Kushal **Majmundar**

Pre-doctoral Researcher, Google Research

Homepage @ majmundarkushal9@gmail.com Github Google Scholar

Education

2016 - 2020 | **B. Tech (Honors) in Computer Science and Engineering** **CGPA: 9.12/10**
International Institute of Information Technology, Hyderabad

Work Experience

Present Aug 2020 | **Google Research | Machine Learning and Optimization Team** **Bangalore, India**
Pre-Doctoral Researcher | Advisors: Dr. Prateek Jain, Dr. Praneeth Netrapalli
Exploring various techniques for learning tabular representation in a self-supervised manner and making already available models at Google space and time efficient.

Aug 2020 Jul 2020 | **Microsoft IDC** **Hyderabad, India**
Software Development Engineer
Maintained the internal database solution and pipelines at Microsoft and developed a Data Quality Service for high frequency data.

Sep 2020 May 2020 | **OWASP** **Remote**
GSOC Fellow
Made open-source contributions by introducing Intrusion detection and prevention in SecureTea by using ML based security algorithms, loggers along with making it easily and securely deployable to servers.

Jul 2019 May 2019 | **Walmart Labs** **Bangalore, India**
Intern
Wrote a pipeline for Auto-conversion of ML-models given in R, Python, Scala, Tensorflow or Java to a common importable bundle for a faster setup of models on server and deployed them using google dataflow with auto-scaled resources.

Aug 2020 Apr 2018 | **International Institute of Information Technology** **Hyderabad, India**
Student Researcher

- Worked as a honors student at Machine Learning Lab under the guidance of Dr. Praveen Paruchuri on co-operative target observation in a multi-agent environment using optimization and RL.
- Worked with Dr. Vasudeva Verma at the Information Retrieval and Extraction Lab on setting the notion of context collapse in social media and devising a method to detect and tackle the same as part of an Independent Study.
- Worked with Dr. Manish Shrivastava at Language Techonologies Research Center on a linguistic perspective to tackle Noun-Phrase Ellipsis.

Research Projects

Tabular Representation Learning Nov'21 - Present
Advisors: Dr. Prateek Jain, Dr. Praneeth Netrapalli

- Masked Reconstruction based Auto-Encoder to learn meaningful representations for tabular data at an entity level.
- Beats current SOTA methods and traditional techniques across nine datasets of various domains and sizes on an average by 4% .
- Learns meaningful representations at a feature level and captures co-relations in-line with the real-world observations.

Model Optimization - GoogleOCR Aug'22 - Present
Advisors: Dr. Prateek Jain

Developed an optimization technique using a combination of SVD and ILP which helped achieve a 10% drop in on-device cpu latency and 33% drop in FLOPS for the current OCR model deployed in google products.

Knowledge Verification Apr'22 - Present
Advisors: Dr. Roee Aharoni

An extension of approaches like Q^2 and TRUE to develop a new metric for Knowledge-Verification in LLMs using linguistic/deep-learning manipulations to convert question-answer pairs to sentences

Efficient KeyWord Spotting Sept'21 - Jan'22

An efficient alternative to ASR to perform on-device multi-lingual keyword spotting using shared-embeddings across languages for use-cases internal to google.

Multi-Agent Co-operative Target Observation May'18 - Apr'20

Advisors: Dr. Praveen Paruchuri, Dr. Naresh Manwani

- Explored and developed different approaches to perform Muti-Agent Co-operative Target Observation with a limited sensor range and communication capabilities among the agents by formulating it as a Linear Programming Problem. Later extended the approach using Actor-Critic based methods.
- Developed a co-operative target observation based solution for CognitiveScale to detect various attacks in HFT stock market environments. Was able to achieve recall as high as 74% in environments with trade frequency as high as 300K trades/hour.

Noun Phrase Ellipsis Detection and Resolution Aug'19 - July'20

Advisors: Dr. Manish Shrivastava, Payal Khullar

Created a dataset with annotations of Noun-Phrase Ellipsis and it's resolutions and developed a BERT based approach to detect and resolve the same.

Context Collapse Aug'19 - Apr'20

Advisors: Dr. Vasudeva Varma

Independent study around the abstract idea of context collapse and why does it exist. Further developed a framework using sentiment analysis and natural language inference.

Publications

MET: Masked Encoding for Tabular Data [🔗]
Kushal Majmundar, Sachin Goyal, Praneeth Netrapalli, Prateek Jain
NeurIPS 2022 First Table Representation Workshop
Under Submission: The International Conference on Learning Representations, 2023 [**TRL'22, ICLR'23**]

Cooperative Monitoring of Malicious Activity in Stock Exchanges [🔗]
Bhavya Kalra, Sai Krishna Munnangi, Kushal Majmundar, Naresh Manwani, Praveen Paruchuri
Trends and Applications in Knowledge Discovery and Data Mining [**PAKDD'21**]

NoEl: An Annotated Corpus for Noun Ellipsis in English [🔗]
Payal Khullar, Kushal Majmundar, Manish Shrivastava
Proceedings of the Twelfth Language Resources and Evaluation Conference, Marseille, France [**LREC'20**]

Achievements

Dean's List and Merit List Awarded **Dean's list** award for academic excellence for being in top 5% of my class for **four** semesters and **Merit List** award for **three** semesters.

Won Multiple Hackathons

- **Runner Up** - Education Track at SigmaHacks3 : Developed an efficient way to use **Deep Fakes** for Educational purposes.
- **Ranked 5** globally in **GS Quantify** online round.
- Second runner's up **Qualcomm, Megathon** as a team of 4 where we achieved a 99.5% test accuracy for matching paper abstracts with summaries using traditional linguistic approaches.
- Won the **Walmart Hackathon** as a team of 2 by developing a working prototype of an offline conversational bot using DNN's and linguistic manipulations.

IIT JEE Ranked in National Top 0.04% (amongst 1,200,000 candidates) in JEE Mains 2016 and Top 2% (amongst 2,00,000 candidates) in IIT-JEE Advanced 2016.

Teaching and Leadership Roles

International Institute of Information Technology *Teaching Assistant* Aug 2018-May 2020

- Teaching Assistant for Machine, Data and Learning course where I helped create assignments around decision trees.
- Teaching Assistant for Compilers course where I helped students to build their own Programming Language from ground-up.
- Teaching Assistant for Science-1 course where I helped evaluate the answer sheets and help them with reading groups.

Ping! [🌐] *Web Admin and Team Head* Aug 2018- Jun 2020

- Managed the website page, blogs, themes and security aspects of it along with severing side details like routing, load balancing, etc.

Skills

Working Knowledge	Tensorflow, Keras, Scala, Dataflow, MLeap, LinearPrograming(IBM CPLEX,PULP), Linux, Kubernetes, Git, Docker, Bash Scripting, Flask, BSoup etc.
Past Experiences	PyTorch, OpenAI gym, K8s, Bison, Flex, VMD, Node.JS, OpenGL, Unity, WireShark etc.

Miscellaneous

- Represented college at multiple inter-collegiate basketball tournaments.
- Humble CTF and Security enthusiast.