Niranjana Deshpande

niranjanadeshpande95@gmail.com linkedin.com/in/niranjanadeshpande/ niranjanadeshpande.github.io

Education

Ph.D. in Computing and Information Sciences Present
Rochester Institute of Technology *Rochester, NY*

Bachelor of Computer Engineering; First Class with Distinction (Top 10% of University of Pune) May 2017
MKSSS's Cummins College of Engineering *Pune, India*

Skills

Programming Languages: Python, R, Java, C, C++, SQL.
Machine Learning: Reinforcement Learning, LSTM, Convolutional Neural Networks (CNNs), ARIMA, Support Vector Machines, Random Forests, Decision Trees, Graph Neural Networks, Meta-Learning, Optimization, Universal Sentence Encoder.
Tools/Languages: Keras, PyTorch, Pandas, NumPy, scikit-learn, Matplotlib, NLTK, TensorFlow, git, tmux, SLURM, MySQL, MongoDB.

Professional Experience

Rochester Institute of Technology Rochester, NY
Ph.D. Candidate *Aug. 2017 - Current*

- Led **applied machine learning research** resulting in ***8 research articles***. **Awarded best paper** at the IEEE International Conference on Web Services 2021.
- Prototyped a framework for automated software construction to **reduce *time and memory usage by 55% and 37.5%***.
- Designed a recommendation system to select APIs during software library migration using **evolutionary algorithms and natural language processing (NLP) techniques** with **72% precision**.

Amazon Seattle, WA
Data Scientist Intern *Jun. 2022 - Sep. 2022*

- Developed **semi-supervised** models to classify EC2 workloads with ***50% recall and 70% precision***.
- Prototyped an efficient deep semi-supervised learning approach, ***reducing maintenance time by 30%***.
- Created an interpretability module to analyze feature importances in deep neural network models using shapley values.
- Delivered **research talks** on **deep semi-supervised learning**, and **algorithm selection** for web services.

Conduent Innovation Labs Raleigh, NC
Data Science Intern *May 2019 - Aug. 2019*

- Collaborated closely with business leaders to uncover and assess prospects for machine learning initiatives using a large **dental claims dataset** with **tens of millions of claims**.
- Developed SVM, ARIMA, and LSTM-RNN time-series models to predict dental claims costs with 70% accuracy.
- Generated and communicated **data-driven insights** to stakeholders regarding consumer behavior and forecasts of dental claims costs.

Projects

Self-Adaptive Service Composition Using Algorithm Selection

- **Tools:** Python, NumPy, Pandas, Matplotlib, Sklearn, SLURM, scikit-learn, Seaborn.
- Devised an adaptive framework for service-oriented systems to recommend 4 optimization algorithms using contextual multi-armed bandits and supervised learning resulting in **55.1% time** and **37.5% memory savings**.

Using Graph Transfer Learning for Algorithm Selection

- **Tools:** Python, Deep Graph Library (DGL), Graph Isomorphic Network (GIN), Transfer Learning, PyTorch, R.
- Designed an approach to recommend algorithms for service-oriented instances using the GIN model with 75% accuracy. Investigated cross-domain algorithm prediction using contrastive loss and dataset augmentation for transfer learning.

Automated API Recommendation for Library Migration Using Search-Based Techniques

- **Tools:** Python, Java, MOEA Framework, PyMOO, MySQL, Universal Sentence Encoder, NSGAII.
- Designed an approach for automated API recommendation using evolutionary algorithms such as GA, NSGAII, AGEMOEA and USE network to achieve 72% precision on 9 Java library pairs.

Empirical Evaluation of Gated Recurrent Networks for Visual Object Tracking

- **Tools:** TensorFlow, OpenCV, Visual Object Tracking (VOT) Toolkit, Python, CNNs, LSTM, GRU.
- Conducted a **comparative study** of LSTM and GRU units in Real-time Recurrent Regression (Re^3) networks using the VOT 2014, VOT 2018 and ImageNet video benchmarks to achieve **accuracies of 71%, 51% and 32%** respectively.

