

# Tejaswi Kasarla

- tkasarla.github.io
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## Research Interests

### Domains

- > Deep Learning
- > Computer Vision
- > Machine Learning

### Sub-Domains

- > Active Learning
- > 2D, 3D Scene Understanding
- > Self-Supervised Learning
- > Temporal Representations
- > Fine-grained Image Understanding

## Courses

### Graduate

- > Digital Image Processing
- > Machine Learning
- > Parallel Scientific Computing
- > Computer Vision
- > Optimization Methods
- > Reinforcement Learning

## Skills

- > **Languages:** Python, C++, Bash, HTML, MATLAB
- > **ML Frameworks:** PyTorch, Caffe, Keras, Tensorflow
- > **Others:** OpenCV, SciPy, Scikit-learn, p5js

## Positions Held

Contributor & DRI, 2017-18  
Stanford Scholar Initiative

## Education

### MS (by Research) in Computer Science

International Institute of Information Technology, Hyderabad

Aug 2019

Grade: 7.17/10

**Advisors:** Prof. C.V Jawahar, Dr. Vineeth N. Balasubramanian

**MS Thesis:** Efficient Annotation and Knowledge Distillation for Semantic Segmentation [\[link\]](#)

The thesis tackles data annotation and computational constraints of deep learning models for semantic segmentation. Smart data annotations strategies make the annotation process efficient. Low-computation models with good performance are crucial for systems like self-driving cars.

### B.Tech in Electrical and Electronics Engineering

Mahatma Gandhi Institute of Technology, JNTU Hyderabad

May 2015

Grade: 80.48%

## Publications

[1] **Tejaswi Kasarla**, G Nagendar, Guruprasad Hegde, Vineeth N. Balasubramanian, C.V. Jawahar, "Region-Based Active Learning for Efficient Labelling in Semantic Segmentation", *IEEE Winter Conference on Applications of Computer Vision (WACV) 2019*. [\[paper\]](#)

## Research Experience

**Computer Vision Researcher**, Research and Technology Center, Robert Bosch

May 2019-Present

- **Multi-sensor Data Annotation:** The project aims to develop a novel annotation system for multi-modal data (LiDAR, RADAR and images) with tools for efficient, accurate 3D localization of objects and their tracking. I implemented object detection and tracking algorithms for integration into the pipeline to facilitate easier annotation of new data. I currently lead the research on synthetic data generation and augmentation techniques for LiDAR.
- **Image Attribute Understanding:** This research aims to retrieve fine-grained image attributes for pedestrians in an image. I implemented and tested a novel deep feature representation that outperforms CNN features and improves the top-20 retrieval by a large margin.
- **Ego-vehicle event detection:** This project aims to build a search and retrieval tool that leverages CAN-Bus data available from a drive sequence to identify video events related to ego-vehicle navigation. I implemented the data ingestion pipeline for video sequences and parallelized it to accommodate 100,000 sequences.

**Research Intern**, Research and Technology Center, Robert Bosch

Jun 2018-Oct 2018

- **Knowledge Distillation for Semantic Segmentation:** Proposed a method to improve the performance of real-time semantic segmentation models using knowledge distillation. Implemented and tested the method across several semantic segmentation architectures (ICNet, ENet, MobileNet). The validation IoU of these fast-segmentation networks improves by 3-4% with no additional computation during inference.

**Graduate Research Assistant**, Center for Visual Information Technology, IIIT Hyderabad

Aug 2016-Mar 2019

- **Active Learning for Semantic Segmentation:** Proposed multiple pixel-wise and superpixel-wise uncertainty estimation strategies for semantic segmentation inference. These uncertain pixels are queried for true labels through an active learning framework with ICNet as base model. Performed extensive experiments of the proposed strategies on unlabeled Cityscapes and Mapillary datasets. By querying true labels for only 10% of superpixels, the methods achieve performance comparable to fully supervised training. Published paper as first-author to WACV 2019.
- **Intelligent Image Matching:** Created a dataset from the screenshots of 3D CAD models sent by Altair Engineering India Pvt. Ltd. Worked with a PhD student to propose an intelligent image matching and registration algorithm to find the errors and differences in the images.

