Karttikeya Mangalam

PhD Student in Computer Science

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Education

University Of California Berkeley, California, USA
Doctor of Philosophy in Computer Science — *Aug.'19 - Present*
Advisor: Prof. Jitendra Malik

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 — *Aug.'14 - Jun.'18*
GPA: 9.5/10 (Seven Semesters)

Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland
Semester Exchange in Computer Science — *Sept.'17 - Feb.'18*
GPA: 5.8/6.0 (One Semester)

D.A.V. Public School, Muzaffarpur, India
All India Senior School Certificate Examination — *April 2012*
GPA: 10/10

Research Interests

Human Motion Prediction, Object Centric Video Understanding, Computer Vision

Publications

Karttikeya Mangalam, Ehsan Adeli, Kuan-Hui Lee, Adrien Gaidon, Juan Carlos Niebles 'Disentangling Human Dynamics for Pedestrian Locomotion Forecasting with Noisy Supervision", *IEEE Winter Conference on Applications of Computer Vision* (WACV'20) [**Oral**]

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], Baylearn 2019.

Karttikeya Mangalam, K S Venkatesh "Bitwise Operations of Cellular Automaton on Grayscale 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

Zhe Cao, Hangg Gao, **Karttikeya Mangalam**, Qi-Zhi Cai, Minh Vo, Jitendra Malik "3D Human Locomotion Prediction with indoor environments constraints" (submitted to ECCV 2020)

Karttikeya Mangalam, Harshayu Girase, Shreyas Agrawal, Kuan Hui Lee, Ehsan Adeli, Jitendra Malik, Adrien Gaidon "It's Not the Journey But the Destination: Endpoint Conditioned Trajectory Prediction" (submitted to ECCV 2020)

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 Assitantship, 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 Recogntion 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 one 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 Salzamann, 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

Reviewer
Professional Service

- 22nd Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2019)
- IEEE Winter Conference on Applications of Computer Vision (WACV 2020)
- International Journal on Multimedia Tools and Applications, Springer (MTAP)
- International Conference on Medical Imaging with Deep Learning (MIDL 2020)

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