Manav Singhal

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Education

National Institute of Technology, Karnataka (NITK) Surathkal, India
B.Tech. in Electrical and Electronics Engineering (with a minor in Computer Science). *July 2018 – July 2022*

- GPA: **9.03/10.00**

Research Experience

Microsoft Research India
Research Fellow. *Mentors: Nagarajan Natarajan, Aditya Kanade, and Nishanth Chandran* *July 2022 - Present*

Carnegie Mellon University
Robotic Institute Summer Scholar. *Mentors: Katia Sycara and Dana Hughes* *June 2021 - Dec 2021*

Microsoft Research NYC
Independent Research Developer. *Mentors: Pavithra Srinath and Olga Vrousgou* *May 2021 - Sept 2021*

Research Projects

Developer Copilots to Software Engineering Copilots
Mentors: Nagarajan Natarajan and Aditya Kanade *Feb 2023 - Present*

- Developing benchmarks and evaluation methodologies for code generation with LLMs, focusing on evaluation of non-functional requirements of the generated code.
- Devised a new metric DiffBLEU, which avoids the repetition bias in the BLEU score providing a more accurate measure for the code generation performance.

One-shot Federated Learning Solution for Non-IID Setting
Mentors: Nishanth Chandran, Divya Gupta and Dimitrios Dimitriadis *July 2022 - Feb 2023*

- Led efforts to enhance the accuracy of global model trained in a challenging one-shot federated learning setup with clients trained on non-IID data.
- Achieved over 5% increase in accuracy compared to baselines in our most non-IID setting by combining client logits and encoder output from a pre-trained autoencoder.

Explanations in Multi-Agent Search and Rescue task
Mentors: Katia Sycara and Dana Hughes *June 2021 - Dec 2021*

- Worked on approaches for imparting explainability in approaches for multi-agent search and rescue tasks by modeling agent beliefs.
- Implemented the approach using a multiple-observer model, interpreting decisions through queries to a belief state in a simulated search and rescue task in Minecraft.

Empirical Analysis of Privacy Preserving Learning
Mentors: Pavithra Srinath and Olga Vrousgou *May 2021 - Sept 2021*

- Achieved competitive performance between the public model without access to the user feature mapping and the private model with access in our analysis of our privacy-preserving feature in the VowpalWabbit library.
- Implemented two different approaches for the feature and compared the existing benchmarks performances of each, released in VW-9.0.0. [Slides], [Source]

Publications

Code LMs, You Understand and *then* Code, Don't You?
***Manav Singhal**, Tushar Agarwal, Abhijeet Awasthi, Nagarajan Natarajan, Aditya Kanade*
Manuscript in preparation.

Fed-Encoder: A One-Shot Federated Learning Solution
***Manav Singhal**, Nagarajan Natarajan, Dimitrios Dimitriadis, Divya Gupta, Nishanth Chandran*
Pre-Print

Explanations in Multi-Agent Search and Rescue Task
***Manav Singhal**, Vidhi Jain, Dana Hughes, and Katia Sycara*
RISS Working Papers Journal 2021.

Awards and Honors

- Selected for the Robotics Institute Summer Scholar (RISS) Program 2021 to pursue a summer research internship at the **Robotics Institute, Carnegie Mellon University**. Among 58 selected globally out of 700+ applicants.
- Selected for the Reinforcement Learning Open Source Fest (RLOSF) 2021 to pursue a summer research project with **Microsoft Research, New York City**. Among 10 selected globally out of 200+ applicants.
- Awarded the Summer Research Fellowship (SRFP) 2020 conducted by the **Indian Academy of Sciences** (IAS) to pursue a summer research internship at **IISc Bangalore**. Among top 5% selected out of 25,000+ applicants.
- Recipient of the OP Jindal Engineering Scholarship (OPJEMS) 2019. Among 80 selected out of 1100+ applicants.
- Ranked **3rd** amongst 75+ participants in Dishathon, a hackathon organized by **DishTV**.

Selected Projects

Train Scheduling using RL

IAS Summer Research Fellow. *Mentor: Shalabh Bhatnagar* *May 2020 - July 2020*

- Worked on evaluating single-agent approaches, such as Dueling Deep Q Networks and Proximal Policy Optimization on the multi-agent Flatland environment for efficient train scheduling.

Using Class Activation Maps for Textual Entailment

Research Intern. *Mentor: Niloy Ganguly* *May 2019 - June 2019*

- Studied Class Activation Maps in NLP to understand the words affecting the textual entailment prediction being made by the CNN model on the SNLI dataset.

Mentorship, Leadership and Extra-Curricular

- Part of the RISS 2021 Working Papers Journal team.
- **Secretary** of Web Club NITK: Coordinated 20+ computer science events organized for a group of 70+ students.
- **Executive Member** of IEEE NITK: Mentored 15+ students in CS summer program and recorded a podcast of my research journey to guide junior undergraduate students.
- **Finalist** at the Speak For India 2019 edition.
- **Finalist** at the Team India selections for World School Debating Championship 2017.

References

Nishanth Chandran nichandr@microsoft.com
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Nagarajan Natarajan nagarajan.natarajan@microsoft.com
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Aditya Kanade kanadeaditya@microsoft.com
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