Deepak Kumar Singh

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EDUCATION

- **International Institute of Information Technology** — Hyderabad, India
  MS by Research in CSE; GPA : 7.33/10.0 — *Aug. 2018 – pursuing*

- **Visvesvaraya Technological University** — Bengaluru, India
  Bachelor of Engineering in CSE; Percentage : 73% — *Aug. 2010 – June. 2014*

PUBLICATIONS

1. **ORDER: Open World Object Detection on Road Scenes**,
   Deepak Singh, Shyam Nandan Rai, Joseph K. J., Rohit Saluja, Vineeth N Balasubramanian, Chetan Arora, Anbumani Subramanian, C. V. Jawahar.
   NeurIPS 2021 Workshop on Machine Learning for Autonomous Driving (ML4AD)

2. **Evaluation of Detection and Segmentation Tasks on Driving Datasets**,
   Deepak Kumar Singh, Ameet Rahane, Ajoy Mondal, Anbumani Subramanian, C. V. Jawahar
   International Conference on Computer Vision and Image Processing (CVIP), 2021

RESEARCH WORK

- **Vision for Mobility and Safety** — IIIT Hyderabad, India
  Aug 2020 - Present

  This work formulates Open-World Object Detection by addressing the key problems present in road scene datasets India Driving Dataset(IDD) and Berkeley Deep Drive(BDD). Road Scene datasets are different from academic datasets such as PASCAL-VOC and MS-COCO, the objects in road scenes have intra-class bounding box scale variation; a majority of the dataset comprises of small objects which are distant from the ego-vehicle. We propose a framework which addresses the said issues and also surpasses the current state-of-the-art work. This work has been accepted in **NeurIPS 2021 Workshop on ML4AD**.

- **Evaluation of Detection and Segmentation Tasks on Driving Datasets** — IIIT Hyderabad, India
  Aug 2020 - Present

  This work benchmarks latest models of object detection, semantic segmentation, and instance segmentation on road scene datasets. We perform a detailed study on their behaviour on both constrained dataset, Cityscapes; and unconstrained datasets, India Driving Dataset(IDD) and Berkeley Deep Drive(BDD). This work lays the foundation in understanding the deep learning systems which are helpful in autonomous driving applications. A model does not perform well if there is a large domain shift, such studies were also made in this work. This work has been accepted in the **6th International Conference on Computer Vision and Image Processing (CVIP), 2021**.

WORK EXPERIENCE

- **Celstream Systems Pvt. Ltd.** — Bangalore
  Software Engineer - Full time — *Sept 2014 - Sept 2016*
  - Built the product's main UI Console on JavaScript environment for better accessibility.
  - Developed modules using IgniteUI Library to create dynamic data-visualization modules.
  - Developed data-adapters for live data-visualization modules.
  - Implemented libraries for multiple custom window management.
  - Migrated the in-house application from Adobe Flash environment to JavaScript environment.
  - Restructured the modules to work in JavaScript environment.
  - Developed REST APIs in Java.

PROGRAMMING SKILLS

- **Languages**: Python, Java, JavaScript, C, C++
- **Technologies and Frameworks**: PyTorch, TensorFlow, fast.ai, scikit-learn, pandas

Course Work

- **MS by Research**   IIIT Hyderabad, India
  Aug 2018 - Dec 2019

  - Digital Image Processing
  - Topics in Applied Optimization
  - Statistical Methods in AI
  - Optimization Methods
  - Computer Vision
  - Mobile Robotics

MOOCs

- **Coursera**

  Aug 2016 - Present

  - Neural Networks and Deep-Learning
  - Improving Deep Neural Networks
  - CNNs
  - Structuring ML Projects
  - Linear Algebra 18.06, MIT
  - Probabilistic Graphical Modeling(Ongoing)
  - Bayesian Statistics(Ongoing)

Projects

- **Self-Training**: A semi-supervised technique on MNIST digits dataset as a proof-of-concept whether a classification model can be improved using Self-Training approach.

- **Principal Component Analysis and Naive Bayes Classifier on face images**: PCA was used to get reduced dimension images for faster and efficient classification. PCA was followed by two methods to perform classification namely, gradient descent method using the cross entropy loss, a Naive Bayes classifier using the Bayes's theorem to determine the probability of classification.

- **Classification on CIFAR-10**: Developed a classifier on various data representations like PCA, LDA, Raw data. Various classifiers were used including Softmargin Linear SVM, MLP, Kernel SVM with RBF-Kernel and Logistic Regression.

- **Contrast Based Filtering for Salient Region Detection [Link]**: Image decomposed into basic, structurally representative elements that abstract away unnecessary detail, and at the same time allow for a very clear and intuitive definition of contrast-based saliency.

- **Oriented Edge Forests for Boundary Detection [Link]**: Efficient model for learning boundary detection based on a random forest classifier. Boundary detector consists of a decision forest that analyzes local patches and outputs probability distributions over the space of oriented edges passing through the patch. This space is indexed by orientation and signed distance to the edge (d; θ). These local predictions are calibrated and fused over an image pyramid to yield a final oriented boundary map

Other Roles

- **HPC Cluster Moderator**: Responsible for maintaining a smooth operation of 92 GPUs cluster using SLURM with various requirements of resource allocation policies, reservation policies, data storage, task management and day-to-day management of optimal usage of the cluster.

EXTRACURRICULARS

- **Winner** - 5k Marathon 2018
- **Winner** - Intramural PG Volleyball 2018