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Aishwarya Gupta

Research Interests

Computer Vision, Machine Learning and Deep Learning.

Publications

2019 **Light-Weight Single Shot Refinement Neural Network for Object Detection** - A Gupta*, H Desai*, M Kolla*, *WiML, NeurIPS Workshop (Poster)*

2019 **VPDS: An AI-based Automated Vehicle Occupancy and Violation Detection System** - A Kumar*, A Gupta*, B Santra*, L Srinivasan*, M Kolla*, M Gupta* and R Singh*, *IAAI* (Application Conference of AAAI)

2017 **A Probabilistic Framework for Zero-shot Multi-label Learning** - A Gaure, A Gupta, V Verma and P Rai, *UAI*

Education

2019 – 2024 **Ph.D**, *Computer Science and Engineering*, **University of Utah**, 4.0/4.0.

2015 – 2017 **Master**, *Computer Science and Engineering*, **IIT Kanpur**, 8.0/10.0.

2011 – 2015 **Bachelor**, *Computer Science and Engineering*, **HBTU Kanpur**, 82.52%.

Work Experience

Aug 2017 – July 2019 **Conduent Labs India/Xerox Research Centre India**, Bangalore, India.
Research Engineer, Computer Vision and Media Analytics Group

Research Projects

Aug 2019 – Present **Learning Deep Networks Robust to Adversarial Attacks**
Guide: *Prof Tolga Tasdizen*, University of Utah.
- Working on improving the adversarial robustness of Deep Networks using semi-supervised loss functions.

Aug 2018 – July 2019 **Light-Weight Network for Object Detection**
Guide: *Dr Manasa Kolla*, Conduent Labs.
- Trained RefineDet-object detection model and identified highly-correlated filter pairs. Further increased their correlation using log-based loss.
- Dropped one of the filters from each of the selected correlated filter pairs and then trained the pruned model from scratch.
- Successfully pruned almost 40% of the model with an accuracy drop of 3-4%.

Aug 2017 – July 2018 **Vehicle Passenger Detection System**
Guide: *Dr Manasa Kolla*, Conduent Labs.
- Detected HOV3+ violators (having occupancy count less than 3) using deep convolutional neural networks (CNNs).
- Achieved an accuracy of **95%** in passenger counting by training the CNN with **oversampling and softmax**, even outperforming Siamese and focal loss in class-imbalanced scenario.

Jan 2016 – June 2017 **Probabilistic Models for Multi-label Learning**
Guide: *Prof Piyush Rai*, Dept of CSE, IIT Kanpur.
- Proposed **MT-LCS**, a probabilistic framework for multi-label learning problem in zero-shot setting by the joint modeling of the label co-occurence matrix and label matrix.
- Also learned a probabilistic model by **factorizing the similarity graph** constructed using the label matrix of the training instances and learned a regression model to predict their low-dimensional embeddings.

*Equal Contributions

Other/Course Projects

Jan 2018 – June 2018 **Vehicle Re-identification in Surveillance Videos**

- Re-identified vehicles present in multiple surveillance videos captured from multiple cameras at different locations and with different viewpoints.
- Detected and tracked vehicles in a frame in a video to get tracks which are matched across different location videos using the deep CNNs (trained using triplet loss).
- Further improved the re-identification accuracy by **augmenting the CNN features with the color features** extracted from a shallow network.

Nov 2017 – Oct 2018 **Survival Analysis using Multi-task Learning**

Guide: *Dr Raman Sankaran & Dr Arun Rajkumar*, Conduent Labs.

- Modeled survival-analysis problem as a multi-task learning problem with timestamps as tasks and predicted the survival status of the patient at each timestamp.
- Learned a non-increasing weight matrix for PCA-reduced patient's micro-gene array data by framing an optimization problem using hinge loss and elastic net.

Spring 2016 **Interesting Face Detection in News Videos**

- Found the face of the queried person in a large news video.
- Constructed a similarity graph of the candidate faces extracted from the video using the geometric and unique-match constraints based similarity metrics.
- The densest component of the similarity graph, extracted using modified Charikar's greedy algorithm, is returned as the queried face.

Spring 2016 **Vehicle and Pedestrian Detection in Videos**

- Carried out vehicle and pedestrian detection in traffic videos using foreground-background subtraction and IoU based tracking followed by a kernelised SVM as a classifier.

Spring 2016 **Mirror Hall**

- Developed an iOS based news app integrated with the reliability confidence of the news source and the listed news.
- The news from different sources were extracted, organized and ranked according to their authenticity based on their deviation from the average sentimental score.

Fall 2015 **Probabilistic Reverse Skyline Queries over Uncertain Databases**

- Carried out Monochromatic Probabilistic Reverse Skyline search queries over uncertain databases to retrieve reverse skylines with respect to the queried object having probability greater than the threshold.

Fall 2015 **Combinatorial Sketching for Finite Programs**

- Completed the sketch (partial implementation of the program) such that it satisfied the specifications of the desired functionality.
- Filled the holes (missing parts of the program) of the sketch using synthesize-verify approach in a loop until the sketch was not completed or proved buggy.

Technical Skills

Languages Python, MATLAB, C/C++, Java, LaTeX

Libraries Pytorch, Caffe, Keras
OpenCV, NumPy, SciPy, Scikit-learn, Pandas