Nikhil Pandey

Curriculum Vitae

Sikar, India

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I am a computer vision engineer with a keen interest in development of perception for automation and robotics.

Areas of Interests

Computer Vision, Reinforcement Learning Control, Unsupervised Learning, Robotics, Meta Learning, Active Learning, and hardware optimization for AI.

Work Experience

Aug 2019 - Current
CTO, *Occipital Technologies Pvt Ltd*, Navi Mumbai.
Currently leading the engineering team in the development of farm automation and mobile applications. The goal is to remove human subjectivity from quality assessment of agricultural commodities leading to a better value realizations for every entity involved in the supply chain.

May 2018 - Aug 2019
Computer Vision Engineer, *Occipital Technologies Pvt Ltd*, Navi Mumbai.
Developed novel and efficient algorithms to achieve product specific requirement in visual analysis. Focused on development, modification, and deployment of ML models on cloud and edge computers.

May 2017 - Jan 2018
Intern, *Agricx.com - AI Unit*, Mumbai.
Developed computer vision algorithm for visual analysis of objects from smartphone images.

Industrial Projects

Occipital Technologies
Sorting Machine, *Sorts several commodities based on color, size, shape, and defects at 15% the cost of pre-existing solutions*.

Occipital Technologies
The Agrograde App, *Cloud based quality certification service for farmers and food producing organization to facilitate remote trading*.

Other Projects

Hynetics, Banglore
Smart Streetlight, *Smart street light solution using edge computing to save electricity and monitor traffic*.
- Used Jetson TX2 for deployment kalman-filer based object tracking at a decent 20FPS on 4 PTZ-CCTV cameras.
- Ported Darknet on Aarch64 platform for human and vehicle detection purpose.
- Street lamp was coupled using Bluetooth to a micro-controller that was trigger upon detection of interested objects using the GPIO of JetsonTX2
- The smart light project was show-cased at Productronica, IPCA-2018.

Occipital Technologies
Video Analytics, *Identification of events and objects for security and monitoring purposes*.
- Implemented object tracking on feeds of multiple CCTV using object detection api from tensorflow.
- Made modules to detect illegal activities such as tailgating, Camera Tempering, Illegal Parking, Counter Flow of vehicles etc.
- Implemented crowd analytic to get the status on Congestion and Loitering, keeping the algorithms pet immune.
- The final algorithm also included safety features such as detection of left-out-baggage, trespassing, tailgating, etc.

Freelance
Computational Photography, *Developed CNN based Image Enhancer*.
- Created solution to address variation of global image properties such as colour, saturation, and luminance
- Trained attention-based CNN for RAW-to-RGB transformation
- Trained a customized multiscale Encoder-decoder model with SSIM and PSNR loss functions.
- Used MIT-Adobe-5k dataset mixed with the userdata to train the model

Personal Projects

Kaggle   **Human Protein Atlas Image Classification**.
- Objective was to develop models capable of classifying mixed patterns of proteins in microscope images.
- Experimented with various architectures including ResNet, DenseNet, InceptionV3 etc.
- Created a custom deep CNN to handle RGBY data.

Avionics   **Mapping and Image Stitching**.
- Used GPS coordinates to map terrain images taken from a Drone
- Leveraged the shape of ground marker for object localization and alignment
- Used OpenCV to find the keypoints and descriptors using SIFT and subsequently stitched stereo pairs of images.

Kaggle   **Chest x-ray dataset and analysis**.
- Curated images and masks of chest x-ray in order to detect and classify pulmonary abnormalities
- Used Inception-ResNet50 to study attention maps

Github   **Iceberg detection**.
- Created CNN models from scratch to detect iceberg from satellite images
- Used 15-fold image augmentation to improve the baseline accuracy.

Github   **Speech Recognition**.
- Used Fast-Fourier transformations on wave file to convert them into spectrographs.
- Tranied CNN to detect distinct features and classify the spectrographs into respective classes .

Kaggle   **Blood cell classification**.
- Created VGG-16 based detection and classification of blood cell into subtype using transfer learning and image augmentation.

Publications

Conference   **Pandey N, Kumar S., Pandey R. (2018) Grading and Defect Detection in Potatoes Using Deep Learning**, *Published in Communication, Networks and Computing. CNC 2018. Communications in Computer and Information Science, vol 839. Springer, Singapore.*

Journal   **Nikhil Pandey, Suraj Kumar and Raksha Pandey- (2017) Various Techniques Used In Defect Segmentation and Disease Inspection in Fruits and Vegetables: A Survey** , *Volume 5, Issue X, International Journal for Research in Applied Science and Engineering Technology (IJRASET), ISSN : 2321-9653.*

Patent

Provisional Patent   **Nikhil Pandey, Gaurav Pardeshi, Kshitij Thakur and Rakesh Barai** , *Multigrade sorting system for fruits and vegetables*, Application No: 202021006542.

Provisional Patent   **Nikhil Pandey, Kshitij Thakur, Gaurav Parsdeshi, Prashant Kumar and Rakesh Barai** , *System for assaying quality of agricultural produce and a method thereof.*, Application No: 202021032310.

Education

Academic Qualifications

2014–2018   **B.Tech Computer Science and Engineering**, *School of Studies in Engineering and Technology, Guru Ghasidas Vishwavidyalaya*, Bilaspur, Chattisgarh, *Aggregate CPA of 7.71* .

2011–2013   **XII RBSE**, *Aastha Academy* , Sikar, *Rajasthan*.
Scored 80 percent in my boards exam.

Technical Skills

Technical Skills   **Python3**, *ROS, Concurrent-computing, Google Cloud, Linux, Edge and low powered arm based computing*.

Libraries   **Tensorflow**, *keras, opencv, skimage, rospy, sklearn, scipy, flask, django, pytorch, numpy and matplotlib*.

Familiarity   **C++**, *Java, Matlab, Ardiuno, TeX, Assembly and Fortran*.

Extracurricular Activities

- **Editor (English Board), Udaan The Magazine:** From 2014 to 2016, I was the member of the English editorial board of the university magazine Udaan.
- **Organizing Committee Member (Marketing and Technical), Equilibrio 2k16:** Contributed in designing of robotics competition and organized funds from sponsors for the college techfest.
- **Project Leader in National Children Science Congress(2009):** Proposed a new method for solid waste disposal system aiming at reduction of industrial pollution.

Training and Certifications

- **Nettech Certified Network Engineer**
- **Neural Networks and Deep Learning (Coursera)**
- **Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization (Coursera)**
- **Convolutional Neural Network (Coursera)**

References

- Dr. Manish Shrivastava, Head of Department of Computer Science and Engineering(GGU):
  manish.cse@ggu.ac.in

- Dr. Pushpendra Kumar Chandra, Assistant Professor, Computer Science and Engineering (GGU):
  p.kchandra@ggu.ac.in

- Dr. Raksha Pandey, Assistant Professor, Computer Science and Engineering (GGU):
  raksha.pandey@ggu.ac.in

- Kshitij Thakur, CEO, Occipital Technologies :
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