

Karttikeya Mangalam

PHD STUDENT IN COMPUTER SCIENCE

EDUCATION

University Of California Berkeley, California, USA

Doctor of Philosophy in Computer Science

Advisor: Prof. Jitendra Malik, Prof. Yi Ma

Aug. '19 - Present

Stanford University, California, USA [**Dropped Out**]

Masters in Computer Science with Distinction in Research

Sept. '18 - Jun. '19

Indian Institute of Technology, Kanpur, India

Major in Electrical Engineering with Minor in Machine Learning

GPA: 9.5/10 (Seven Semesters)

Aug. '14 - Jun. '18

Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

Semester Exchange in Computer Science

GPA: 5.8/6.0 (One Semester)

Sept. '17 - Feb. '18

Paramount Academy, Muzaffarpur, India

All India Senior School Certificate Examination, Class XII

Percentage: 94.6%

May '12 - Apr. '14

D.A.V. Public School, Muzaffarpur, India

All India Senior School Certificate Examination, Class X

GPA: 10/10

April 2012

RESEARCH

Trajectory Prediction, Egocentric Vision, Computer Vision, Deep Learning

INTERESTS

PUBLICATIONS

Takuma Yagi, **Karttikeya Mangalam**, Ryo Yonetani, Yoichi Sato "First-Person Human Trajectory Prediction", *Computer Vision and Pattern Recognition 2018* (CVPR'18) [**Spotlight Paper**]

Karttikeya Mangalam, Tanaya Guha "Using Spontaneity of Speech to Improve Emotion Recognition", *International Speech Communication Association - Interspeech 2018* [**Oral**]

Karttikeya Mangalam, Vinay Prabhu "Do deep neural networks learn shallow learnable examples first?", Workshop on Identifying and Understanding Deep Learning Phenomena, *International Conference on Machine Learning 2019* (ICML'19) [**Spotlight Paper**].

Karttikeya Mangalam, K S Venkatesh "Bitwise Operations of Cellular Automaton on Gray-scale Images", *28th Irish Signals and Systems Conference* (ISSC'17), Ireland [Poster]

Karttikeya Mangalam, Mathieu Salzmann "On Compressing U-net Using Knowledge Distillation", ArXiv:1812.00249

AWARDS &

ACHIEVEMENTS

All India Rank 1 in National Science Talent Search Examination-2011 out of 500,000 students

Selected as an **Indian National Mathematical Olympiad Awardee**, awarded to only 30 students nationwide annually 'for demonstrating extraordinary talent in pre-college mathematics'

Received **Summer Undergraduate Research Grant** for Excellence 2016 by IIT Kanpur

Received **Academic Excellence Award**, for 3 consecutive years (2015-17) at IIT Kanpur

1st State Rank in Regional Mathematics Olympiad-2013 out of 10,000 students
1st State Rank in 5th SOF International Mathematics Olympiad 2012
1st State Rank in both First & Second Round of NTSE-2010 out of 30,000 students
1st State Rank in National Level Science Talent Search Examination -2011

Top 1% Nationwide out of 37,000 enrolled in National Standard Examination in Physics
Top 1% Nationwide in National Standard Examination in Junior Science 2010
Top 1% Nationwide out of more than a million students in AISSCE 2014
99.97 percentile in Joint Entrance Examination (IIT-JEE) 2014 among 1.5 million students

Recipient of **Honda Young Engineer & Scientist's (Y-E-S) Fellowship** 2017, awarded to 14 undergraduates nationally *for appreciating their excellent undergraduate research work*

Received a grant of **\$10,000** through the YES+ program for summer research internship

Selected as a National Talent Search awardee in 2010 bestowed by MHRD to **500 among over 300,000** students nationwide *to identify students with high intellect and academic talent*

Awarded UnifyID fellowship in Spring'19 to promote young researchers in Machine Learning.

