

# Mridul Gupta

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<b>OBJECTIVE</b>	Ph.D. student in Electrical and Computer Engineering looking for a summer internship in the field of Computer Vision, Deep Learning, Machine Learning and Image Processing.
<b>EDUCATION</b>	<p><b>Purdue University</b></p> <ul style="list-style-type: none"><li>▪ Ph.D. in Electrical and Computer Engineering, GPA-4/4. Aug 2018 – present</li><li>▪ M.S. in Electrical and Computer Engineering, GPA-3.8/4. Aug 2018 – Jul 2021</li></ul> <p><b>Indian Institute of Technology Roorkee, India</b></p> <ul style="list-style-type: none"><li>▪ Bachelor of Technology, GPA-8.21/10. Jul 2013 – Jun 2017</li></ul>
<b>INTERESTS</b>	<ul style="list-style-type: none"><li>▪ Deep Learning, Computer Vision, Machine Learning, Image Processing</li></ul>
<b>SKILLS</b>	<ul style="list-style-type: none"><li>▪ Languages - Python, C++</li><li>▪ Libraries - OpenCV, TensorFlow, Keras, PyTorch</li></ul>
<b>EXPERIENCE</b>	<p><b>Research Assistant</b>, VIPER Lab, Purdue University, Advisor: Prof. Edward J. Delp Jan 2020- Present</p> <p><b>Teaching Assistant</b>, EPICS, Purdue University Aug 2019- Dec 2019</p> <p><b>Quantitative Analyst</b>, HSBC, India Jun 2017 – Jun 2018</p> <p><b>Research Internship</b>, IPSA Lab, Indian Institute of Technology Ropar, India May 2016 – Jul 2016</p> <p><b>Research Internship</b>, ITS Lab, Indian Institute of Technology Madras, India May 2015 – Jul 2015</p>
<b>PROJECTS</b>	<p><b>Food Image Generation: Research Assistant- VIPER Lab</b> Mar 2021-Present</p> <ul style="list-style-type: none"><li>▪ Working on a <b>GAN</b>-based algorithm to generate synthetic food images</li><li>▪ Generated images will have multiple food items in a single image</li></ul> <p><b>Sub-Pixel Localization of Objects: Research Assistant- VIPER Lab</b> Jan 2021-Present</p> <ul style="list-style-type: none"><li>▪ Developed a method to localize a single object and two closely-spaced objects using dual band images</li><li>▪ Developed method can localize a single object with an error of <b>0.08</b> pixels and two objects separated by 0.7 pixels with an error of <b>0.11</b> pixels</li></ul> <p><b>Small Target Detection: Research Assistant- VIPER Lab</b> Jan 2020-Present</p> <ul style="list-style-type: none"><li>▪ Developed a method to detect small targets with low SNR in dual band infrared images using spatial, spectral and temporal information</li><li>▪ Developed method, on average, can detect <b>90%</b> targets with at most <b>1</b> false alarm in an image</li><li>▪ Working on a deep learning-based method for detecting small targets with low SNR</li></ul> <p><b>Video Frame Interpolation</b> Spring 2021</p> <ul style="list-style-type: none"><li>▪ Re-implemented a <b>dynamic filter network</b>-based algorithm for interpolation of video frames to increase temporal resolution by <b>100%</b></li><li>▪ Modified the method to interpolate frames weighted by occlusion masks which decreased the convergence time of the algorithm by <b>30%</b></li></ul> <p><b>Feature Projection Network</b> Spring 2021</p> <ul style="list-style-type: none"><li>▪ Re-implemented the feature projection network which projects the features from any dataset in a direction orthogonal to the common features thus increasing their discriminative quality</li><li>▪ Encoder for the network was implemented using 3 blocks of a single head transformer whose classification accuracy increased by <b>2%</b> by using feature projection</li><li>▪ Method was tested on sentiment analysis datasets (MR, SST2) and is applicable for other problems as well</li></ul> <p><b>Building Classification: VIPER Lab</b> Aug 2019-Dec 2019</p> <ul style="list-style-type: none"><li>▪ Developed a <b>transfer learning</b>-based algorithm that classified buildings on coastal areas as residential or commercial from their google street view images with an accuracy of <b>94%</b></li></ul>

**Extracting Information From Historical Data: Quantitative Analyst- HSBC** Jun 2017 – Jun 2018

- Wrote a C++ code to extract historical data for certain products from the database and compute properties like volatility
- Maintained the Fixed Income Product's pricing library and worked on adding new features and developing methods for faster and accurate pricing (C++)

**Forgery Detection In Single-Sensor Multispectral Images: Research Intern- IPSA Lab** May 2016 – Jul 2016

- Improved the accuracy of forgery detection in single-sensor images using **expectation/maximization** algorithm in **MATLAB**
- Extended the use of algorithm to single-sensor multi-spectral images
- The accuracy varies with size of forged region and is **93.75 %** for **8%** forgery

**Automatic Data Extraction From Traffic Videos : Research Intern- ITS Lab** May 2015 – Jul 2015

- Developed a vehicle recognition software in **Python(Keras)** using **CNN** and **LSTM** which was used to calculate road parameters
- Developed software can categorize and track the vehicles with an accuracy of **95%**

## PUBLICATIONS

- **Sub-Pixel Localization of Objects Using Multiple Spectral Bands**, M. Gupta, J. Chan, M. Krouss, G. Furlich, P. Martens, M. Chan, M. L. Comer, E. J. Delp, IEEE Aerospace Conference (AeroConf), 2022 (accepted).
- **Building height estimation via satellite metadata and shadow instance detection**, H.Hao, S. Baireddy, E. Bartusiak, M. Gupta, Kevin LaTourette, Latisha Konz, M. Chan, M. L. Comer, E. J. Delp, Automatic Target Recognition XXXI, SPIE 11729, 2021.
- **Small Target Detection Using Optical Flow**, M. Gupta, S. Baireddy, J. Chan, M. Krouss, P. Martens, M. Chan, M. L. Comer, E. J. Delp, IEEE Aerospace Conference (AeroConf), 2021 1-9.
- **Detecting Image Forgery in single-sensor Multispectral Images**, M. Gupta, P. Goyal, Soft Computing for Problem Solving, 2017 211-221.
- **Data extraction from traffic videos using machine learning approach**, A. Mittal, M. Gupta, I. Ghosh, Soft Computing for Problem Solving, 2017 841-852.

## ACADEMIC SERVICE

- Reviewer for the IEEE Signal Processing Magazine
- Reviewer for the Computer Vision and Image Processing Conference (2021)

## ACADEMIC ACHIEVEMENTS

- Selected for regionals of ACM-ICPC, Amritapuri region, India 2015
- International Mathematics Olympiad, SOF, Delhi State Rank-9 and International Rank-125 2013

## POSITION OF RESPONSIBILITIES

- Head, Accounting Committee, HKN society, Purdue University 2020
  - Helped the society keep a track of expenses
- Head, Initiation Committee, HKN society, Purdue University Spring 2019
  - Planned and executed the initiation process for the incoming prospective ECE students
- Joint Secretary, Lights Section, IIT Roorkee 2015 – 2016
  - Managed lighting effects in college cultural events and organized recreational activities.