Sudhir Kumar Suman

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EDUCATION

- Pursuing **Dual(Btech+Mtech)** in **Electrical Engineering** from **IIT Bombay** Expected 2021
- **Key Courses Undertaken:** Computer Vision, Digital Image Processing, Machine Learning, Advance Machine Learning, Reinforcement Learning, Automatic Speech Recognition, Computer Programming and Utilization, Linear Algebra, Data Analysis and Interpretation

SCHOLASTIC ACHIEVEMENT

- Secured a rank in top **1.2%** in JEE Advance having **0.2** million candidates 2016
- Secured a rank in top **2%** in JEE Mains having over **1.2** million candidates 2016

RESEARCH EXPERIENCE

- **Prostate cANcer graDe Assessment (PANDA):** Jul'20
  Kaggle | Supervised Research Exposition | Guide:Prof.Amit Sethi
  - Developed a Machine Learning pipeline to deal with **gigapixels multi-resolution wholeslide** images
  - Trained two staged **Deep Learning** model to to classify the severity of **prostate cancer** from microscopy scans of prostate biopsy samples
  - Currently acheived Quadritic Kappa Score of **0.907** and ranked **22** out of **930+** international participant teams on Kaggle Pulic Leaderboard
- **Detection of Sign of Depression using Social Media Text:** Feb'20
  University of Cambridge | Internship | Guide:Prof.J.Kadiwala *Worked remotely*
  - Developed a Machine Learning pipeline for **detection of depression** based on messages from social media platform
  - Employed Deep Learning model **BiLSTM** with **Attention** to learn the mental information from sparse space with unbalanced small dataset

OPEN SOURCE PROJECT

- **Recommendation Model Neural Collaborative Filtering:** *[Report] [Code]* Mar'20
  Swift for TensorFlow | Guide:Prof.Amit Sethi & Brad Larson
  - Implemented **Neural Collaborative Filtering** architecture in new deep learning framework **Swift for TensorFlow** to model latent features of users and items and got it merged in swift-model package
  - Added new dataset **MovieLens** in Swift for TensorFlow dataset package to directly load and use it.
  - Experimented on MovieLens-100K dataset for the correctness test of Recommendation model by predicting the top K-items user will interact in coming days

KEY PROJECTS UNDERTAKEN

- **Instance Segmentation:** *[Report] [Code]* Nov'19
  Course: Advance Machine Learning |Guide:Prof.Amit Sethi
  - Implemented deep neural network **Mask-RCNN** to detect and provide segmentation masks to object belonging to 300 different categories
  - Extended the model Mask-RCNN to **Open Image Dataset** provided by Google AI for Instance Segmentation Open Image Challenge 2019
- **Looking to Listen:** *[Report] [Code]* Nov'19
  Course: Automatic Speech Recognition |Guide:Prof.Preethi Jyoti
  - Implemented **Speech Seperation** paper by Google Research to isolate a single speech signal from a mixture of sounds
  - Build an End to End pipeline consisting of **Audio Model**, **Visual Model** both consitiing of Dilated CNN and **Fusion Model** consisting of BiLSTM followed by fully connected layer
- **Competition and Collaboration:** *[Report] [Code]* Nov'19
  Course: Foundation of Intelligent and Learning Agents |Guide:Prof.S. Kalyanakrishnan
  - Trained two agents to play in Tennis environment where the agent must bounce the ball between one another while not dropping the ball out of bounds
  - Used Actor-Critic network for training where Actor determine best action and Critic evaluate quality of action as determined by Actor inorder to incorporate action taken by both agent for better learning

- **Image Classification on CIFAR:** *[Code]* Oct'19
  Course: Advance Machine Learning | Guide:Prof.Amit Sethi
  - Implemented forward and backward pass of different layers of Fully Connected Neural Networks from scratch with the flexibility to take variable size input
  - Trained the implemented **Neural Network** for object classification on CIFAR dataset and achieved 75-80% accuracy on each class of CIFAR
- **Automation of Gate Security System:** *[Report] [Code]* Jun'19
  Summer Project
  - Collected around 1700+ images of vehicles and manually annotated all the desired class present in it
  - Trained model **YOLOv3** on annotated images to detect vehicle along with its type and locate the License Plate of the detected vehicle for recognition purpose
  - Delivered a **Detection Module** of Automation model for automating the gate security system to ease the guard's job
- **License Plate Detection and Recognition:** *[Report] [Code]* Apr'19
  Course: Computer Vision | Guide: Prof.Arjun Jain
  - Implemented an EECV 2018 paper in PyTorch using CNN to extract features and fully connected layers in the end to predict bounding box around License Plate
  - Built a **Recognition Module** which exploits **Region of Interest** from CNN layers to extract features map of interest and several **classifiers** to predict the corresponding license plate number
- **Non-Invasive Glucometer:** *[Report]* Apr'19
  Course: Electronic Design Lab | Guide:Prof.Shalabh Gupta
  - Designed an analog circuit to get the amplified voltage level for corresponding glucose concentration present in the body
  - Collected blood sugar concentration data using the designed setup and invasive glucometer and trained **Regression** model on it
  - Delivered an alternative **low-cost solution** to traditional invasive glucose testing method for **monitoring glucose-related** diseases
- **Toonification of Image:** *[Code]* Nov'18
  Course: Image Processing | Guide:Prof.Ajit Rajwade
  - Implemented **Bilateral Filtering** for **smoothing and quantizing** the colors and **Edge Detection** for **detecting and boldening** the edges in the image
  - Combined these implementation to get an **artistic and comical** effect on a wide range of images
  - Enhanced speed and accuracy of the algorithm using **Fast Bilateral Filtering** by working in higher dimensional space

TECHNICAL SKILLS / EXTRA COURSES(MOOC)

- **Programming:** C++, Python, Embedded-C, VHDL, Assembly-Language, Bash, Swift
- **MOOC:** Deep Learning in Pytorch, Applied Machine Learning, Algorithmic Toolbox, Front End Web Development, Introduction to Data Science

POSITION OF RESPONSIBILITY

- **Coordinator of Techfest:** 2017
  Asia's largest college technical festival
  - Materialised the social initiative SHE(menstrual health awareness campaign,organizing seminars and distributing sanitary pads in 50+ villages) and Nirbhaya(self defense workshops for women)
  - Negotiated and interacted with over 30 international and national artist for ambiance
- **School Pupil Leader:** 2013
  Highest post of leadership at school level
  - Elected by the student to represent the student body of school
  - Worked with head of school to plan school wide events

EXTRA CURRICULAR ACTIVITIES

- Brought 1st prize to school in Inter School General Science Competition 2011
- Won the 1st place in Intra School English Elocution competition 2012
- Bagged the 2nd position in singing at school level singing competition 2014
- Bagged 3rd position in Relay Race at Annual Sports Meet held at School 2014
- Successfully completed a one year course under the National Service Scheme(NSS) IIT Bombay, involving ideation and implementation of solutions to social problems 2017