Simran Deepak Makariye

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Education

New York University (Courant Institute of Mathematical Sciences) — New York, NY

Master of Science in Computer Science; CGPA: 3.889/4.0 — *Sept 2022 - May 2024*

***Coursework**: Deep Learning, Computer Vision, Cloud and Machine Learning, Natural Language Processing.*

***Current Research**: 1. Re-imagining stock price trends using deep learning. Adv.: Prof. Vasant Dhar @ NYU Stern - CDS*

2. Inter-areal interaction through a communication subspace. Adv.: Prof. Eva Dyer, Neural Data Science Lab, Georgia Tech

National Institute of Technology, Tiruchirappalli — Trichy, India

Bachelor of Technology in Computer Science and Engineering — *July 2016 - June 2020*

Minor Degree in Management; CGPA: 8.6/10

***Coursework**: Natural Language Processing, Machine Learning, Probability Theory, Linear Algebra, Optimization Techniques.*

Experience

Qualcomm — Bangalore, India

Software Engineer - Location Technology Team — *June 2020 - Aug 2022*

- Designed and optimized several positioning algorithms to deliver solutions to automotive and mobile-based customers.
- Implemented denoising auto-encoders to improve signal acquisition sensitivity and super-resolution autoencoders to improve multipath performance, reducing power consumption by **1.5dB** and improving CEP95 by **20%**.
- Prototyped a proximity detection model that preserves user privacy using two GNSS satellites + Angle of Arrival (AoA) based DBSCAN clustering technique.
- Optimized memory utilization on SDX-12 modem chip's position engine module by **20-30%** and performed static analysis and code coverage using the Parasoft tool to improve the current test suite.
- Improved position accuracy by enhancing weak signal context detection, fine-tuning initialization parameters in Kalman filtering-based position algorithm, and applying code enhancements in E-911 sessions leading to a **30%** improvement in an open-sky environment.

Qualcomm — Bangalore, India

Software Engineer Intern - Location Technology Team — *May 2019 - July 2019*

- Performed a comprehensive trade-off analysis to mitigate the multipath problem seen in GNSS by comparing various robust estimators such as RANSAC, L-meds, and M-estimator. L-meds performed the best of the three estimators, reducing the error down to **30m** and could tolerate up to N/2 outliers.

Indian Institute of Technology, Hyderabad(IIT-H) — Hyderabad, India

Research Intern (Supervisor: Dr.Manohar Kaul) — *May 2018 - July 2018*

- Worked on document classification of complex citation networks and knowledge graphs using Semi-Supervised GCN.
- Enhanced the base model using topological signatures to infer specialized features by computing vertex-based degree filtrations i.e. persistence diagrams. - [Project Report]

Selected Projects

- **Integrated Content Management Platform - New York Public Library (NYPL)(Ongoing)**: Developing a generalized content management pipeline for the NYPL website, incorporating deep learning techniques to enhance collection item accessibility and enable automated meta-data tagging. Also, integrating crowdsourcing technologies to further refine and optimize these solutions, resulting in improved user experience and streamlined content management processes.
- **Multi-Image Fusion and Semantic Segmentation for Power Substation Delineation (Ongoing)**: Collaborating with Transition Zero, a leading clean energy technology company, to develop deep neural models that fuse multiple revisits of low-resolution Sentinel-2 L1C imagery and generate a super-resolved image and then applying semantic segmentation task to accurately delineate power substations from the super-resolved image.
- **Video Frame Prediction and Semantic Segmentation with Self-Supervised Learning**: Implemented a fully CNN architecture - SimVP - for video frame prediction and trained a U-Net architecture for Semantic Segmentation on a diverse synthetic dataset consisting of video clips of 3D moving objects achieving a Jaccard Index of **0.251** with minimal training and fine-tuning. - [Code]
- **Semantic Role Labeling on NomBank Dataset**: Developed a GCN + Bi-LSTM model to accurately identify argument-predicate relationships within sentences by utilizing syntactic and contextual features, including dependency relations, POS tags, word and lemma embeddings that yielded a F1-score of **0.83**. - [Code]
- **Smart Mental Health Monitoring using Wearable Sensors (Runner up - Qualcomm Software Hackathon 2020)**: Designed and implemented an LSTM-based stress detection model using time-series data consisting of both wrist features and chest features emulated as wrist features. Achieved a remarkable accuracy of **90%**.
- **Human Neuron Inspired CNN architecture for Music Emotion Recognition**: Designed a CNN-based Music Emotion Recognition model that mimics the way a human brain responds to an emotion i.e. by firing a specific set of neurons for each emotion. It yielded an accuracy of **82%** with the additional benefit of fewer computational parameters. - [Project Report]

Programming Skills

- **Languages**: Python, C++, MATLAB, C, Java, R, SQL
- **Technology Stack**: Pytorch, Tensorflow, Keras, Docker, Tableau, Scipy, Scikit-learn, NLTK, Pandas, Django, Perforce, Git
- **Databases**: MySQL, MongoDB, PostgreSQL, Oracle DB