RESEARCH PROJECTS

ALL RESEARCH PAPERS
ARE UPLOADED
ON THE HOMEPAGE &
ARXIV

First-Person Human Trajectory Prediction

Summer Internship, Prof. Yoichi Sato, CV Lab, University of Tokyo May '17 - Nov. '17

- In collaboration with a master's student, devised a *Deep Multi-stream Convolution-Deconvolution Architecture* for estimating future pedestrians' positions in a first person viewpoint video
- Incorporated numerous key observations as salient features to improve performance such as perceived visual scale of humans, ego-motion of the camera wearer and human pose information for pedestrians
- Investigated several state of the art models for Pose Estimation, Segmentation, Depth Estimation, Social Interaction Modeling and Path prediction techniques centered around Human Affective CV
- Collaborated to *record and benchmark a new dataset* for locomotion research in first person vision
- Results published at **CVPR** 2018 as a spotlight presentation

Human Locomotion Forecasting

Research Assitanship, Prof. Juan Carlos, Stanford Vision Lab Sept. '18 - June'18

- Formulated the problem of *human locomotion forecasting* in presence of noisy inputs
- Developed a novel method based on motion disentanglement for reducing prediction complexity
- Proposed a end to end pose estimation, completion, disentanglement and prediction pipeline for locomotion prediction without using any human annotated data
- Implemented several strong baselines like Temporal Convolutional Networks, Bidirectional LSTM Encoder Decoder networks and Transformers for baseline

Machine Rationalization : A Conditioned Language Generation Task

Summer Internship, Prof. Alain Tapp, MILA, Montreal June '17 - Present

- Curated a dataset of over 1B tokens from Reddit for unsupervised conditional rationalization
- Proposed the new Natural Language Generation task of Rationalization: Generating reasonable explanations for a given occurrence in an unsupervised context-free setting
- Proposed a novel metric for the task that is reasonably correlated with human intuition
- Proposed a new GAN architecture that improves upon the currently available baselines

Learning Spontaneity to Improve Emotion Recognition in Speech

Prof. Tanaya Guha, Multimedia & Signal Processing Lab, IIT Kanpur Jan.'17 - Mar. '18

- Proposed two different *Multi Task Learning based SVM frameworks* (Hierarchical and Joint) for emotion recognition in speech utilizing the spontaneity information outperforming competing methods.
- Identified several novel features for the task of spontaneity (planned or improvised) detection such as context and delta values through feature ablation experiments on the USC IEMOCAP database
- Results presented at **Interspeech 2018** as an Oral. Video [Link](#)

Distillation of Fully Convolutional Networks with Residual Connections

Semester Research Project, Dr. Mathieu Salzmann, CV Lab, EPFL

Oct. '17 - Feb. '18

- Implemented the **U-net architecture** with 2D and 3D convolutional layers in Pytorch
- Tested and compared a number of different models, varying the channel layer depth, softmax temperature, kernel size, architecture depth and optimization parameters
- Proposed novel distillation methods based on work by Hinton et al. and successfully performed the knowledge transfer to a much **smaller model with just 3% of the original parameters**

Binary Image Recombination after Bitwise Operations Of Cellular Automaton

SURGE Research Internship, Prof. K S Venkatesh, CV Lab, IIT Kanpur

May '16 - May '17

- Designed a novel algorithm to extend the use of Cellular Automaton of Image Processing tasks
- Improved upon the performance of *Median filtering algorithm* on denoising **Salt & Pepper noise by 5-7 %** with minimal space-time overheads using the proposed algorithm
- Results of the project are published in **Irish Signals and System Conference 2017**, Ireland

Do Deep Neural networks learn shallow trainable examples first?

UnifyID fellowship

Spring 2019

- Studied characteristics of generalization of deep networks relative to simple machine learning models
- Formulated the experimental procedure to investigate learning trajectory
- Carried out experiments with DL models (ResNet101 & DenseNet121) against ML models (SVM/RF)
- Results published as an **Oral** in the workshop on **Deep Phenomenon (ICML 2019)** [Video Link](#)

VOLUNTARY WORK

- Served as a reviewer for 22nd International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2019).

Core Team Operations

Counselling Service, IIT Kanpur

Jan. '16 - Jan. '17

- In a team of 10, organized a 6-day long Orientation Program on behalf of IIT Kanpur to welcome the batch of 2016 and ensure a smooth transition to college life
- Led a team of 137 students guides, to carry out the admission procedures for the new batch such as academic registration, course allotment and biometric affiliation
- Organized institute-level remedial sessions aimed at providing help to the academically weak students