VIDESH SUMAN

Undergraduate Senior

sumanvid97@gmail.com ◇ *LinkedIn* ◇ *Github* ◇ *sumanvid97.github.io*

EDUCATION

University of Massachusetts Amherst, *MA, United States* [Joining in Fall '19]
MS in Computer Science (Research track)

Indian Institute of Technology (IIT) Bombay, *Mumbai, India* [Jul '15 - May '19 (Expected)]
B. Tech. in Civil Engineering GPA: 7.56/10

UNDERGRADUATE THESIS

Statistical Downscaling of Rainfall Projections using CNNs [Report] [Poster] [Jul '18 - Present]
Guides: Prof. Subimal Ghosh(CE) and Prof. Amit Sethi(EE) *IIT Bombay, Mumbai*

- Leveraging computer vision techniques to predict daily observed rainfall projections at 0.25° (∼25 km) resolution for the Indian landmass, from reanalysis simulations of climate variables at 2.5° (∼250 km) resolution.
- Training custom CNN architectures with dense blocks, dilated and transpose convolutions, and cyclic learning rate schedulers for more optimal convergence.
- Divided the landmass into seven meteorologically homogeneous zones and performing region-wise super-resolution owing to the varying local rainfall patterns for different regions of India, and the 10× scaling factor.
- *Major Tools:* PyTorch, MATLAB, netCDF4

KEY TECHNICAL PROJECTS

Progressive Neural Networks for Multitask Learning [Report] [Code] [Oct '18 - Nov '18]
Intelligent & Learning Agents under Prof. Shivaram Kalyanakrishnan *Computer Science, IIT Bombay*

- Investigated the prospects of multitask learning by adding lateral connections to the A3C framework. The idea was to transfer knowledge from source task (Pong) to target task (Breakout) to improve results on target task.
- *Major Tools:* PyTorch, OpenAI Gym

Single Image Super-resolution using Adversarial Learning [Report] [Code] [Oct '18 - Nov '18]
Deep Learning under Prof. P. Balamurugan *Operations Research, IIT Bombay*

- Implemented a GAN based model for single image super-resolution task on Pascal VOC2012 dataset.
- Leveraged a pre-trained SRResNet as the generator, and an 8-layered VGGNet classifier as the discriminator.
- For photo-realistic image generation, augmented the loss function by combining adversarial loss with perceptual loss, obtained from a higher-dimensional feature space of pre-trained VGG-19.
- *Major Tool:* PyTorch

Deep Learning for Medical Image Analysis | Literature Review [Slides] [Jan '18 - Apr '18]
R&D Project under Prof. Amit Sethi *Electrical Engineering, IIT Bombay*

- Conducted extensive study on DL methods for instance segmentation & classification of whole slide images.
- Presented methods on training a CNN classifier to detect clinical heart failure from H&E stained WSI, and on training a CRF to obtain the final pancreas segmentation output based on the fused result from tissue detection and boundary segmentation CNNs.

Analytics in Tool Condition Monitoring [Report] [Aug '17 - Nov '17]
R&D Project under Prof. Asim Tewari *Mechanical Engineering, IIT Bombay*

- Analyzed a publicly available force/vibration dataset from the milling operations of cutting tool and predicted the states using various regression models (highest R^2 score of 98.97% by SVM).
- Performed a series of milling experiments, and worked on extracting signal lobes (corresponding to the actual cutting of the workpiece) from the frequency domain analysis of the collected signals.
- *Major Tools:* R, Python

Flappy Bird AI [Blog] [Code] [Mar '18 - Apr '18]
Machine Learning under Prof. Amit Sethi *Electrical Engineering, IIT Bombay*

- Trained an environment agnostic bot for the game using Q-learning & Deep Q-Network to produce a comparative analysis between the two frameworks. The DQN framework learnt significantly faster.
- While training, early convergence was ensured by incorporating ε-greedy & experience replay strategies.
- *Major Tools:* Keras, TensorFlow

INTERNSHIPS

Virtual Conversational Platform | The Walt Disney Company [May '18 - Jul '18]
Consumer Technologies Division under Mr. Aftab Sheikh *Mumbai, India*

- Devised a proof-of-concept of virtual conversational assistants for multiple internal & consumer facing use-cases like Helpdesk Assistance and in-app Voice Search.
- Designed the conversations and trained each agent with effective intent & context recognition using custom entities. The pre-existing databases were integrated and deployed on the cloud for fulfilled responses.
- *Major Tools:* Dialogflow, Node.js, Firebase, Actions on Google

Optical Character Recognition | NCAIR, IIT Bombay [May '17 - Jul '17]
Cyber Systems Engineering & Analytics Group under Prof. Asim Tewari *Mumbai, India*

- Implemented a license plate recognition system through a pipeline of contour detection & recognition steps.
- Devised a similar image processing pipeline (with seven-segmented algorithm) for capturing relevant contours for the digit recognition task from the images of health monitor displays.
- *Major Tools:* Python, OpenCV

SCHOLASTIC ACHIEVEMENTS

- Secured a national rank of **1490** among ∼140k candidates in JEE Advanced [2015]
- Conferred with the prestigious KVPY fellowship; national rank of **374** among ∼100k students [2014]

RELEVANT COURSEWORK

Computer Science	Computer Programming, Data Structures & Algorithms, Design and Analysis of Algorithms
Artificial Intelligence	Introduction to Machine Learning, Deep Learning, Intelligent and Learning Agents, Advanced Machine Learning†, Medical Image Computing†
Mathematics	Probability and Statistics, Multivariate & Vector Calculus, Linear Algebra, Differential Equations I & II
Online Courses	Convolutional Networks, Sequence Models, CNNs for Visual Recognition, Regularization & Optimization, Neural Networks, Machine Learning

† *to be completed in Apr '19*

ORGANIZATIONAL EXPERIENCE

- **Convener, Web and Coding Club (WnCC)** (2016-17) - Part of the 12-member team responsible for holding workshops, talks, sponsored hackathons with the spirit of fostering institute-wide coding culture. Some of the highlights of my WnCC tenure: Community Wiki, Seasons of Code, research meetings.
- **Marketing Coordinator, Mood Indigo** (2016) - Part of the 13-member team responsible for pursuing the marketing budget of Asia's largest college cultural festival through corporate sponsorship and brand integration.
- **Web Coordinator, Mood Indigo** (2016) - Part of the 7-member technical team responsible for developing websites and online portals for the fest, also providing technical assistance during the four days of the fest.