PRASHANT RANGARAJAN

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EDUCATION

University of Washington, Seattle 2020 – Fall 2026 (expected)
· MS & PhD Computer Science & Engineering
· Research: **Reinforcement Learning**, **Machine Learning**, **Active Inference**, **Large Language Models**

Birla Institute of Technology and Science, Pilani, Pilani Campus 2015 – 2020
· BE (Honors) in Computer Science and MSc (Honors) with Distinction in Mathematics. CGPA: 9.7/10

TECHNICAL SKILLS

Machine Learning & Artificial Language (ML/AI): Reinforcement Learning, Deep Learning, Active Inference, Causal Inference, Transformers, Autoregressive Modeling, Large Language Models, Prompt Engineering, Retrieval-Augmented Generation (RAG), Graph Neural Networks (GNNs), Natural Language Processing (NLP), Time-Series Forecasting, Multi-Agent Learning

Programming: Python, C

Frameworks & Tools: PyTorch, Scikit-learn, Hugging Face, NumPy, Pandas, SQL, Matplotlib, Git, Copilot and other AI assisted tools

PUBLICATIONS

Rangarajan, P. and Rao, R.P. (2025) Hierarchical planning using active inference and successor representations (expanded version; under revision in the journal *Neural Computation*).

Rangarajan P and Rao RP (2023). Hierarchical planning using active inference and successor representations, *Conference on Cognitive Computational Neuroscience*, 1221.

Rangarajan P and Rao RP (2019). Estimation of vector autoregressive parameters and Granger causality from noisy multichannel data, *IEEE Transactions on Biomedical Engineering,* **66**, 2231-2240.

Rangarajan P, Mody SK, and Marathe M (2019). Forecasting dengue and influenza incidence using a sparse representation of Google Trends, electronic health records, and time series data, *PLOS CompBio* **15**, e1007518.

RESEARCH & PROJECT EXPERIENCE

University of Washington, Seattle, *PhD Researcher* 2020 – Present
· Devised a brain-inspired memory augmentation large language model for **RAG** based architectures
· Designed a **hierarchical reinforcement learning** framework using **successor representations** to learn abstract states and actions, improving planning efficiency and sample complexity
· Developed a **brain-inspired hierarchical planning** algorithm via **active inference**, demonstrating stronger generalization across tasks
· Analyzed generalization bounds for **performative prediction** in single and multiplayer game-theoretic settings (**multi-agent learning**, adversarial ML)
· Investigated high-dimensional statistics (concentration bounds, random matrices) and their applications to **transformer-based architectures** and **LLMs**

Indian Institute of Science (IISc), Bangalore, *Research Intern* 2017, 2019 – 2020
· Built **semi-supervised** and **active learning** algorithms for **knowledge graphs** using **GNNs**, improving performance on sparse or low-resource settings
· Researched advanced probability theory including **martingales** and **stochastic differential equations**; applied these concepts to **mathematical finance** for pricing various **options**

University of Virginia, Charlottesville, *Research Intern* 2018 – 2019
· Led end-to-end **data science** project forecasting dengue and influenza outbreaks using **ML** on Google Trends, Electronic Health Records, and epidemiological time series
· Proposed a **sparse representation learning** method achieving **18% lower forecasting error** as compared to the existing state-of-the-art; results published in *PLOS Computational Biology*

École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, *Research Intern* May – July 2018

· Optimized **cross-lingual word embeddings** for **NLP** in low-resource languages, achieving **up to 2x improvement** as compared to baseline embeddings for certain pairs of languages, using metrics such as mean reciprocal rank and precision/recall@k

University of Washington, Seattle, *Research Intern* 2017 – 2018

· Proposed a new method for learning **vector autoregressive (VAR)** models and **Granger causality** from noisy multichannel data; achieving a **50% reduction in estimation error** of peak Granger causality as compared to the existing state-of-the-art; results published in *IEEE Transactions on Biomedical Engineering*

HONORS & ACHIEVEMENTS

Indo-US S.N. Bose Scholar: One of 50 students selected across India 2019

Canada-Mitacs Globalink Research Internship: Selected but did not attend 2019

EPFL Summer Internship in Computer Science: 64 selected from 3,500 worldwide 2018

KVPY Scholar: All-India Rank 67/150,000; IISc, Bangalore admission offer 2014

National Talent Search Examination Scholar: Top 0.1% nationwide 2011