Nikhil Pandey

Curriculum Vitae

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I am a computer vision engineer with a keen interest and work experience in deep learning, looking for research opportunities with a possibility of a PhD candidature.

Areas of Interests

Image Processing, Instance Segmentation, Object detection, Perception, Video Understanding, Feature Classification, CNN, Deep Learning, Statistical Inference, Machine Learning,Edge Computing, Robotics, Automation, Multivariate Image Analysis and Data Science.

Work Experience

May 2018 - Current
CTO, ***Occipital Technologies Pvt Ltd***, Navi Mumbai.
I am the Chief Technology Officer at Occipital Technologies, India. We create computer vision based products to remove subjectivity from quality assessment of agricultural commodities leading to a better value realizations for every entity involved in the supply chain.

May 2017 - Jan 2018
Intern, ***Agricx.com*** - ***AI Unit***, Mumbai.
Developed computer vision algorithm based on SVM and UNets using openCV, dlib and keras, for analysis of fruits and vegetables 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.*

- After writing image acquisition, serial communication, sensor interface, and PLC actuation pipelines, I leveraged ROS's UDP layer for multi-thread handling and custom message passing between these modules.
- Integrated HarDNet along with transfer-learning pipeline for instance segmentation from stereoscopic images to achieve 0.5 mm precision at 35 FPS or up to 8 tonnes per hour.
- Created a fail-safe mechanism utilizing the Gaussian properties of the machine apparatus.
- Trained Attention based UNets for defect segmentation and quantification of the extent of defect to provide a soft threshold for rejections.

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

- Used MMDetection framework based HTC-Resnet50 model for the primary instance segmentation and background subtraction which is then fed to the color and defect detection pipeline.
- To tackle the aberration produced due to difference of optics, trained an end-to-end encoder-decoder network with 31M parameters for image recreation.
- Curated dataset of 12000 defective commodities over various classes and trained a robust classifier with 92% accuracy.

Publications

Conference
Pandey N, Kumar S., Pandey R. (2019) 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- "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.

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 decent 20FPS on 2 different 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 using the GPIO of JetsonTX2 upon detection of interested objects
- 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 Left out baggage detection, Trespassing etc.

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.

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.

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 with distinction is all subjects.

Technical and Personal 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

- **Project Leader in National Children Science Congress:** Proposed a new method for solid waste disposal system aiming at reduction of industrial pollution.
- **Editor (English Board), Udaan The Magazine:** From 2014 to 2016, I was the member of the English editorial board of the university magazine Udaan.

References

- Dr Manish Shrivastava, Head of Department of Computer Sc. and Engineering(GGU):
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- Dr Amit Khaskalam, Assistant Professor, Information Technology (GGU):
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- Raksha Sharma, Assistant Professor, Computer Sc. and Engineering (GGU): rakshasharma10@gmail.com
- Kshitij Thakur, CEO, Occipital Technologies : kshitij@occipitaltech.com