Vinay Samuel

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vinaysamuel2003

Education

Carnegie Mellon University **GPA: 3.55/4.00**
Statistics and Machine Learning *June 2025*

Relevant Coursework

(PhD)Introduction to Deep Learning [**Python**, **PyTorch**], (PhD)Convex Optimization, Computer Vision (**Python**), (PhD) Advanced Natural Language Processing, Introduction to Machine Learning [**Python**, **PyTorch**], AI Problem Solving and Representation, Linear Algebra

Experience

Research Experience

QA Synthetic Dataset Research Team **Remote**
NLP Researcher, *Advised by Aman Chadha, Senior Scientist at Amazon* *Apr 2023 – Aug 2023*

- Leveraged **GPT-4** to generate 200k+ QA pairs, boosting diversity of training data and for smaller Bert-like LMs [**Hugging Face**] to generalize to out-of-domain questions competing with gold standard human annotated data sets such as SQuAD.
- Augmented 4 low resource datasets using GPT4 in order to increase exact match by 5% - 27% and f1 score by 2% - 15% on test datasets of three well known low resource datasets.
- Co-authored paper showcasing methodology and results for using large language models to synthesize QA training data generation which currently has multiple citations. ArXiv publication: https://arxiv.org/abs/2309.12426

ASR Lattice Re-scoring Research Team **Remote**
NLP Researcher, *Advised by Aman Chadha, Senior Scientist at Amazon* *Jun 2023 – Sept 2023*

- Implemented a novel contextual speech recognition system using semantic lattice rescoring to integrate contextual features, achieving a 14.88% reduction in WER on the LibriSpeech test set
- Developed a Transformer-based neural network architecture in **PyTorch** for lattice rescoring to leverage contextual information and long-range dependencies
- Conducted experiments with different lattice representations, comparing GMM and DNN acoustic models to analyze performance impacts and submitted finding to ICASSP conference. ArXiv publication: https://arxiv.org/abs/2310.09680

Xu Lab at Carnegie Mellon University **Pittsburgh, PA**
Image Classification and Computer Vision Intern *Oct 2021 – June 2022*

- Fine-tuned the state-of-the-art imaging models using **Tensorflow** to make tile-level mutational signature predictions and the **LSTM** to make patient-level predictions from the intermediate layer embeddings of the **ResNet CNN model**.
- Leveraged statistical modeling and cross validation to determine optimal hyperparameters for model.
- Achieved 1.2% increase in previous accuracy which would help augment clinicians to assess and detect a wide variety of conditions such as smoking and UV radiation exposure.

Skills

Programming Languages

Python, C++, R, Tensorflow, Keras, NumPy, PyTorch, OpenCV, Large Language Models, Hugging Face, CUDA, AWS
Automatic Speech Recognition, Question and Answering Systems, Computer Vision, NLP, Statistical Modeling
Kubernetes, Git

Publications

Can LLMs Augment Low-Resource Reading Comprehension Datasets? Opportunities and Challenges
Vinay Samuel, Houda Aynaou, Arijit Ghosh Chowdhury, Karthik Venkat Ramanan, Aman Chadha, arXiv preprint

Improved Contextual Recognition In Automatic Speech Recognition Systems By Semantic Lattice Rescoring
Ankitha Sudarshan, Vinay Samuel, Parth Patwa, Ibtihel Amara, Aman Chadha, arXiv preprint