

Akash Kumar

Google Scholar | GitHub | Kaggle | Medium | LinkedIn

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EDUCATION

- **University of Central Florida (UCF)** Orlando, FL
PhD in Computer Science Aug. 2020 -
- **Delhi Technological University (DTU)** Delhi, India
Bachelor of Technology in Electronics and Communications; CGPA: 8.58/10.0 Aug. 2015 - June. 2019

RESEARCH INTERESTS

Computer Vision, Deep Learning, Natural Language Processing, Image Processing, Machine Learning

RESEARCH EXPERIENCE

- **Action Recognition via Self-Supervised Learning** Orlando, FL
Research Assistant | Supervisor: Dr. Y. S. Rawat Aug. '20 - Present
 - Self-supervised learning for downstream tasks such as video classification, segmentation & object detection.
 - Working on 3D video feature representation learning via diverse self-supervised pretext tasks.
- **Fine-grained classification and segmentation, MANAS Lab, IIT Mandi** Himachal Pradesh, India
Research Assistant | Supervisor: Dr. Arnav Bhavsar April'20 - July'20
 - Improved classification accuracy via advanced data augmentation practices and part-wise attention localisation.
- **Image Forgery Detection & Localization, MANAS Lab, IIT Mandi** Himachal Pradesh, India
Research Assistant | Supervisor: Dr. Arnav Bhavsar June'19 - April'20
 - Explored the online negative triplet mining for deepfakes classification in low resolution videos. ([Github](#))
 - Detection and localization of Copy-Move Forgery in Images. Created a synthetic tampered dataset using semantic inpainting and copy-move forgery on COCO dataset. Employed domain adaptation to learn the representation from synthetic to real-world images. ([Github](#))
- **Indian Landmark Recognition, DTU** New Delhi, India
Research Assistant | Supervisor: Dr. S. Indu Oct. 2018 - Jan. 2019
Devised an architecture to predict landmark labels directly from image pixels using Graph-based saliency approach to help better understanding and organizing photos of diverse Indian monuments style. Deployed saliency detection in conjunction with transfer learning, ML classifiers and ensembling methods. ([Github](#))
- **Content-based Video Relevance Prediction, MIDAS Lab, IIIT Delhi** New Delhi, India
Research Assistant | Supervisor: Dr.Rajiv Ratn Shah(IIITD) & Dr.Roger Zimmerman(NUS) April 2018 - Aug. 2018
Developed a recommender system to solve the problems of "cold-start" videos and generate a personalized recommendation based on user's history. Built the system using Data Augmentation, Random Forest Regression & Deep Learning based Linear Discriminant Analysis. ([Github](#))
- **Bird Species Classification, NuTech Labs (CVIP'18 Challenge Winner)** New Delhi, India
Research Intern July. 2018 - Sept. 2018
Implemented an end-to-end deep learning model for bird detection and inter-species classification in high resolution images. Worked on Transfer learning, Multistage training, Object detection via Mask R-CNN and Model ensemble on a very small dataset (150 images). ([Github](#))

- **Rooftop Assessment for Solar Installation Using Satellite Imagery** Himachal Pradesh, India
Computer Vision Intern, The Solar Labs June. 2017 - July. 2017
Formulated an online rooftop assessment system for solar installations using Satellite Imagery. Implemented algorithms to identify individual rooftops of buildings and optimal area to place solar panels. ([Github](#))

