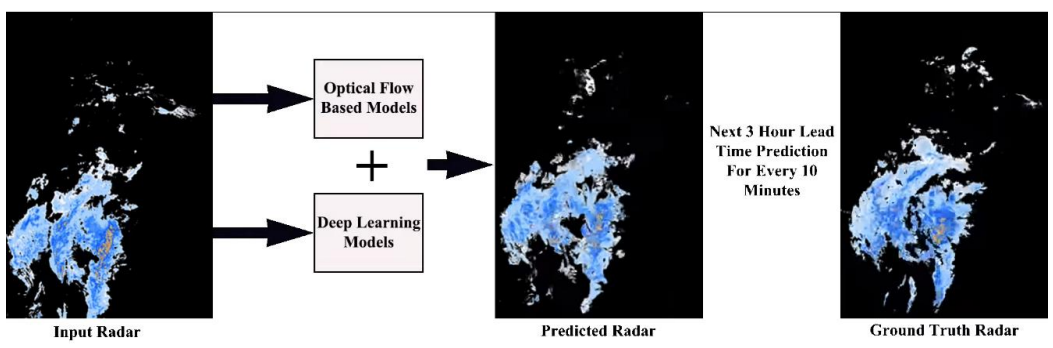
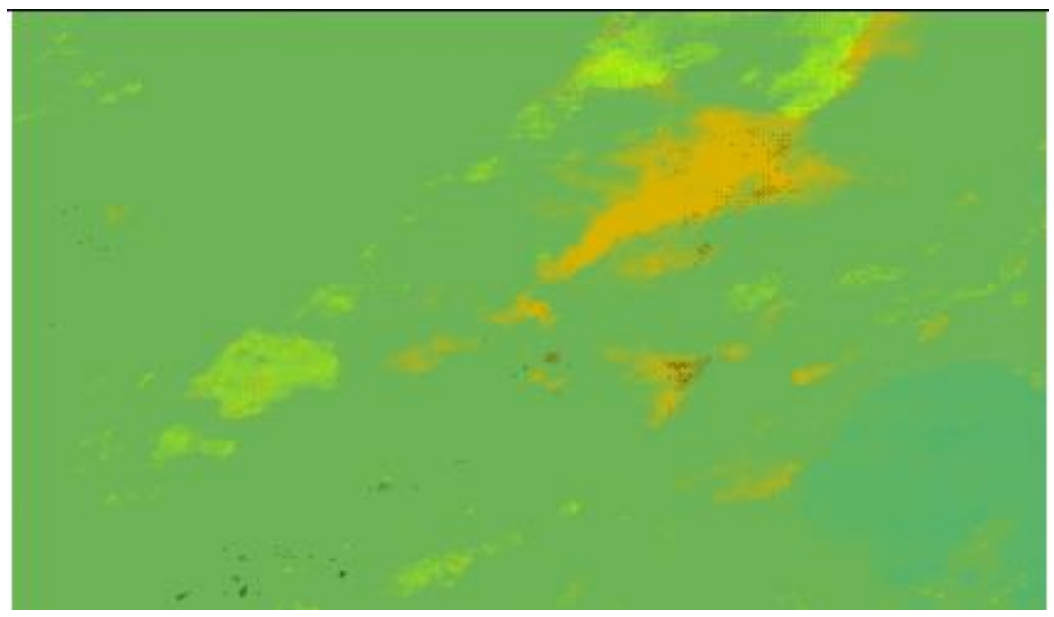
AI Association with Japan

AI image analysis and prediction to improve the weather news prediction accuracy:
Funding Agency: Weathernews Inc., Tokyo, Japan

