Vishnu Dutt Sharma

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EDUCATION

University of Maryland, College Park *June 2020 - May 2024 (expected)*
Doctor of Philosophy (Ph.D.) in Computer Science
Advisor: Dr. Pratap Tokekar

Virginia Polytechnic Institute and State University *August 2019 - May 2020*
Doctor of Philosophy (Ph.D.) in Computer Engineering
Advisor: Dr. Pratap Tokekar
(*Transferred to University of Maryland, College Park*)

Indian Institute of Technology Kharagpur *July 2012 - June 2017*
Master of Technology, Bachelor of Technology
Major: Electronics & Electrical Communication Engineering
Specialization: Visual Information & Embedded Systems
Minor: Computer Science & Engineering

RESEARCH & DEVELOPMENT EXPERIENCE

Robotics Algorithms & Autonomous Systems Lab Aug'19 - Present
Graduate Research Assistant

- Working on interpretable decision making and risk-aware planning for multi-robot coordination
- Ongoing and prior work include Semantic Segmentation, Image Inpainting and Reinforcement Learning for robotic perception path planning

Comcast Corporation May'21-Aug'21
Graduate Research Intern, Applied AI for CX Team

- Contributed to the improvement of the maintenance truck scheduling system using learning algorithms
- Designed a deep learning architecture to replace the heuristic-based variables, and weak-supervision rules for label improvement
- Implemented data monitoring pipelines for the existing data, and data processing modules for the new variables with PySpark

American Express India Pvt Ltd Jul'17 - Jul'19
Risk Analyst, Machine Learning & Data Science Team

- Developed deep learning models for applications including fraud detection, credit authorization and new accounts approval with specific focus on RNNs
- Contributed towards deep learning model deployment, benchmarking on cloud platform (AWS) and analyzing emerging techniques like distributed learning
- Implemented a variable creation tool using RNN aimed for enterprise-wide adoption

FlytBase Labs (Formerly *NavStik Labs*) May'16 - Jul'16
Summer Intern

- Integrated Semi-Direct Visual Odometry (SVO) package with FlytPOD flight computer for indoor localization
- Analyzed position estimation with visual odometry incorporating SVO for simple and complex trajectories in GPS-denied and GPS-assisted conditions

- Achieved indoor relocalization error contained within 10cm for linear and circular trajectories

American Express India Pvt Ltd May'15 - Jul'15
Summer Intern, Commerce Data Science Team

- Designed a categorization algorithm using SKU (Stock Keeping Unit) description for retail items
- Implemented a rule-based categorization system in Python for generating database by web-crawling and processing results for web search with Natural Language Processing Toolkit (NLTK) and other open-source libraries
- Achieved 60% accuracy in categorizing item across type, gender and brand dimensions

PROJECTS

Empirical Study of Second-Order Optimizers for Deep Learning Applications
Studied the effect of architecture and data on CNN and MLP with SGD, L-BFGS, and K-FAC optimizers for regression and classification tasks

SegNet: Reproducibility and Qualitative Analysis
Analyzed reproducibility, generalizability, and effect of input image properties for SegNet architecture

DeepVO: A Deep Learning approach for Monocular Visual Odometry
Implemented a CNN-based solution for Monocular Visual Odometry for ground robot

Word Segmentation and Poetry Linearization in Sanskrit
Contributed to projects focused on deep learning-based solutions for *Sandhi* segmentation and poetry-to-prose conversion in Sanskrit texts. These projects resulted in three conference papers

Autonomous Aerial Vehicle
Worked on development of control stack of the Unmanned Aerial Vehicle. Part of the Best Team Co-operation Award-winning team at the International Aerial Robotics Competition 2016

Autonomous Underwater Vehicle
Contributed towards the development of the embedded and control stack of the underwater vehicle

Plagiarism Detection using Tree-kernel methods
Developed plagiarism detection algorithm using sub-tree kernel matching over the abstract syntax trees extracted from C source codes

Others Projects:
SmartKart (Semi-autonomous shopping cart), ROACH (Semi-autonomous all-terrain vehicle), Sirius (All-terrain vehicle with hybrid leg)

PUBLICATIONS

- **Sharma, V. D.**, Toubeh, M., Zhou, L., & Tokekar, P. (2020). Risk-Aware Planning and Assignment for Ground Vehicles using Uncertain Perception from Aerial Vehicles. In Proceedings of the 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS-2020).
- Krishna, A., **Sharma, V. D.**, Santra, B., Chakraborty, A., Satuluri, P., & Goyal, P. (2019, July). Poetry to Prose Conversion in Sanskrit as a Linearisation Task: A case for Low-Resource Languages. In Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL-2019).
- Krishna, A., Santra, B., Bandaru, S. P., Sahu, G., **Sharma, V. D.**, Satuluri, P., & Goyal, P. (2018). Free as in Free Word Order: An Energy Based Model for Word Segmentation and Morphological Tagging in Sanskrit. In Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing (EMNLP-2018).
- Reddy, V., Krishna, A., **Sharma, V. D.**, Gupta, P., Vineeth, M. R., & Goyal, P. (2018, May). Building a Word Segmenter for Sanskrit Overnight. In Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC-2018).

Under Review

- Zhou, L., **Sharma, V. D.**, Li, Q., Prorok, A., Ribeiro, A., & Kumar, V. Graph Neural Networks for Decentralized Multi-Robot Submodular Action Selection. *(Under review at IROS-2022).*
- **Sharma, V. D.**, Chen J., Shrivastava A., & Tokekar, P. Occupancy Map Prediction for Improved Indoor Robot Navigation. *(Under review at IROS-2022).*

TECHNICAL STRENGTHS

Languages & Scripts	Python, C++, C, PySpark, Hive, MATLAB
Packages & Frameworks	PyTorch, TensorFlow, OpenCV, AirSim, ROS

RELEVANT COURSEWORK

Advanced Techniques in Visual Learning and Recognition*, Deep Learning, Advanced Machine Learning, Computer Vision, Data Analytics, Decision Making for Robotics, Advanced Numerical Optimization, Empirical Research Methods in Computer Science, Natural Language Processing