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, Prof. Yi Ma

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)

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**, Qinh Vo, Jitendra Malik "3D Human Locomotion Prediction with indoor environments constraints" (submitted to CVPR 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