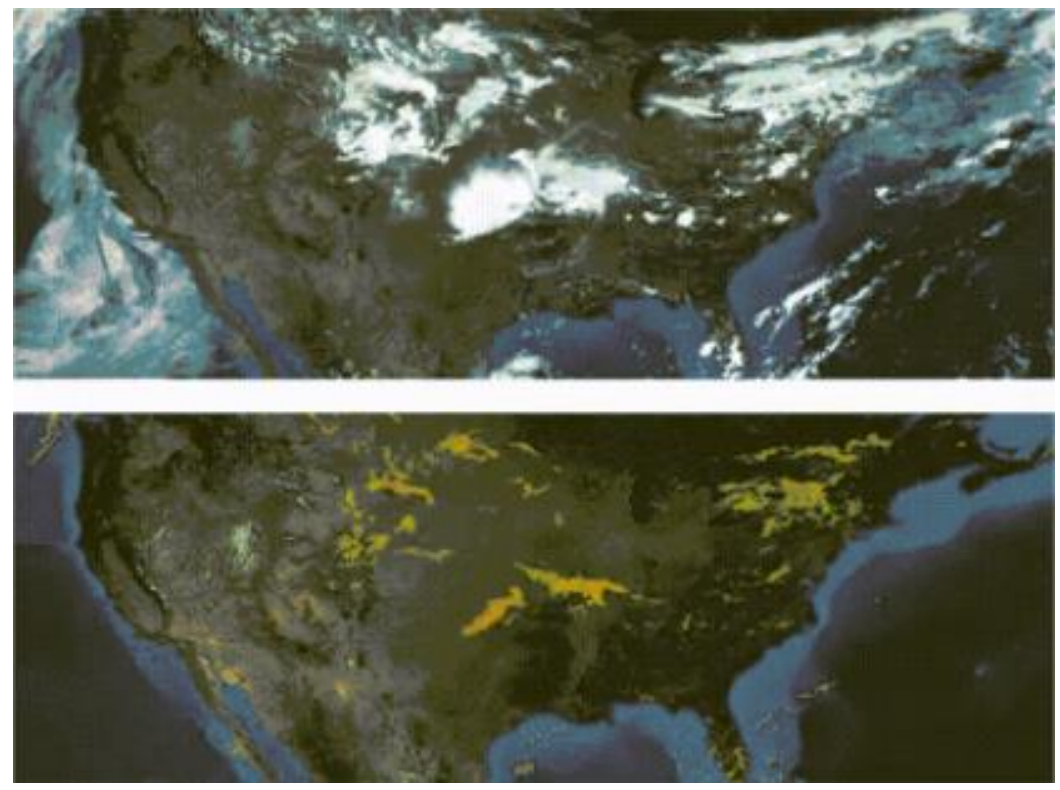
Me & my research group at Visual Learning and Intelligence Laboratory has used AI image analysis and prediction to improve the weather news prediction accuracy. A collection of advanced preprocessing algorithms and AI models are developed for analysing the images in order to forecast the weather conditions. Following algorithms and models have been developed and carried out the technology transfer:

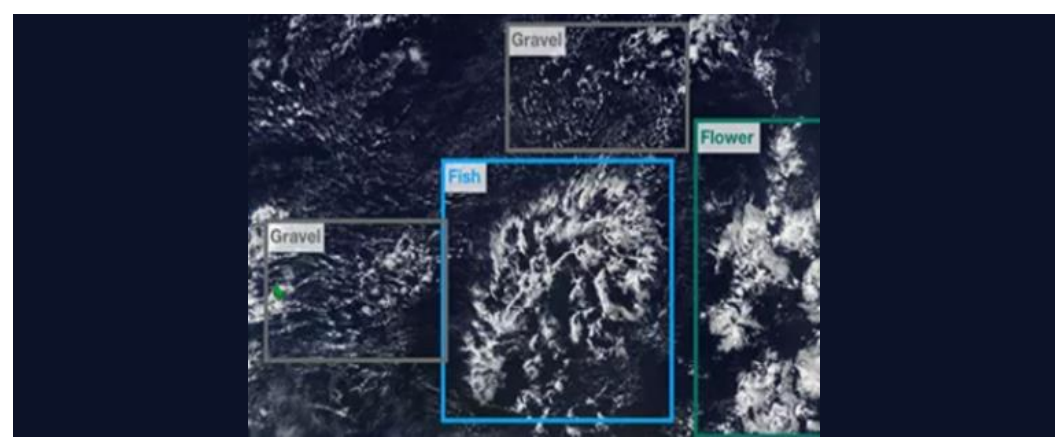


Precipitation Nowcasting



Volcanic Eruption Classification – Ash Detection





Cloud segmentation on real-time RGB/Infrared data using deep learning techniques.

