)

- 1. Clinical Dialogue Transcription Error Correction using Seq2Seq Models *Authors:* Gayani Nanayakkara, Nirmalie Wiratunga, David Corsar, Kyle Martin and Anjana Wijekoon
- Customized Training of Pretrained Language Models to Detect Post Intents in Online Health Support Groups *Authors:* Tootiya Giyahchi, Sameer Singh, Ian Harris and Cornelia Pechmann
- 3. EXPECT-NLP: An Integrated Pipeline and User Interface for Exploring Patient Preferences Directly from Patient-Generated Text (Short) **Authors:** David Johnson, Nick Dragojlovic, Nicola Kopac, Marilyn Lenzen, Sarah le Huray, Kennedy Borle, Samantha Pollard, Dean Regier, Mark Harrison, Giuseppe Carenini, Raymond Ng and Larry Lynd

10:15 am - 10:30 am Break

10:30 am – 12:00 pm <u>Session 6: Hackathon (presentations and award ceremony)</u> (Session Chair: Serguei Pakhomov)

12:00 pm - 1:30 pm Lunch Break

1:30 pm – 3:00 pm (20 minutes per full paper, 15 minutes short paper) Session 7: Knowledge Discovery & COVID (1 full, 5 short presentations) (Session Chair: Arash Shaban-Nejad and Simone Bianco)

1. Pattern Discovery in Physiological Data with Byte Pair Encoding *Authors:* Nazgol Tavabi and Kristina Lerman

- Predicting COVID-19 Disease Progression with A Factor Graph-based Model (Short)
 Authors: Yurui Cao, Phuong Cao, Haotian Chen, Karl Kochendorfer, Andrew Trotter, William Galanter, Paul Arnold and Ravishankar Iyer
- Semantic Network and Content Analysis of COVID-19 Vaccine Related Social Media Text (Short)
 Authors: Chad Melton, Jintae Bae, Olufunto Olusanya, Jon Brenas, Eun Kyong Shin and Arash Shaban-Nejad
- 4. Towards Providing Clinical Insights on Long Covid from Twitter Data (Short) *Authors:* Rohan Bhambhoria, Jad Saab, Sara Uppal, Xin Li, Artur Yakimovich, Junaid Bhatti, Nirma Khatri, Diana Moyano, Elham Dolatabadi and Sedef Akinli Kocak
- 5. A Graph-based Imputation Method for Sparse Medical Records (Short) *Authors:* Ramon Viñas, Xu Zheng and Jer Hayes
- Using Nursing Notes to Predict Length of Stay in ICU for Critically III Patients (Short)
 Authors: Sudeshna Jana, Tirthankar Dasgupta and Lipika Dey

3:00 pm - 3:15 pm Closing remarks/discussion



How to present in Virtual Chair

Microphones/Spotlights:

Step on a podium/panel or microphone and you will be in a spotlight. This means anyone in the same room can now hear and see you. You will be able to see other peoples video but you will only hear them if they also step on a microphone.







Screen sharing:

To share your screen click on the screen object in your bottom center menu.



- You can choose to share your full screen, a specific window or a browser tab.
- Sharing computer sound currently only works for sharing a chrome browser tab.
- For presentations: Choose the window or tab your slides are in. Start sharing. Then enter full screen.
- People will see your screen in full size right away. People that enter the room later might only see your screenshare as a small window.

Tip: Tell people that join late to click on the small screen share window to see it in full size.



Presentation Tips:

- Practice presenting ahead of time with a colleague.Try out screen sharing and
 presenting from the microphone before your sessions starts.
- You can start your screen share before stepping on a microphone to make sure all is good (this way only people near you can see your shared screen but not everyone in the room). Then step on the microphone to broadcast your screen share to everyone.

To practice presenting visit our <u>self guided demo spaces</u> or your event venue. For more detailed information on screen sharing visit the gather <u>help page</u> on the subject.