PREETISH RATH

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SUMMARY

- PhD Candidate with over 5 years of experience in designing machine learning (ML) models for predicting clinical interventions, identifying disease biomarkers, and providing clinically actionable insights.
- Specialized in time-series models for complex health datasets with over 10,000 patient stays records, rich in vitals and lab results, with extensive missing data.
- Demonstrated success in translating ML research to real-world clinical settings, evidenced by a risk prediction model currently operational in a major hospital.

EDUCATION

PhD Candidate Computer Science (Machine Learning)

Mike Hughes, Tufts University — 2019 - Present — Boston, MA

- Led a project to address high false alarm rates in clinical risk prediction models, deemed as a major health technology risk. Developed a novel objective that reduced 100's of false alarms while improving correct alarm rates by up to 15%.
- Leveraged hidden Markov models to handle 2 major limitations of health records datasets - missing data and limited labels. Our model outperformed several supervised and semi-supervised baselines by up to 10% AUROC.
- Lead teaching assistant for an introductory machine learning course engaging with over 100 students on a range of topics including boosted trees, neural networks, and language models (BERT).
- Mentored 2 summer interns in developing time series machine learning models aimed at predicting hospital length-of-stay, culminating in our research featuring in a specialized health-focused workshop publication at NeurIPS 2022.

M.S - Electrical Engineering

Hamid Nawab, Boston University — 2015 - 2017 — Boston, MA

- Master's Project: Spearheaded a series of 4 innovative projects that were integrated as assignments into the curriculum of the 'Digital Signal Processing' course. These projects emphasized the significance of signal processing techniques for diverse machine learning applications including speech recognition, image retrieval, and pitch detection.
- Honed skills in developing machine learning models tailored for diverse data modalities, encompassing audio, speech, imaging, and text.
- Mentored 3 international students as a Master's student ambassador. Provided graduate school counseling and assisted in acclimating to life in the U.S.

B.Eng - Electrical and Electronics Engineering

Manipal University — 2010 - 2014 — Manipal, India

- Senior Project: Implemented a speech to text digit recognition system using the Hidden Markov Model Toolkit to assist people with Dysarthria (speech disorder)

EXPERIENCE

Research Engineer

Massachusetts General Hospital — 2017 - 2019 — Boston, MA

Mike Prerau, Department of Anesthesia, Critical Care and Pain Medicine

- Developed novel statistical signal processing algorithm to identify biomarkers of schizophrenia by extracting valuable insights from over 100h of high frequency electroencephalograph signals (published in the SLEEP journal).
- Collaborated with clinicians and neuroscientists providing weekly research updates and incorporating key clinical insights into the experimental pipeline.

Research Intern - Machine Learning

Philips Healthcare, North America — 2016 — Cambridge, MA

Christine Swisher, Acute Care Solutions

- Developed an ensemble tree model from over 8000 patient records to identify preventable non-physiological events causing false alarms in ECG monitors.
- Our model achieved a high sensitivity and specificity of 82.5% and 93.4%, respectively and also suggested actionable measures for clinical staff to reduce alarm fatigue.

Associate System Engineer

IBM — 2014 - 2015 — Pune, India

Banking Solutions

- Improved banking solutions for 2 clients by developing and tested SQL procedures for retrieving, cleaning and standardizing data.

PUBLICATIONS

Optimizing Early Warning Classifiers to Control False Alarms via a Minimum Precision Constraint.

AISTATS 2022

Rath P., Hughes M.

2022 https://t.ly/D-j5l

False-alarm control in early warning prediction models

Prediction-Constrained Markov Models for Medical Time Series with Missing Data and Few Labels

NeurIPS 2022 Workshop

Rath P., Heuton K., Hughes M.

2022 https://t.ly/AtlrT

Semi-supervised models for time-series w/ missing data

Semi-supervised Ordinal Regression via Cumulative Link Models for Predicting In-Hospital Length-of-Stay

Interpretable ML for Health 2023

Lobo A., Rath P., Hughes M.

2023 https://t.ly/9aQ-3

Semi-supervised models for ordinal outcomes

Transient Oscillation Dynamics During Sleep Provide a Robust Basis for Electroencephalographic Phenotyping and Biomarker Identification

SLEEP 2022

Stokes P., Rath P., Prerau M.

2022 https://t.ly/jzdtP

Identifying schizophrenia biomarkers with neural data

ChatGPT and large language models : The potential of large language models to improve the practice of cardiology

Book Chapter, Cardiology Society of India Update, 2023

Rath P., Dr. Kiron V.

2023

Review of literature on utility of LLMs in cardiology

SKILLS

Expertise

Time-series models (RNN/LSTM/HMM)

Deep learning (CNN/Transformers)

Digital Signal/Image/Speech Processing

Semi-supervised learning

ML (Classification, Regression, Clustering)

Programming

Python SQL PyTorch NumPy

Parallel computing Scikit-learn MATLAB

Linux/Unix Keras