Road Scene Vehicle Detection in adverse weather conditions

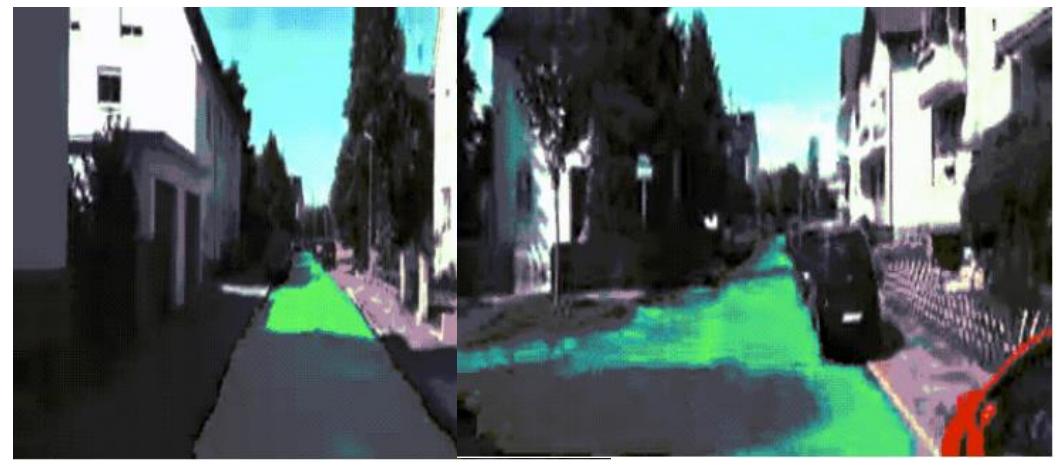


Image Dehazing for road scene analysis tasks such as vehicle detection, vehicle classification and road line detection

Continued…

Design and Development of Real-Time Transportation Safety Monitoring System for Smart Cities

Executive Summary:

The project aimed at the development of methods for analyzing traffic flows especially in the crowded scenario, methodologies to analyze various anomalous events like accidents, snatch thefts, and violence during religious processions, the design of machine learning models and the design of techniques for representing such anomalous events. The software is developed which works in real-time on surveillance scenarios. The deep learning-based models have been introduced to determine traffic violators (helmetless driving, rushing at stop signals, wrong side driving, illegal turns, etc.) and deep learning-based methods for recognition of human poses in various surveillance scenarios for person re-identification are the significant works competed as a part of this collaborative project. A real-time and scalable system for person re-identification that can identify potential anti-social elements and track their movements is an off-shoot of this collaborative project.

Salient Research Achievements:

- **Detection of anomalous events:**
  Gaussian mixture model (GMM) is used to form a universal attribute model consisting of multiple actions to identify relevant attributes, also called action vectors. They contain actions of anomalous activity. For snatch theft detection, we have achieved over 99% classification accuracy. Due to the dynamic nature of this feature representation, this approach can also be used for other anomalous actions such as accident detection.

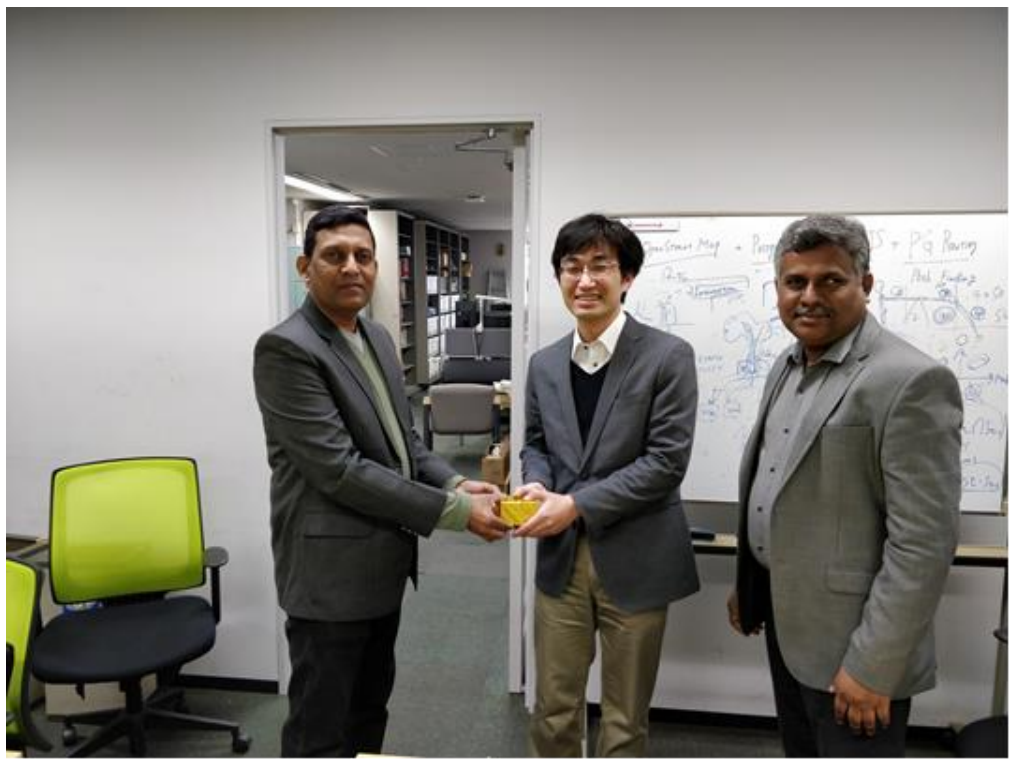
- **Traffic violation detection (motorcyclists without a helmet):**
  Deep learning approach such as a convolutional neural network (CNN) to identify motorcyclists in dense traffic videos is explored in this work. After identification of motorcyclist, another CNN is used to detect head region to classify among motorcyclists with and without a helmet with over 90% classification accuracy at 52 ms/frame.

