

# Videsh Suman

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Interests: Deep Learning, Computer Vision, NLP, Perception, Graphical Models, Reinforcement Learning

## Education

### University of Massachusetts (UMass) Amherst

Sep '19 - May '21 (Expected)

M.S. IN COMPUTER SCIENCE (GPA: 3.97/4.00)

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

### 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

### Risk-Aware Traffic Interaction Modeling for Autonomous Driving | University of Maryland

June '20 - Present

PART-TIME RESEARCH WITH PROF. ANIKET BERA, GAMMA LAB

- Proposed a traffic interaction based driving framework for **frame-level action recognition** to understand human driving behavior
- Leveraged **graph convolutions** for spatio-temporal message-passing to learn intentions and interactions amongst road users
- Achieved **overall mAP scores within 3% of state-of-the-art** on goal-oriented action and cause benchmarks of **Honda Dataset**
- Evaluating robustness of this driving framework on the task of **causal risk identification** in a **weakly-supervised manner**

### Data Informed Network Simulation | Microsoft Research India

May '19 - Jul '19

RESEARCH INTERNSHIP UNDER DR. SUNDARARAJAN S., DR. NAGARAJAN N. & DR. VENKAT PADMANABHAN

- 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
- Achieved **high distribution similarity** for **propagation delays** & **packet loss rates** on inference with test sequences
- Formulated a confidence metric for any test inference based on log-likelihood of input traces from training distribution

### Deep Super-Resolution of Rainfall Projections for Indian Landmass

Sep '18 - Apr '19

UNDERGRADUATE THESIS UNDER PROF. AMIT SETHI & PROF. SUBIMAL GHOSH

- Leveraged deep **super-resolution** to predict regional **rainfall projections** in  $10\times$  spatial resolution, from 9 climate parameters
- Designed an encoder-decoder **CNN** with **dense blocks** for learning parameters shared across **seven zones** of Indian landmass
- Improved **state-of-the-art** by achieving overall MSE of **5 mm/day** rainfall by training on **daily climate data** of past **38 years**

### 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
- Integrated the data with entities, and deployed them for fulfilled responses on tasks like voice search and Helpdesk assistance

## Key Projects

### 3D Vision and Neural Rendering

Mar '20 - Present

INTELLIGENT VISUAL COMPUTING UNDER PROF. EVANGELOS KALOGERAKIS

- Implemented **PointNet** for point cloud alignment (**76%** accuracy), and **DeepSDF** for 3D surface reconstruction from point clouds
- Performing the task of **camera pose estimation** for 3D objects and scenes from their trained **NeRF** representations

### Discriminative Adversarial Search for Text Summarization [report]

Oct '20 - Dec '20

ADVANCED NLP UNDER PROF. MOHIT IYER

- 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 UNDER 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

### Super-resolution using Deep Adversarial Learning [report] [code]

Oct '18 - Nov '18

DEEP LEARNING UNDER PROF. P. BALAMURUGAN

- Implemented **GAN** for single image super-resolution using **ResNet** based generator and discriminator networks
- Achieved **photo-realistic  $4\times$  super-resolution** by training on **Pascal VOC2012** using a **perceptual loss** based **minimax objective**

### Deep RL for Flappy Bird [blog] [code]

Mar '18 - Apr '18

MACHINE LEARNING UNDER 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,  $\text{\LaTeX}$ , Java
- Machine Learning Tools:** PyTorch, Tensorflow, Keras, OpenCV, scikit-learn, pandas
- Conferences Attended:** NeurIPS 2020, IROS 2020
- Scholastic Achievements:** **KVPY** Fellowship (2015) from IISc Bangalore; national rank of 1490/140k in **JEE Advanced** (2015)
- Extra-curricular Activities:** former volunteer at **MLFL-UMass**, former convener of the web and coding club (**WnCC-IITB**); former coordinator in marketing and technical teams of **Mood Indigo**; fine arts and music enthusiast