Ranak Roy Chowdhury

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SUMMARY

Researcher crafting robust and data-efficient time-series algorithms for speech, sensory and healthcare applications.

HONORS and AWARDS

- Invited keynote speaker at SIGKDD 2023 Workshop on Machine Learning in Finance. [[Link](#)]
- Qualcomm Innovation Fellowship 2022. One of the *19 winners among 132 participants* across North America. [[Link](#)]
- Halıcıoglu Data Science Institute Graduate Fellowship 2019. One of the *10 winners among 3906 applicants*. [[Link](#)]

WORK EXPERIENCE

University of California San Diego   **Graduate Student Researcher**   **Sep 2019 – Present**

- Crafted self-supervised pretraining method for irregular, asynchronous time-series through sampling density-aware contrastive learning and time-sensitive data reconstruction techniques, improving few-shot performance.
- Developed a self-supervised task-aware data reconstruction technique that uses end-task knowledge to customize the learned representation to boost end task performance, **improving time-series classification** by **2.7%**.
- Devised a globally-attentive multiscale Super-Resolution GAN that uses irregularly spaced sparse data to generate high-resolution spatiotemporal data for regions with no physical sensors, **reducing reconstruction loss** by **3.7%**.
- Innovated a Fourier-transform (FT) inspired weight initialization and learnable Short-Time FT layer redesign to integrate time and frequency information, **improving F1 score** for sensory time-series classification by **2.3%**.

Amazon Web Services, Inc.   **Applied Scientist II Intern**   **Jun 2023 – Sep 2023**

- Crafting an LLM-enabled music understanding framework to solve music tasks, like captioning, retrieval, tagging and classification in a text-to-text fashion. We take music and task prompts as input and generate text output.

Amazon Web Services, Inc.   **Applied Scientist II Intern**   **Jun 2022 – Sep 2022**

- Built a pre-trained model for accent-robust speech representation, improving **Speech Recognition** by **20.4%** and **Speaker Verification** by **6.3%,** across **12 minority accents.** Used Domain Adversarial Training to induce accent invariance and Accent Classification with Contrastive Learning to infuse accent knowledge into the model acoustics.

Nokia Bell Labs   **Data Science Intern**   **Jun 2021 – Aug 2021**

- Developed an ML pipeline to automate ticket resolution. Conducted data cleaning, preprocessing, and visualization on time-series semi-structured system-level log corpus, followed by statistical feature extraction and classification.

Amazon Web Services, Inc.   **Software Development Engineer Intern**   **Jun 2020 – Sep 2020**

- Built a SHAP-based ML Interpretability framework from SQL surface for AWS Redshift, enabling users to write SQL queries to introspect and evaluate ML model predictions. Reduces data transfer by minimizing S3 access which **improves execution speed** by **2x** and **reduces memory footprint** by **90%** over existing Sagemaker workflow.

EDUCATION

University of California San Diego   **Sep 2019 – Mar 2024 (Expected)**
Ph.D. in Computer Science and Engineering. PI: Professor Rajesh K. Gupta

University of California San Diego   **Sep 2019 – Jun 2022**
M.S. in Computer Science and Engineering. Major: Artificial Intelligence and Machine Learning

Bangladesh University of Engineering and Technology   **Jul 2014 – Oct 2018**
B.Sc. in Computer Science and Engineering. Major: Artificial Intelligence

SELECTED PUBLICATIONS

- **Ranak Roy Chowdhury,** Jiacheng Li, Xiyuan Zhang**,** Dezhi Hong, Jingbo Shang, Rajesh K. Gupta. PrimeNet: Pre-training for Irregular Multivariate Time-Series. **AAAI** 2023. [[Link](#)]
- Xiyuan Zhang**, Ranak Roy Chowdhury**, Dezhi Hong, Rajesh K. Gupta, Jingbo Shang. Unleashing the Power of Shared Label Structures for Human Activity Recognition. **CIKM** 2023. [[Link](#)]
- Xiyuan Zhang**, Ranak Roy Chowdhury**, Jingbo Shang, Rajesh K. Gupta, Dezhi Hong. Towards Diverse and Coherent Augmentation for Time-Series Forecasting. **ICASSP** 2023. [[Link](#)]
- **Ranak Roy Chowdhury**, Xiyuan Zhang**,** Jingbo Shang, Rajesh K. Gupta, Dezhi Hong. TARNet: Task-Aware Reconstruction for Time-Series Transformer. **KDD** 2022. [[Link](#)]
- Xiyuan Zhang**, Ranak Roy Chowdhury**, Dezhi Hong, Jingbo Shang, Rajesh K. Gupta. ESC-GAN: Extending Spatial Coverage of Physical Sensors. **WSDM** 2022. [[Link](#)]
- Shuheng Li, **Ranak Roy Chowdhury**, Jingbo Shang, Rajesh K. Gupta, Dezhi Hong. UniTS: Short-Time Fourier Inspired Neural Networks for Sensory Time Series Classification. **SenSys** 2021. [[Link](#)]
- **Ranak Roy Chowdhury**, Muhammad Abdullah Adnan, Rajesh K. Gupta. Real Time Principal Component Analysis. **TDS** 2020 [[Link](#)], **ICDE** 2019. [[Link](#)]

SOFTWARE PROFICIENCIES

Python, Linux, Git, PyTorch, Keras, Tensorflow, fairseq, Hugging Face, NumPy, pandas, SciPy, Matplotlib, Seaborn, scikit-learn, statsmodels, Pillow, OpenCV, NLTK, CoreNLP, Gensim, spaCy, C, C++, Java, Matlab, SQL, PostgreSQL.