Akash Choudhuri

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Research Interests

My primary research interest lies in the intersection of **machine learning** and **deep learning** with applications in the domain of **healthcare**. I have also recently explored the field of **uncertainty quantification using Graph Neural Networks**. My long-term research goal is to develop a scalable and comprehensive framework to predict the risk posed by patients in healthcare settings and propose mitigation strategies. I have a good understanding of **data processing and analytics**, **deep learning**, **natural language processing**, and **statistics**.

Education

- **The University of Iowa** — Iowa City, USA
  Doctoral Degree: *Computer Science;* ***GPA:*** *3.68/4.0* — *January 2022 - Present*
- **Institute of Mathematics and Applications** — Bhubaneswar, India
  Master of Science: *Mathematics with Data Science;* ***GPA:*** *8.70/10* — *July 2019 - July 2021*
- **Birla Institute of Technology** — Mesra, India
  Bachelor of Science: *Mathematics and Computing;* ***GPA:*** *8.0/10* — *July 2016 - June 2019*

Technical Skills

- **Languages**: Python, JAVA, R, C, MATLAB
- **Frameworks**: Scikit, PyTorch, TensorFlow, Keras, Flask, H3, Pyspark, AWS
- **Tools**: GIT, MySQL

Professional Experience

- **Lawrence Livermore National Laboratory** — Livermore, USA
  Intern, Data Science Summer Institute — *May 2023 - August 2023*
  - **Uncertainty Quantification of Weighted Link Prediction in Graphs (Summer Project)**: Researched and Developed a conformal prediction algorithm to compute the uncertainty bounds of link prediction using GCNs at a feature level. I am currently working towards a publication.
  - **Cardiac Electrocardiography using Machine Learning (DSSI Challenge Problem)**: Primarily worked on the multi-class classification problem to classify irregular heartbeats from a time series data of heartbeats. Fine-tuned and created different ML Models like XGBoost and a hybrid MLP+Randomforest Classifier algorithm. Created a hybrid model that gave 12% gain in accuracy in the MIT-arrhythmia dataset.
- **Data Sutram** — Kolkata, India
  Data Scientist — *July 2021 - December 2021*
  - **Optimized Algorithm for Delivery Management Systems**: Created a real-time optimization algorithm to assign orders to delivery executives in last-mile delivery services.
  - **Dynamic Footfall**: Found metrics to compute dynamic footfall of places in India using internet devices ping data.
  - **Improved geo-coding Wrapper**: Created a wrapper method that uses Google APIs to geocode Indian addresses.
- **Solytics Partners** — Pune, India
  Consultant (Data Science) — *May 2021 - July 2021*
  - **Financial Model Testing**: Worked on validating a Credit Risk Model of the World Bank and performed additional stress testing experiments.
  - **Technical Recruiter**: Was associated with technical recruiting of employees in USA and also conducted campus recruitment process in Indian universities
- **Solytics Partners** — Remote
  Intern (Data Science) — *March 2020 - April 2021*
  - **Auto ML Model**: Worked on creating various pipelines for creating an Auto ML and Deep Learning platform for credit risk scoring.
  - **Pyspark integration with Keras Models**: Worked on creating Pandas UDFs to customize Neural Networks on Spark.

Current Projects

- **Heterogeneous Hypergraphs for predicting Healthcare Associated Infection Incidence Rates**: (Work in Progress) Creating a hypergraph-based deep learning method to predict levels of disease incidence based on heterogeneous interactions of patients with healthcare entities over time.
- **Optimized Vaccine Allocation model to Combat COVID-19**: (In submission AAAI 2024) Using real-time USA mobility data to optimize vaccine allocation across counties in USA.

Publications

- **Choudhuri,A. Jang, H., Segre, A.M., Polgreen, P., Jha, K. and Adhikari, B.**: Continually-Adaptive Representation Learning Framework for Time-Sensitive Healthcare Applications, In publication Process, Proceedings of The 32^{nd} ACM International Conference on Information and Knowledge Management, 2023.
- **Choudhuri, A.**: "A Hybrid Machine Learning Model for Estimation of Obesity Levels" In Data Management, Analytics and Innovation: Proceedings of ICDMAI 2022, Springer Nature (https://doi.org/10.1007/978-981-19-2600-$6_2$2) .

Important Talks

- **CDC MIND Group Meeting 2023**: Presented initial motivations about the integration of clinical notes for CDI incidence prediction and CCMI prediction and presented the results of our paper titled "Continually-Adaptive Representation Learning Framework for Time-Sensitive Healthcare Applications".
- **Summer Slam 2023**: Presented initial approach to computing uncertainty bounds for weighted link prediction in graphs at the Summer Slam at Lawrence Livermore National Laboratory.
- **Tutorial Series 49th Annual Conference of the Odisha Mathematical Society, 2020**: Presented an introductory tutorial on using ANNs for credit risk estimation.

Academic Service

- **International workshop on Epidemiology meets Data Mining and Knowledge Discovery (epiDAMIK @ KDD)**: Program Committee Member and reviewer of the conference for 2022 and 2023.
- **Informatics in Medicine Unlocked (IMU)**: Reviewer for the journal in 2022 and 2023.
- **IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)**: Reviewer for the 2024 edition of the conference.

Honors and Awards

- **UIOWA CS Department Travel Grant:**: Full funding received to present research works in 2023.
- **Focus Areas in Science and Technology Summer Fellowship:**: From the Indian Academy of Sciences from May-June, 2019.
- **Summer Research Fellowship:**: From the Indian Academy of Sciences from May-July, 2018.
- **Indo-German Spring School on Algorithms and Big Data:**: Obtained full scholarship to attend the workshops and discussion sessions in 2020.

Relevant Courses

- **CS: 4980**: Computational Epidemiology
- **DATA: 4750**: Probabilistic Statistical Learning
- **ECE: 5995**: Data Mining
- **CS: 5630**: Cloud Computing Technology
- **CS: 5350**: Design and Analysis of Algorithms
- **ECE: 5995**: Generative AI Tools
- **BIOS: 7600**: Statistical Analysis of Network Data

References

- **Bijaya Adhikari:**: Assistant Professor, Department of Computer Science, University of Iowa. bijaya-adhikari@uiowa.edu
- **Kishlay Jha:**: Assistant Professor, Department of Electrical and Computer Engineering, University of Iowa. kishlay-jha@uiowa.edu