SAI VIKAS DESAI

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RESEARCH INTERESTS

Active Learning, Semi-Supervised Learning, Object Detection, Deep Learning, Computer Vision

EDUCATION

Indian Institute of Technology (IIT), Hyderabad *Aug 2017 - July 2020*
Master of Technology Current CGPA: 9.18
Department of Computer Science and Engineering

Sreenidhi Institute of Science and Technology *June 2017*
Bachelor of Technology Overall Percentage: 82.6%
Department of Electronics and Communication Engineering

WORK EXPERIENCE

Research Assistant, IIT Hyderabad *Aug 2017 - Aug 2020*
I worked under the guidance of Dr. Vineeth N Balasubramanian on using active learning to minimize labeled data requirements for object detection. My work focuses on using semi supervised learning methods to train object detection models with applications in precision agriculture.

Intern, Geoinformation Science Research Team, AIST Tokyo *June 2019 - July 2019*
I worked with Dr. Ryosuke Nakamura and Dr. Nevrez Imamoglu on the application of deep learning networks for tree detection and segmentation from street view images of Tokyo. I worked on fusing 2D semantic segmentation outputs with 3D LIDAR data to achieve efficient tree segmentation.

Summer Intern, Field Phenomics Lab, University of Tokyo *May 2018 - June 2018*
I worked with Dr Wei Guo on the application of deep learning in high throughput plant phenotyping, specifically on the estimation of rice heading date from time series crop images. We developed a cost effective sliding window based model to detect rice panicles in crop images, with minimal labeling effort.

Intern, Nuclear Fuel Complex, Hyderabad *Jan 2017 - Mar 2017*
I worked on interfacing a computer with a high precision mandrel measurement machine and developed a software application to automate the process of mandrel inspection. This internship was supported by NFC, an industrial unit of Department of Atomic Energy, Government of India.

SKILLS

Tools & Libraries	Pytorch, Keras, Scikit-learn, Numpy, OpenCV, Matplotlib
Languages	C++, Java, Python, Bash
Operating Systems	Linux, Windows
Web Technologies	HTML, CSS, Javascript
Other Skills	Git, LaTeX

RELEVANT COURSES

Applied Machine Learning, Deep Learning, Statistical Learning Theory, Convex Optimization Theory, Bayesian Data Analysis, Computational Complexity, Advanced Data Structures and Algorithms

PROJECTS

Adaptive Supervision for Object Detection *Jan 2019 - Apr 2019*
In collaboration with University of Tokyo

Proposed an adaptive supervision framework for active learning and demonstrate its effectiveness on the task of object detection. A combination of weak and strong supervision is used to obtain 30% savings in annotation cost to attain a target performance level. Accepted to **BMVC 2019**.

Rice Heading Stage Estimation using Deep Learning *Aug 2017 - Jul 2019*
In collaboration with University of Tokyo

Proposed a simple pipeline to detect regions containing flowering panicles from ground level RGB images of paddy rice. Used the flowering panicle region counts to estimate the heading date of the crop with a mean absolute error of less than 1 day. Published in **BMC Plant Methods 2019**.

Active Learning with Point Supervision for Cereal Crop Detection *Feb 2019 - Jan 2020*
In collaboration with University of Tokyo

Proposed a cost-effective point supervision based active learning approach for panicle detection in cereal crops. We show promising results on two publicly available cereal crop datasets - Sorghum and Wheat with 55% reduction in labeling costs. Published in **BMC Plant Methods 2020**.

Fine-grained Sampling for Active Learning in Object Detection *Oct 2018 - Dec 2019*

Examined a fine-grained sampling based approach for active learning in object detection. Studied the effects of our method on the Feature Pyramid Network and RetinaNet models, and shown significant savings in labeling effort to obtain good detection performance. Accepted to **CVPR 2020 Workshops**.

Edge Computing Toolkit for Real-Time Field Phenotyping *Jun 2020 - Aug 2020*

We developed EasyRFP, a Flask back-end, Angular font-end software toolkit which can be interfaced with any commercial GPU enabled micro computer (such as NVIDIA Jetson) and a digital camera. Our toolkit can be seen as a wrapper as it can work with any pre-trained model, provided that its learning framework (ex: Tensorflow, PyTorch, ONNX) is supported by the underlying embedded AI device (NVIDIA Jetson NX). Accepted to **ECCV 2020 Workshops**.

PUBLICATIONS

1. S. V. Desai, A. L. Chandra, M. Hirafuji, S. Ninomiya, V. Balasubramanian, W. Guo, EasyRFP: An Easy to Use Edge Computing Toolkit for Real-Time Field Phenotyping, CVPPP Workshop, **ECCV 2020**, Glasgow, UK.
2. S. V. Desai, V. Balasubramanian, Towards Fine-Grained Sampling for Active Learning in Object Detection, Visual Learning with Limited Labels, **CVPR 2020 Workshop**, Seattle, USA.
3. S. V. Desai, Akshay L. Chandra, V. Balasubramanian, An Adaptive Supervision Framework for Active Learning in Object Detection, British Machine Vision Conference, **BMVC 2019**, Cardiff, UK.
4. S. V. Desai, V. Balasubramanian, T. Fukatsu, S. Ninomiya, W. Guo, Automatic estimation of heading date of paddy rice using deep learning. **Plant Methods 15, 76 (2019).**

5. Akshay L. Chandra, S. V. Desai, V. Balasubramanian, S. Ninomiya, W. Guo, Active learning with point supervision for cost-effective panicle detection in cereal crops. **Plant Methods 16, 34 (2020).**
6. Akshay L. Chandra, S. V. Desai, V. Balasubramanian, W. Guo, Computer Vision with Deep Learning for Plant Phenotyping in Agriculture: A Survey, **ACCS Journal India** (**March 2020** edition).
7. S. V. Desai, A. Kumar, M. Taparia, P. Rajalakshmi, V. Balasubramanian, U. B. Desai, W. Guo, AI Based High Throughput Crop Phenotyping in Drone and Static Images, Workshop on AI for Society in Developing Nations (an **AAAI** India Chapter Event), Dec **2018**.

SERVICE

- Reviewer for CVPPP Workshop in ECCV 2020, VL3 Workshop in CVPR 2020, ICVGIP 2018 Conference.
- Sub-Reviewer for ICLR 2020, WACV 2019, WACV 2020, IEEE TKDE and ICCV 2019
- Teaching Assistant (Content Preparation) for NPTEL course on Deep Learning for Computer Vision (Fall 2020).
- Teaching Assistant for CS5500: Reinforcement Learning (Spring 2020)
- Teaching Assistant for CS5370: Deep Learning for Vision (Fall 2019)
- Teaching Assistant for CS6360: Advanced Topics in Machine Learning (Spring 2019)
- Teaching Assistant for CS6510: Applied Machine Learning (Fall 2018)

ACHIEVEMENTS

- Received Certificate of Appreciation in Research for the years 2020 and 2018 in IIT-Hyderabad.
- Part of the winning team in "Quest 2k15 Hackathon" in JNTU Hyderabad in 2015.

REFERENCES

1. Dr. Vineeth N Balasubramanian, Associate Professor, Department of Computer Science Engineering, IIT Hyderabad, Sangareddy, Telangana - 502285, India. E-mail: vineethnb@iith.ac.in