Akansh Maurya

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Objective

I am looking for research opportunities to expand my knowledge in Machine Learning and its various application in Computer Vision, Signal Processing, and Robotics.

Education

1. Institute Of Engineering And Technology, Lucknow
Bachelors of Technology, Electrical Engineering **CGPA: 8.7/10**, GRE: 315/340 *Expected: June 2021*

- **Minor projects:** Comparison of neural network vs. traditional based PID tuning techniques, Nature-inspired optimization algorithm. (Report)
- **Courses**: Optimization, Control Systems, Signal Processing, Programming in C, MATLAB, Engineering Physics, Linear Algebra, Vector Calculus, Statistics and Probability, Analog and Digital sensors.

2. Delhi Public School, Vidyut Nagar
Intermediate: 91.6 % and High school: 10 CGPA *Mar2013- May 2017*

- Gold Medalist and Scholar Badge Holder

Professional Experience

1. Research Intern at Signal Processing, Interpretation and Representation (SPIRE) Lab *Oct,2020- Present*
Indian Institute of Science(IISc), Bengaluru (Certificate)

- Working under the guidance of **Dr. Prashanta Kumar Ghosh** to build an app that can help detect an asthmatic patient based on cough sound and phonation. I pre-processed 285 patients recording for feature engineering and calculated statistical features on Kaldi MFCCs and their derivatives to train classifiers like Support Vector Machine, XGB, etc.
- Initial results show that forced Wheeze sound performs best with an accuracy of 86%. We are currently proceeding to use ConvNet on spectrogram to detect Asthmatic patients. We are also working on sound recorded by the stethoscope.

2. Deep learning Intern at Embedded and Real-Time System Lab (ERTS), *May-July, 2020*
Indian Institute of Technology (IIT), Bombay (Certificate)

- Under the supervision of **Prof. Kavi Arya,** we developed a Deep Learning-based web app that automates verifying and validating of ID card images; It reduced the processing time from 14 days to 3 hours. Implemented a ResNet-50 architecture for classification, verifying college ID cards, received 98.8% accuracy.
- Developed a RotateNet model with 91% accuracy that corrected orientated images, improved OCR results on rotated images, implemented text detection and recognition with DBNet and CRNN, and got 27 fps speed to process images.
- I designed and coded a custom fuzzy string matching algorithm to validate text present in the ID card. F1 score of the whole system is 0.90054. The paper written by us is under review in the International Journal on Document Analysis and Recognition.

3. Machine Learning Intern at Astute Resolutions, Lucknow(Certificate) *May-July, 2019*

- Smart City Surveillance to identify non-helmet motorcycle riders and subsequently detecting number plates to penalize. Worked on the Haar cascade algorithm for helmet detection.

Publications

- **Maurya A.**, Manjrekar O., Arya K., et al. (2020). "A system for verifying non-standard personal identity documents using deep learning models." *International Journal on Document Analysis and Recognition.* [Submitted ICDAR-IJDAR, 2021 journal track]**.** Manuscript

Honor and Awards

- Secured **5th** position in **National Level Robotics competition**, eYRC 2019 -2020, among 34340 students in 8585 teams in all themes. My team theme was Survey and Rescue (**Aerial robotics**). (Certificate), (Competition Video)
- Runner up for best Business Plan in AKTU Literary and Management Fest 2018-2019. (Certificate)
- Amir Fatima Undergraduate Scholarship Award 2018, a scholarship awarded by an alumnus of IET Lucknow for student welfare and technical advancement.

Technical Skills

- Programming Language: C, Python, MATLAB.
- Python Libraries: Pytorch, TensorFlow, OpenCV, Robot Operating System(ROS), Numpy, Matplotlib, Pandas, Librosa
- Skills: Computer vision, Deep Learning, Audio Processing, Time-series Analysis

MOOCs

- Deep Learning Specialization by deeplearning.ai (Coursera)
- Linear Algebra(IIT Kanpur, NPTEL)
- Control System Engineering(IIT Madras, NPTEL)
- Machine Learning by Andrew Ng(Coursera)

Projects(Others)

S.No.	Project Name	Description and skills gained	Code/Blog /Video
1.	**Verification and Validation of ID cards using Deep Learning**	• In this project, we used a CNN-based (Resnet-50) model to detect valid College ID cards. We created "RotateNet" to correct the Image's orientation for improving OCR performance. • We developed a custom string matching algorithm for verifying details. We also performed Grad-Cam for feature localization. Used Pytorch, OpenCV, NumPy, and Pandas libraries of Python	Code|Blog Video
2.	**Automated measurement of fetal head circumference**	• Worked on ultrasound images to detect and segment fetus head to monitor its growth(medical imaging problem). • Implemented encoder–decoder model, dice loss, got accuracy of 93%	Code|Blog
3.	**Fovea Localization for Age-related Macular degeneration (AMD) and Non-AMD Patients**	• This project is part of ADAM competition. Accomplished localization of Fovea, inside the human eye. • Managed to get decent accuracy on small dataset of 400 images by different custom data augmentation techniques.	Code|Blog
4.	**Survey and Rescue Drone** (Pluto X Drone)	• Autonomous drone navigating in the flood-affected region. • Image processing to detect contours and beacons. Used PID controller, custom path planning algorithm, ROS, OpenCV.	Code|Blog| Video
5.	**Vargi Bot** (Categorization-UR5 Bots)	• *Vargi*, a Sanskrit language word meaning categorization. Warehouse management, two UR5 arms, one picks items from shelf to conveyer belt, and other does sorting. Learned ROS, Gazebo, Robot manipulation, and perception.	Video
6.	**Surface type detection for the robot's indoor navigation** (Final Year Project)	• We determine the surface type under a wheeled robot from the readings of the IMU sensor. Used FFT to denoise the signal. • We will be using RNN and 1-D ConvNet for time-series classification.	Code
7.	**Chest X-Ray Images Pneumonia Detection**	• Detection of **Pneumonia** from Xrays. • Solved class imbalance problem by weighted loss and oversampling. • Performed Grad-Cam. The accuracy of the CNN model on the test set was 91.51%.	Code
8.	**Image Processing from Scratch**	• I implemented features like scaling, composite, edge detection, gaussian blurring, etc. only using NumPy.	Code|Video

Volunteer Experience

1. **Volunteer and Academic Assistant** of Parmarth- the social club of IET Lucknow *Oct 17- Jan 19*
   Taught children of slums nearby college, conducted cloth and food distribution to the needy.
2. **Joint Secretary** at Electrical Engineering Society(EES), IET Lucknow *Sept 18- Aug 19*
   Organized workshops and activities to encourage technical skills in juniors. My duty was to look over the ground tasks.
3. **Graphic Designer** at a college fest, Pravah. I designed banners, posters, and brochures using adobe photoshop.

Activities and Hobbies

- I like to play badminton and Kho-kho; I also participated in many inter-college events.
- I enjoy reading, mostly news articles, and sometimes novels.
- My photography page: @itsapostrophe