Syed Arbaaz Qureshi (he/him/his)

arbaaz.qureshi29@gmail.com Google Scholar linkedin.com/in/arbaazqureshi/ arbaazqureshi.me

Education

University of Massachusetts Amherst *September 2021 - May 2023*
Master of Science in Computer Science. **GPA: 4.0/4.0**

Indian Institute of Technology Patna *August 2015 - May 2019*
Bachelor of Technology in Computer Science and Engineering. **GPA: 8.2/10**

Skills

Concepts: Natural Language Processing, Large Language Models, Deep Learning, Machine Learning, Data Science, Retrieval Augmented Generation, Transformers
Software/Toolkits: TensorFlow, Keras, PyTorch, LangChain, LlamaIndex, NumPy, SciPy, Pandas, Scikit-learn, MatPlotLib, Plotly, MySQL
Programming languages: Python, Java, C#, C, MySQL, CosmosDB, Distributed Systems, MS Azure, AWS, Shell Scripting

Work Experience

Lowe's Companies, Inc. Data Scientist (L4). *July 2023 - Present*
• Advisor: Dr. Surya Kallumadi

• Projects:
1) Conversation guided recommender System using LLMs:

- Built a multi-modal chatbot for product discovery/purchase/comparison and home improvement question answering for the shopping website. Currently building an evaluation system for the chatbot.
- Worked with different LLMs (different GPT models, Gemini, LLaMA etc), and with different paradigms of in-context learning (few shot learning, chain-of-thought reasoning, retrieval augmented generation for home improvement project question answering) to realize an efficient chatbot.

2) Context-aware query auto-completion system:

- Built a query auto-complete system that suggests auto-completions based on semantic similarity with the user session's previous queries. This system is deployed on Lowe's website.
- The developed framework shows improved recall and a reduced average number of characters typed for the ground truth to appear in the auto-complete suggestions. A/B test reveals a 1% increase in product conversion rate and about 2% increase in user engagement with the auto-complete suggestions.
- Currently working on capturing product associations (example, hammer → nails) based on historical query logs. Trying out embedding based and association rule mining based approaches.

IBM. Graduate Student Researcher. *February 2023 - June 2023*
• Advisors: Dr. Taesung Lee and Dr. Youngja Park
• Project: **Towards generating informative textual description for neurons in language models [AAAI-24]:**

- Devised a method to obtain text descriptions per neuron, of concepts that activate those neurons in a BERT model. Our method alleviates the requirement of Human in the loop, to generate the text descriptions.
- Created a dataset of 72K Amazon reviews and their annotated concepts, using various open-source LLMs like Flan-T5 XL and Pythia 12B. Analyzed which annotated concepts trigger neurons in the BERT language model using this dataset.

Google. Engineering Intern in the Pixel Watch Ambient Compute team. *September 2022 - December 2022*
• Advisor: Dr. Cac Nguyen
• Project: **Low latency off-body detection on the Google Pixel Watch**

- Created an end-to-end framework which loads and processes wear data from the cloud, trains any generic neural network on the wear data to detect whether the watch is on-wrist or off-wrist, and evaluates how the network performs in a real-world setting.

· Performed extensive experimentation (building, debugging, training and evaluation) with different convolutional neural networks and different off-body detection algorithms, and achieved a performance which competes with the deployed heuristic algorithm.

Microsoft Research. Research Fellow in team Sankie. *August 2019 - August 2021*
• Advisors: Ms. Sonu Mehta, Dr. Rahul Kumar & Dr. Ranjita Bhagwan
• Project: **ML for DevOps tasks involving code-edits**

· Tasked with generating commit messages, and automatically classifying edit, based on the content of the commit.

· Scraped commit-commit message pairs from more than 1000 GitHub repositories. Built ACMG (Automatic Commit Message Generator), based on an existing work code2vec, and trained it on the scraped dataset.

· Built edit2vec (an extension of code2vec) for automatic code edit classification. Trained and analyzed it on the ManySStuBs4J dataset, and on another dataset that we collected.

· Achieved an accuracy of over 99% on code edit classification. Discovered code2vec isn't generalizable to other downstream tasks.

AI-NLP-ML lab, IIT Patna. Research Assistant. *August 2018 - May 2019*
• Advisors: Dr. Sriparna Saha, Dr. Gaël Dias & Dr. Mohammed Hasanuzzaman
• Projects:
1) Multitask representation learning for multimodal estimation of depression severity [IEEE IS 2019]

· Developed different multitask learning model architectures to learn representations of individual modalities, by simultaneously predicting depression severity score and class.

· Outperformed the state of the art by 4.93% on RMSE and 1.50% on MAE. Set new baseline for depression classification, 66.66% accuracy and 0.53 F1-score.

2) Multitask learning to concurrently estimate emotion intensity and depression severity [IEEE CIM 2020]

· Designed and trained various multitask learning model architectures (fully shared, shared private and adversarial shared private) to concurrently predict depression score and emotion intensity using text data.

· Showed that substantial performance improvements in predicting the depression severity can be achieved by using emotion-aware models.

Selected project

Research Paper Tagger (RPT), with Dr. Mohit Iyyer, at UMass Amherst.
Objective: Automatically tagging the research track of an NLP paper, given the title, abstract and the authors.

· Built a dataset of 1744 research paper-research track pairs from ACL 2021, 2020 and 2019. Fine-tuned a BERT-based classifier on the collected dataset, on various combinations of title, abstract and the authors of the research papers.

· Achieved a top-1 accuracy of 70% and a top-3 accuracy of 83% on the test split of the collected dataset. Working on publishing this work in a conference/workshop.

Publications

1. **Towards generating informative textual description for neurons in language models**
   Association for the Advancement of Artificial Intelligence (AAAI), 2024 [To be released on Feb 20, 2024]
2. **Gender-Aware Estimation of Depression Severity Level in a Multimodal Setting**
   International Joint Conference on Neural Networks (IJCNN), 2021. [pdf]
3. **Improving Depression Level Estimation by Concurrently Learning Emotion Intensity**
   IEEE Computational Intelligence Magazine (IEEE CIM), Volume 15, Issue 3, 2020. [pdf]
4. **Multitask Representation Learning for Multimodal Estimation of Depression Level**
   IEEE Intelligent Systems, Volume 34, Issue 5, 2019. [pdf]
5. **Automatic Prediction of PHQ-8 Questionnaire Scores using Artificial Intelligence**
   French Journal of Psychiatry, Volume 1, Supplement 2, 2019 [pdf]