Videsh **Suman**

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Interests: Computer Vision, Deep Learning, Neural Rendering, Perception, NLP

Education

University of Massachusetts (UMass) Amherst *Sep '19 - May '21*
M.S. in Computer Science (GPA: $4/4$)

Relevant Courses: 3D Vision, Computer Vision, Advanced NLP, Probabilistic Graphical Models, Optimization, Data Science Algorithms

Indian Institute of Technology (IIT) Bombay *Aug '15 - May '19*
B. Tech. in Engineering

Relevant Courses: Machine Learning I & II, Deep Learning, Reinforcement Learning, Medical Image Computing, Algorithm Design

Work Experience

Software Engineer | Leia Inc. *Jan '22 - Feb '23*
Computer Vision & Machine Learning

- Worked in the research and development of AI projects to democratize 3D viewing experience on Lightfield displays
- Improved the existing depth estimation model with temporal regularizations to reduce flickering across depth frames
- Created objective metrics based on transform invariance and optical flow to measure the temporal instability of depth videos
- Created an attention-based seq2seq learning pipeline to improve the quality and efficiency of head tracking
- Quantized ML models via SNPE for efficient edge deployment for real-time mono-to-stereo video conversion
- Worked on depth estimation and view synthesis pipeline to view generative AI content with an immersive 3D experience

Neural Rendering for Car Exterior Visualization | Fyusion Inc. *July '21 - Jan '22*
Research Internship with Dr. Rodrigo Ortiz-Cayon

- Experimented with NeRF-based methods for neural surface reconstruction of car exterior from sparse set of images
- Researched on differentiable rendering to learn implicit shape representation and obtain refined camera poses of input images

Driving Behavior Modeling using Risk-Aware Traffic Interactions *June '20 - May '21*
Part-Time Research with Prof. Aniket Bera, GAMMA Lab UMD

- Proposed a traffic interaction based driving framework with graph convolutions to understand human driving behavior
- Achieved overall mAP scores within **3%** of state-of-the-art on goal-oriented action and cause benchmarks of Honda Dataset
- Improved the existing risk assessment benchmark for pedestrians by **6%** through vulnerability modeling of road users

Data Informed Network Simulation | Microsoft Research India *May '19 - Jul '19*
Research Internship with Dr. Venkat Padmanabhan & Dr. Nagarajan Natarajan

- Hypothesized a novel data-driven network simulator to learn the behaviour of network traces from ns-2 and real Skype calls
- Created probabilistic and LSTM-based state space forecasting models to estimate network sequences from the target distribution

Key Projects

3D Vision and Neural Rendering *Mar '20 - May '20*
Intelligent Visual Computing | Prof. Evangelos Kalogerakis

- Implemented PointNet for point cloud alignment (**76%** accuracy), and DeepSDF for 3D surface reconstruction from point clouds
- Performed efficient gradient-based camera pose optimization for 3D scenes from their trained NeRF representations

Discriminative Adversarial Search for Text Summarization [report] *Oct '20 - Dec '20*
Advanced NLP | Prof. Mohit Iyyer

- Demonstrated the effectiveness of discriminative adversarial beam reranking for text summarization on CNN DailyMail dataset
- Implemented discriminator-driven beam reranking with UniLM for generating human-like (i.e. longer & more novel) summaries

Semi-Supervised Learning for Vision and Language Reasoning [report] [code] *Oct '19 - Dec '19*
Computer Vision | Prof. Subhransu Maji

- Investigated the direction of SSL via self-training, mixup regularization and MixMatch algorithms for NLVR2 dataset using LXMERT
- Concluded the **limitation** (**63%** accuracy) of this learning paradigm of leveraging unlabeled training data for a multimodal task

Deep Super-Resolution of Rainfall Projections for Indian Landmass *Sep '18 - Apr '19*
Undergraduate Thesis - Civil Engineering | Prof. Amit Sethi & Prof. Subimal Ghosh

- Leveraged 10× super-resolution to predict regional rainfall projections from climate parameters using encoder-decoder CNNs
- Improved state-of-the-art by achieving overall MSE of **5** mm/day rainfall for climate data across seven zones of Indian landmass

Deep RL for Flappy Bird [blog] [code] *Mar '18 - Apr '18*
Machine Learning | Prof. Amit Sethi

- Trained RL agents on the environment using vanilla Q-learning and Deep Q-Network, both acquiring superhuman performance

Miscellaneous

- **Programming Tools:** Python, C++, MATLAB, R, Bash, SQL, Git, LaTeX, Java, Android Studio
- **Machine Learning Tools:** PyTorch, PyTorch Lightning, Tensorflow, Keras, OpenCV, Open3D, scikit-learn, pandas
- **Scholastic Achievements:** KVPY Fellowship (2015) from IISc Bangalore; national rank of 1490/140K in JEE Advanced (2015)
- **Extra-Curricular:** former volunteer at MLFL-UMass, WnCC-IITB; former coordinator of Mood Indigo; fine arts and music enthusiast