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Member, 2017-18  
LeanIn, IIIT Hyderabad

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Content Writer, 2017  
TEDxHyderabad

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Organizing Team, 2016  
Summer School on Deep Learning for Computer Vision

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Team Lead, 2015  
MIT Media Lab India Initiative

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## Achievements

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*Finalist*, Atmel Embedded Design Contest, 2015 : for efficient dual-axis solar tracker

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## Certifications

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IPAM Workshops on Mathematical Challenges and Opportunities for Autonomous Vehicles, Ongoing

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Summer School of Machine Learning at Skoltech, 2020

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Summer School on Deep Learning for Computer Vision, IIIT-Hyderabad, 2016

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Design Innovation Workshop, MIT Media Lab India Initiative, 2015

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## References

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**Dr. Amit Arvind Kale**  
Principal Senior Expert and Group Leader  
*Bosch, India*

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**Prof. C.V. Jawahar**  
Amazon Chair Professor & Dean (Research and Development)  
*IIIT-Hyderabad*

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**Dr. Vineeth Balasubramanian**  
Associate Professor  
*IIT Hyderabad*

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**Intern**, Center for Visual Information Technology, IIIT Hyderabad Mar 2016-June 2016  
Implemented algorithms on scene text recognition and built a web applications for the same.

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**Research Fellow**, LVPEI Center for Innovation, LV Prasad Eye Institute Aug 2015-Jan 2016

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- **Pediatric Perimeter:** [Pediatric Perimeter](#) is novel device that quantifies visual field extent (VFE) for infants. The device is a hemispherical dome with light emitting diodes (LEDs) controlled using a computer program to measure Reaction Time (RT) and the VFE. As a part of the project, I built a cross-platform software for the testing procedure that integrates LED control with Arduino. Implemented and tested algorithms for eye and head tracking of the infant in the software and recorded the readings of the experiment.
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## Scientific Outreach

**Organizer:** Women in Computer Vision Workshop ([WiCV](#)), CVPR 2021

**Organizer:** Whiteboard Talks, Robert Bosch. A bi-weekly talk series discussing research, engineering and other ongoing topics at Corporate Research, Robert Bosch, India (ongoing)

**Reviewer:** Women in Machine Learning Workshop (WiML), NeurIPS 2019

**Volunteer:** ICLR 2020, ICML 2020, NeurIPS 2020, ICVGIP 2018

**Talks:**

- *Active Learning for Semantic Segmentation*, SMILES summer school, 2020
  - *Active Learning for Semantic Segmentation*, First Research Symposium, IIIT Hyderabad, 2017
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## Other Projects

**Unsupervised Sketch Simplification for SBIR**, IIIT Hyderabad Aug 2016 - Nov 2016  
*Supervisors: Dr. Vineeth Gandhi*

Proposed a novel unsupervised method of sketch simplification to retrieve images from sketch input by humans. Formulated a function based on Fourier descriptors for the simplification of sketch drawn by humans. The proposed method trains an auto-encoder network on TU-BERLIN dataset and uses the learned representation to show sketch based image retrieval (SBIR) on Caltech-256 dataset.

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**Multi-class Cost Effective Active Learning (CEAL)** Aug 2018  
[Cost Effective Active Learning for Melanoma Segmentation](#) paper introduces dropout at test-time as Monte Carlo sampling to model the pixel-wise uncertainty of the image segmentation (UNet base model). I extended the Monte Carlo sampling to multi-class segmentation for Cityscapes dataset. This framework was trained with ICNet base model and obtained IoU of 50.0. [\[code\]](#)  
*Work done as part of WACV 2019 paper*

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**Deep Retinal Image Understanding** Mar 2018  
The paper, [Deep Retinal Image Understanding](#) proposes a unified framework for joint retinal vessel and optic disc segmentation. I implemented the framework to obtain results on dataset of eye fundus images from LV Prasad Eye Institute. [\[summary blog\]](#) [\[results\]](#). *Work done for LV Prasad Eye Institute*

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**Constrained Policy Optimization** Nov 2017  
[Constrained Policy Optimization](#) is a local policy search algorithm that enforces constraints while searching for the best policy during training. I implemented and trained the algorithm presented in the paper to learn policy for a toy gathering task. *Work done as part of graduate course on Reinforcement Learning*

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**Supervised Learning of Gaussian Mixture Models for Visual Vocabulary Generation** Nov 2016  
Wrote the code in MATLAB for expectation-maximization (EM) algorithm for soft assignment in k-means algorithm. Trained the code on Caltech-101 dataset to create a visual vocabulary of images. *Work done as part of graduate course on Machine Learning*

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