Sarvesh Bipin Patil

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EDUCATION

BE, Electronics and Telecommunication Year of Passing: 2019
Vivekanand Education Society's Institute of Technology, Mumbai CGPA: **8.89**
University of Mumbai

Higher Secondary School Certificate (12th Std.) Year of Passing: 2015
Royal Junior College of Science and Commerce, Dombivli Percentage: **84%**
Maharashtra State Board

Secondary School Certificate (10th Std.) Year of Passing: 2013
Sister Nivedita English School, Dombivli Percentage: **88.73%**
Maharashtra State Board

WORK EXPERIENCE

HyperWorks Imaging, Bengaluru

Data Scientist *Aug 2019 – Present*

- Built a system for multi-modal Super-Resolution of optical microscope images to scanning electron microscope images using highly modified Pix2Pix and ESRGAN models, for accurate particle size analysis
- Improved upon a particle sizing algorithm using an in-house object detection model for highly agglomerated microscopic particles, that achieved 0.989 D50 and 0.982 CV values compared to expert human annotators
- Developed a full-stack web application for an AutoML product using Django and Angular 8. The AutoML backend performed feature engineering and model selection using Bayesian Optimization and generated insights about the models and their predictions
- Deployed the Web App on a secure Gunicorn - Nginx server, residing in a Docker container controlled by a Jenkins automation server connected to GitHub for version control
- Created an annotation tool for researchers to enable high-quality object detection of particles with very little, training data. Implemented an MLOps based backend using MLFlow and Nginx for the tool to make tracking and merging of experiments easier.
- Created a generalizable and robust pipeline for the object of interest identification. Implemented synthetic generation of images using StyleGAN-2 to make CNN models robust, and improve testing accuracy by about 20%. This helped an advertising agency keep track of their stock in coolers across South-East Asian countries.
- Currently working on a cross-platform MVP using React Native and Firebase. Implemented an SFU server for WebRTC, socket connection for chatting, and geo-fencing to facilitate interactive audio-first communication.

ACADEMIC PROJECTS

Automatic Traffic Management System *June 2018 – April 2019*

- Used Mask-RCNN to calculate the rolling mean of the traffic density to manipulate traffic signal timers
- A dataset of about 11,500 Indian vehicles was collected and a ResNet152 model was trained for brand detection. The model was written in Keras and was served as a RESTful API using Flask.
- Used a pretrained Single Shot Detector model to track vehicles across zebra crossing lines
- The project was placed among the top 5 in the final year and was selected for exhibition in Avishkar, a state-level project competition.

Image Generation From Textual Input *August 2018 - January 2019*

- Implemented a conditional GAN to generate images using captions. Used sentence level embeddings on the captions and trained the GAN to generate flowers matching the description.
- Gained a deep understanding of the challenges involved in cGAN training over several experiments

PUBLICATIONS AND PREPRINTS

Research Paper

- Sarvesh Patil, et al., "Multi-Modal Super Resolution for Dense Microscopic Particle Size Estimation", submitted to IEEE-TPAMI, preprint arXiv:2010.09594

Technical Paper

- Sarvesh Patil, et al., "Use of UAVs for mining applications." International Journal of Advance Research, Ideas, and Innovations in Technology 4.2 (2018),

Literature Review

- Sarvesh Patil, "Deep Learning Based Natural Language Processing for End to End Speech Translation", preprint arXiv:1808.04459

TECHNICAL SKILLS

- **Programming Languages:** Python(Expert), JavaScript(Expert), TypeScript(Intermediate), C, C++(Beginner)
- **Frameworks:** PyTorch, Tensorflow+Keras, Scikit-Learn, OpenCV, NLTK, Flask, Django, Angular 8, React Native, NodeJS, Nginx, MLFlow, Embedded-C
- **Software:** Fiji (ImageJ), PostgreSQL, Firebase, MongoDB, Jenkins, MLFlow, Git, MATLAB, Arduino, V-REP, AutoCAD, Photoshop, Eagle

CERTIFICATIONS AND PROFESSIONAL DEVELOPMENT

- **Data Structures and Algorithms Nanodegree (Udacity)**
- **Deep Learning Specialization (Coursera)**
- **Google India Challenge Scholarship: Android Developer (Udacity)**
- **Deep Learning Nanodegree (Udacity)**

EXTRA-CURRICULAR AND VOLUNTEER EXPERIENCE

Emergency Distress Relief App

- Created an Android Emergency App in my third year, linked with the Dial-100 response of the Police Department of Navi Mumbai, using Android Studio with a FireBase backend for storage and authentication

Student Committees

- Technical Coordinator, IEEE Students Chapter (2016 - 2017) - designed three original events to increase student participation. Lead a team of 10 coordinators while working on the annual symposium - Melange.
- Operational Head, Praxis (Technical Fest, 2016) - helped the organizing committee plan and create 7 technical events, 4 non-technical events, and an inter-city treasure hunt.

Miscellaneous Achievements

- Reached quarter-finals in a national robotics competition, E-Yantra-2017 conducted by the Indian Institute of Technology Bombay. Used V-REP (now CoppeliaSim) to simulate a collector bot, collecting fresh fruits and ignoring rotten fruits in an area, identified by ArUco markers.
- Reached the quarter-finals in E-Yantra-2016 (90th percentile). Implemented Dijkstra's algorithm in Numpy to find the shortest path on graphs created from a maze using OpenCV-Python.
- Volunteer at E-Summit (2016), an Entrepreneurship event conducted by the E-Cell department of the college

Mini-Projects

- Created a model to determine bias and discrimination for Age, Gender, and Income, in advertisements using demographic information and user preferences
- Implemented a facial recognition algorithm using Siamese Neural Networks for an automatic attendance app as a proof of concept
- Built a quadcopter using KK2.1.5 flight controller, Raspberry Pi, and various CO_2 and volatile gas sensors for remote monitoring applications in the mining industry.
- Designed an RFID based parking assistant using 8051 microcontroller
- Built an IoT based industrial hazard detection system using MQTT protocol with an Arduino, ESP8266, and various gas sensors. IFTTT was used to send SMS and emails to the registered users on detection of hazards.
- Built a Bluetooth controlled bot for simple object holding and transportation.