Shashank Kirtania

Research Fellow, PROSE Team
Microsoft

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LinkedIn | GitHub |
Website | Google Scholar

Education

Thapar Institue of Engineering and Technology 2019 - 2023
Computer Engineering

Research Interests

Reasoning and Planning with Foundational Models, Multi-Agent systems, AI4Code, Neuro-Symbolic reasoning

Experience

Microsoft Research Sep. 2023 – Present
Research Fellow (Predoctoral) with the PROSE group *Remote / Bengaluru*

Wadhwani AI Jan. 2023 - July 2023
Machine Learning Research Intern *Remote / Bengaluru*

Google Summer of Code, PyMC May 2022 - Sep 2022
Open Source Contributor *Remote*

Indian Institute of Technology, Delhi June 2022 - July 2022
Research Intern *Remote*

Indian Institute of Information Technology June 2021 - May 2022
Research Intern *Remote*

Publications

- Priyanshu Gupta*, **Shashank Kirtania***, Ananya Singha, Sumit Gulwani, Arjun Radhakrishna, Gustavo Soares. *MetaReflection:Learning Instructions for Language Agents using Past Self-Reflections.* *preprint* ***under review in EMNLP 2024***
- **Shashank Kirtania**, Priyanshu Gupta, Arjun Radhakrishna. *Logic-LM++: Progressive Refinement in Semantic Comprehension can Improve Logic Enhanced LM Systems* Natural Language Reasoning and Structured Explanations Workshop @ **ACL 2024** *link*
- **Shashank Kirtania**, Shalini Batra. *NoTouch: Contactless Fingerprint Verification.* **Best Capstone Research Project *2023***
- Tejasvee Bisen, M Javed, **Shashank Kirtania**, P Nagabhushan. *DWT-CompCNN: Deep Image Classification Network for High Throughput JPEG 2000 Compressed Documents.* **Pattern Analysis and Applications, Springer, 2023** *link*

Technical Skills

Languages: Python, C++, C#, TeX, Shell, MATLAB*, Julia* * = Elementary Proficiency
Software and Tools: PyTorch, AutoGen, Langchain, Fairseq*, Flask, Git, Docker, Postman

Selected Projects

Multi-Agent Learning Systems Sep. 2023 - May 2024
Advisor: Dr. Gustavo Soares, Dr. Sumit Gulwani

- Built pipeline for using LLMs as psuedo-domain experts for instruction learning for multi hop reasoning problems.
- Employed novel strategy of automatic instruction learning to optimize performance of LLM agents in static & dynamic environments. Used this technique to improve performance of smaller LLMs in code & ReAct pipelines.
- Worked on improving automated refinement using qualitative measures for code.

Repo Level Code Repair Jan. 2024 - Present
Advisor: Dr. Gustavo Soares, Dr. Arjun Radhakrishna

- Worked on fixing component governance issues from the alerts for C# using tool aided LLM system. Used roslyn based tools to improve code understanding for LLMs to manage large code bases.
- Working on automatic bug reproduction for a given github issue in a repository to improve bug localisation for LLM to fix.
- Working on automated task decomposition for automated repair to leverage human in the loop to assist LLM for automatic code repair.

Phonetically Aware Word Recommendation Jan. 2023 - Mar. 2023

Advisor: Dr. Soma Dhavala

- Curated dataset for English and Gujarati for students from grade 2 to grade 10 for phonetic assesment.
- Created RICE translation Scheme for Gujarati to breakdown words phonetically at unicode level.
- Trained encoder to cluster words using unicodes for English & Gujarati for phonetic similarity across languages.

Indic Speech Recognition & Verification Apr. 2023- June 2023

Advisor: Prof. Makarand Tapaswi

- Finetuned AI4Bharat Wav2Vew2.0 model for child speech recognition in Gujarati. Used these finetuned models for Oral Reading Fluency evaluations in over 5000 schools in Gujarat.
- Finetuned NeMo based speech verification model for fair evaluations for Oral Reading Fluency assessments.

Contactless Biometric Verification Jan. 2022 - Dec. 2022

Advisors: Prof. Shalini Batra, Prof. Prashant Rana

- Worked on image processing pipeline using traditional image processing filters like Gabor filter, Sobel filter to introduce strong image refinement with minimal degradation in image quality.
- Worked on remote fingerprint verification systems that uses specialised Encoder to breakdown fingerprint photos and fingerprint scans to an embedding space for biometric verification.
- Trained U-net styled architecture from scratch to create dense embedding for fingerprint photos, achieved an EER of 4.7% competitive to other deep learning methods for fingerprint verification.

Classification of Images in Semi-compressed domain June 2021 - May 2022

Advisors: Dr. Mohammad Javed

- Implemented Hight-Throughput JPEG2000 image compression algorithm to compress images using Discreet Wavelet Transformations.
- Used DWT coefficients to leverage different bands for classifying semi-compressed images using CNN architecture.
- Implemented and bench marked SOTA CNNs for Image classification on curated dataset.

Autofill for data manipulation in Julia Aug 2023

Julia, Programming by Example

- Implemented PBE based approach same as FlashFill, to generate programs from input-output examples.
- Developed DAGs with iterative intersection and unification functions for data process optimization.

Sticky-Stuff incident analysis with PyMC Dec 2022

Statistical Modeling, PyMC

- Implemented a change-point model from scratch using PyMC to interpret raw data from MLB 2021 stats of pitcher's swing rates to find the exact date of new regulations on tampering.
- Presented work at PyData Delhi in 2023.

Achievements and Position of Responsibilities

- Student Volunteer at ACM SIGPLAN Programming Languages Design and Implementation 2024.
- Positioned 6th nationally among 5000 + teams in Amazon Machine Learning challenge 2023.
- Bronze Medal in American Express Time Series Forecasting Challenge 2022.
- PyData Delhi talk on Introduction to Probabilistic Programming.
- Joint Secretary of Creative Computing Society at TIET in 2022.
- Head of Photography at Fine Arts and Photography Society at TIET in 2021.
- Top 20 percentile in Facebook Hackercup 2020 in Round-1.