SELECTED PROJECTS

- **Plant Pathology (Kaggle:Top 20%)**: Misdiagnosis of agricultural crops diseases leads to pathogen strains and increased input cost. Employed EfficientNet, Noisy Student weights, label smoothing, focal loss and test time augmentation to achieve 97% accuracy. (CVPR'20 Challenge)
- **Indian Driving Dataset Segmentation Challenge**: Devised solutions for unstructured driving scenarios on Indian roads. Traffic participants behaviours are highly diverse in India. Surveyed various segmentation models such as FCN, UNet, SegNet, Efficient Net, Pyramid Scene Parsing Net and DeepLabV3 to increase the performance for semantic labeling of pixels. ([Github](#))
- **Understanding Clouds from Satellite Images (Kaggle:Top 30%)**: Addressed the problem of building climate models by analyzing cloud organization patterns from satellite images. Explored various Transfer learning, Data augmentation, fine-tuning and model callbacks approaches to boost the classification accuracy. ([Github](#))
- **Fake News Detection**: Implemented feature-based and deep learning models for fake-news classification. Tried combination of metadata, statements and justifications to improve the classification accuracy. ([Github](#))
- **Amazon Product Review System**: Devised architectures to use Review titles and statements for sentiment analysis. Used NLTK and scikit-learn for vectorization and embeddings. Applied RNN, LSTM and BiLSTM models to improve the classification accuracy. ([Github](#))
- **Bothoven, IIT Bombay Robotics Competition**: Assembled a line follower robot that process audio and strikes the rod based on musical sequence subject to various geometric and movement constraints. Worked on Audio Processing, Wireless Communication, Line Follower & Path Planning.

PUBLICATIONS & PREPRINTS

- **Detecting Deepfakes with Metric Learning**
Akash Kumar, Arnav Bhavsar
8th International Workshop on Biometrics and Forensics (IWBF), 2020
- **Syn2Real: Forgery Classification via Unsupervised Domain Adaptation**
Akash Kumar, Arnav Bhavsar
IEEE Winter Applications of Computer Vision Workshops (WACVW), 2020 ([Link](#))
- **Bird Species Classification using Transfer Learning with Multistage Training**
Akash Kumar, Sourya Dipta Das
Workshop on Applications of Computer Vision (WACV), 11th ICVGIP 2018 ([Link](#))
- **Improving Landmark Recognition using Saliency detection and Feature classification**
*Akash Kumar**, *Sagnik Bhowmick**, *N. Jayanthi*, *S. Indu*
Workshop on Digital Heritage (WDH), 11th ICVGIP 2018 ([Link](#))
- **IceBreaker: Solving Cold Start Problem for Video Recommendation Engines**
*Akash Kumar**, *Agniv Sharma**, *Abhigyan Khaund**, *Y. Kumar*, *P. Kumaraguru*, *R.R. Shah*, *R. Zimmerman*
MR2AMC Workshop, 20th IEEE International Symposium on Multimedia(ISM) 2018 ([Link](#))

PROGRAMMING SKILLS

- **Languages**: Python, C++, MATLAB, Basic HTML, CSS
- **Frameworks**: Keras, PyTorch, Tensorflow, OpenCV, Flask (Beginner)
- **Tools & Platforms**: Git, L^AT_EX, Vim, Sublime, Linux

ACHIEVEMENTS

- **Student Travel Grant:** Received grant to attend 7th NCVPRIPG'19, Karnataka, India.
- **Winner:** Conference Challenge Winner organized in 3rd ICCVIP'18, Madhya Pradesh, India.
- **Top 5/15:** Conference Challenge organized in 26th ACM Multimedia Conference'18, Seoul, South Korea.
- **Winner:** Best Innovation Award in Go-Karting Championship IGKC'17, Pune, India.
- **Top 50/2500:** e-Yantra Robotics Competition, IIT Bombay.
- **National Top 0.01%:** IIT-JEE Mains, 2015
- **Top 14/6k:** NTSE Stage-I, 2013
- **National Top 1%:** International Maths Olympiad, 2012.
- **1st Rank:** Military School Entrance Exam.

WORKSHOPS/CONFERENCES ATTENDED

- **Jan. 2020:** 15th Winter School on Speech and Audio Processing, IIT Mandi.
- **July. 2019:** Workshop on Applied Deep Learning, IIT Mandi.
- **Dec. 2018:** Workshop on Machine Learning for Medical Analysis, 11th ICVGIP, IIIT Hyderabad.
- **Dec. 2017:** 6th National Conference on Computer Vision, Image Processing & Graphics (NCVPRIPG), IIT Mandi.

EXTRACURRICULAR

- **Department Head:** Embedded & Machine Vision dept., INFERNO, Go-Kart Team DTU.
- **Team Captain:** Inter-Hostel Football Team. (Runner-Ups)
- **Organizing Member:** Organized Robowars event in DTU TechFest'17.
- **Team Member:** Organized various events as a core member of Stratazenith society.