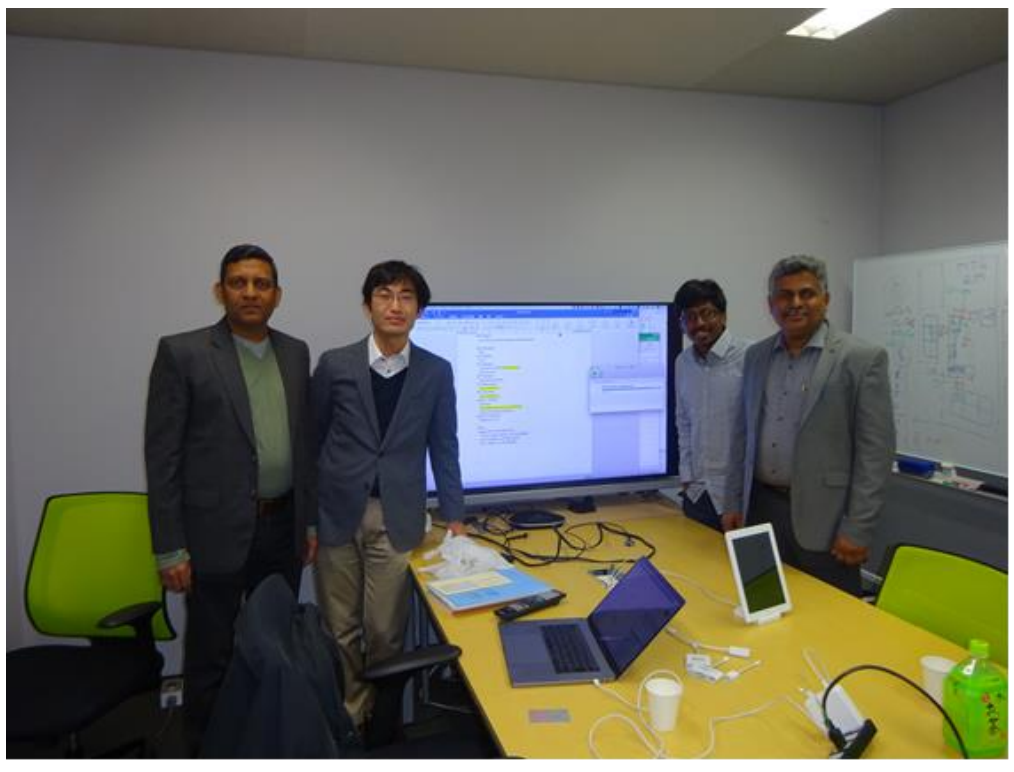
- **Person re-identification in surveillance videos:**
  Using deep features (VGG16), a graph is constructed in such a way where each person is a node in which the edge between these nodes is calculated from a similarity measure to find the closest k neighbors of each node (person). A graph kernel is then used to classify among multiple persons.

This is a collaborative project work between Indian Institute of Technology, Hyderabad, India and University of Tokyo, Japan.
Funding agency: DST-JSPS
Duration: June, 2018- Mar. 2020.
On the Indian side:
Principal Investigator: Prof. C Krishna Mohan, IIT Hyderabad, India.
Co-Investigator: Prof. B H Shekar, Mangalore University, Mangalore, Karnataka, India.
On the Japan side: Dr. Masaki Ito, University of Tokyo, Japan.

Some memories down the lane of this Project

Continued…





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