



Our research group on “Machine Learning and Vision” at IIT-Hyderabad works at the intersection of the theory and application of machine/deep learning - with a focus on applications in computer vision. With a strong interest in the mathematical fundamentals and a passion for real-world application, our group aims at being at the forefront of the field, by carrying out impactful research in the areas of deep learning, machine learning and computer vision, guided by application contexts derived from real-world use. Our problems of interest in recent times have focused on:

- Learning with limited supervision (or) Label-efficient learning: This includes problems such as zero-shot learning, few-shot learning, continual learning, active learning, domain adaptation, domain generalization; and
- Explainable machine/deep learning: This includes problems on use of causality in machine learning, adversarial and attributional robustness, disentanglement of latent variables.

We are also broadly interested in the theoretical understanding of deep learning, and making deep neural networks faster (to train and test), as well as smaller. From an application standpoint, problems of our recent interest include applying the algorithms we develop to domains such as:

- Agriculture: E.g. Plant phenotyping using computer vision;
- Drone-based vision: E.g. Detection of objects from drone imagery, as well as low-resolution imagery;
- Autonomous navigation: E.g. Adding levels of autonomy to driving vehicles in developing countries, focusing on India;
- Human behavior understanding: E.g. Detection of emotions, human poses, gestures, etc of the human body using images and videos

The algorithms developed in our research have been used for explaining COVID-19 diagnosis in chest X-ray images, finding defective cells in solar arrays, explaining cancer prediction on gene expression data, identification of pathogens in tomograms, leaf counting, genus classification in plant images, etc. Alumni of our group have gone on to join Google AI Residency, Facebook AI Residency, Harvard, Max Planck Institute, and other reputed institutions around the world. We invite you to please see <https://iith.ac.in/~vineethnb/index.html> or <http://lab1055.cse.iith.ac.in/> for more information on our research interests, projects, and publications.