Videsh **Suman**

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Interests: Autonomous Driving, Computer Vision, Deep Learning, Graphical Models, Reinforcement Learning

Education

University of Massachusetts (UMass) Amherst *Sep '19 - Present*

M.S. in Computer Science (GPA: **3.95/4.00**)

- Relevant Courses: Graphical Models, Computer Vision, Optimization, Advanced NLP (ongoing), Data Science Algorithms (ongoing)

Indian Institute of Technology (IIT) Bombay *Aug '15 - May '19*

B. Tech. in Civil Engineering

- Relevant Courses: Machine Learning, Deep Learning, Reinforcement Learning, Advanced Machine Learning, Medical Imaging

Research & Work Experience

Risk-Aware Traffic Interaction Modeling for Autonomous Driving | University of Maryland *June '20 - Present*

Research Internship under Prof. Aniket Bera, GAMMA Lab

- Proposing a novel learning framework for driving scene understanding that is safer for vulnerable road users like pedestrians
- Leveraging spatio-temporal graph convolutions to learn every road user's influence over the remaining traffic agents across time
- Evaluating the robustness of this driving framework on the task of causal risk identification in a label efficient manner

Data Informed Network Simulation | Microsoft Research India *May '19 - Jul '19*

Research Internship under Dr. Sundararajan S., Dr. Nagarajan N. & Dr. Venkat Padmanabhan

- Formulated a data-driven network simulator to learn the behaviour of network traces from ns-2 and real Skype calls
- Devised probabilistic and neural approaches for state space modeling to estimate a sequence of network states
- Evaluated state-transition models as well as the deepAR forecasting model for test data on metrics capturing network realism
- Derived a log-likelihood applicability score for a given test input trace, based on the ensemble of training data

Deep Statistical Downscaling of Rainfall Projections for Indian Landmass [report] [poster] *Sep '18 - Apr '18*

Undergraduate Thesis under Prof. Amit Sethi & Prof. Subimal Ghosh

- Leveraged the idea of deep super-resolution to predict spatial rainfall projections in 10× resolution, from 9 climate parameters
- Designed robust CNN architecture with dense blocks, and cyclic LR schedulers to achieve MSE of 5 mm/day (improving SOTA)

Intelligent Virtual Conversational Platform | Disney India *May '18 - Jul '18*

Internship in Consumer Technologies under Mr. Aftab Sheikh

- Designed conversations, and trained the agents for conversational assistance with effective intent & context recognition

Research Implementations

Semi-Supervised Learning for Vision-and-Language Tasks [report] [code] *Oct '19 - Dec '19*

Computer Vision under Prof. Subhransu Maji

- Implemented a recent semi-supervised learning approach MixMatch on the LXMERT framework, by strategically mixing-up the labeled and unlabeled multi-modal examples of a visual-language reasoning dataset, NLVR2.

Segmenting Bird Roosts from Weather Radar Data [report] *Sep '19 - Dec '19*

Independent Study under Prof. Daniel Sheldon & Prof. Subhransu Maji

- Fine-tuned MistNet, a deep seg-net proposed for radar scans, to eliminate large number of false positive bird roost detections
- Proposed transfer learning strategies and Mask-RCNN based approach to address catastrophic forgetting of the finetuned MistNet

Unsupervised Learning for Archetypal Style Analysis [report] [code] *Mar '19 - Apr '19*

Advanced Machine Learning under Prof. Sunita Sarawagi

- Derived 32 archetypal styles from 2046 artworks, implemented style transfer and experimented with the quality of stylization

Progressive Neural Networks for Multitask Learning [report] [code] *Oct '18 - Nov '18*

Reinforcement Learning under Prof. Shivaram Kalyanakrishnan

- Investigated knowledge transfer between 2 tasks via multitask learning by adding lateral connections to the A3C framework

Single Image Super-resolution using Adversarial Learning [report] [code] *Oct '18 - Nov '18*

Deep Learning under Prof. P. Balamurugan

- Implemented a perceptual loss based GAN for super-resolution on Pascal VOC2012, using SRResNet as the generator network.

Flappy Bird AI [blog] [code] *Mar '18 - Apr '18*

Machine Learning under Prof. Amit Sethi

- Trained an environment agnostic bot using Q-learning and Deep Q-Network with ε-greedy and experience replay strategies

Skills & Achievements

- **Programming:** Python, MATLAB, R, C++, Java, Git, LaTeX, HTML/CSS
- **Tools/Frameworks:** PyTorch, Tensorflow, Keras, OpenCV, scikit-learn, OpenAI Gym, Jekyll, Dialogflow, Node.js
- **Scholastic Achievements:** KVPY Fellowship (2015) from IISc Bangalore; national rank of 1490/140k in JEE Advanced (2015)
- **Extra-curricular Activities:** Former convener of the web and coding club (WnCC-IITB) organizing hackathons, research talks, Seasons of Code, etc; former coordinator in marketing and technical teams of Mood Indigo; sketching and music enthusiast