Publications

1. **Deshpande, Niranjana**, Mohamed Wiem Mkaouer, Ali Ouni, and Naveen Sharma. 2023. Third-Party Software Library Migration at the Method-Level Using Multi-Objective Evolutionary Search. In Swarm and Evolutionary Computation (In Press).
2. **Deshpande, Niranjana**. 2023. Towards Algorithm Selection for Search-Based Software Engineering. Doctoral Symposium, ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE).
3. Aizaz Ul Haq, **Deshpande, Niranjana**, AbdElRahman ElSaid, Travis Desell, and Daniel E. Krutz. 2022. Addressing Tactic Volatility in Self-Adaptive Systems Using Evolved Recurrent Neural Networks and Uncertainty Reduction Tactics. In Proceedings of the Genetic and Evolutionary Computation Conference (GECCO '22).
4. **Deshpande, Niranjana**, Mohamed Wiem Mkaouer, Ali Ouni, and Naveen Sharma. 2022. Search-Based Third-Party Library Migration at the Method-Level. In Applications of Evolutionary Computation.
5. **Deshpande, Niranjana**, Naveen Sharma, Qi Yu, and Daniel E. Krutz. 2022. Online Learning Using Incomplete Execution Data for Self-Adaptive Service-Oriented Systems. In 2022 IEEE International Conference on Web Services.
6. **Deshpande, Niranjana** and Naveen Sharma. 2021. Algorithm Selection Using Transfer Learning. In Proceedings of the Genetic and Evolutionary Computation Conference Companion (GECCO '21).
7. **Deshpande, Niranjana**, Naveen Sharma, Qi Yu, and Daniel E. Krutz. 2021. R-CASS: Using Algorithm Selection for Self-Adaptive Service-Oriented Systems, **Best Paper Award**. In 2021 IEEE International Conference on Web Services.
8. **Deshpande, Niranjana** and Naveen Sharma. 2020. Composition Algorithm Adaptation in Service Oriented Systems. In Software Architecture.

Honors and Awards

- **NSF Travel Award** at Foundations of Software Engineering (FSE) 2023.
- **Best Paper Award** at IEEE International Conference on Web Services (ICWS) 2021.
- WiML Registration Funding: **International Conference on Learning Representations (ICLR) 2021, International Conference on Machine Learning (ICML) 2020**.
- Student Grant, **IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS) 2020**.
- Selected as one of top 30 student teams for the Digital Pune Hackathon 2015 organized by Persistent Systems.

Invited Talks

- **Using Algorithm Selection for Service-Oriented Systems**, ASA DataFest, March 2023.
- **AI @ RIT**, AI Summit at RIT, October 2022.
- **Algorithm Selection for Service-Oriented Systems**, Amazon Web Services, September 2022.

Service

- **New in ML Workshop, NeurIps 2023**, Mentor/Reviewer.
- **Women in Machine Learning (WiML), NeurIps 2023**, Reviewer.
- **IEEE International Conference on Web Services (ICWS) 2023**, Sub-Reviewer.
- **AutoML Conference 2023**, Reviewer.
- **American Statistical Association's DataFest 2023**, Judge.

Teaching Experience

Introduction to Software Engineering (SWEN-261) RIT
Instructor *Fall 2023*

- Teaching an introductory software engineering class to 40 undergraduate students from various majors. I am responsible for teaching lessons, creating exams and course content, holding office hours, and directing two course assistants.

Engineering Self-Adaptive Software Systems (SWEN-749) RIT
Course Assistant *Spring 2019, Fall 2018*

- Course assistant for an advanced graduate elective on engineering self-adaptive systems to 15 graduate students from different majors. I was responsible for conducting paper discussions, grading, teaching, and addressing student questions during office hours.