Karttikeya Mangalam

SENIOR UNDERGRADUATE, ELECTRICAL ENGINEERING, IIT KANPUR

C-601, Route Louis Favre- 4
Ecublens VD 1024, Switzerland
mangalam@iitk.ac.in | karttikeya.mangalam@epfl.ch
Webpage : https://karttikeya.github.io/
Github : https://github.com/karttikeya/
+44-07-873-40733

EDUCATION

Indian Institute of Technology Kanpur, India
Major in Electrical Engineering with
Minor in Artificial Intelligence   *Aug' 14 - Jun' 18 (Expected)*
GPA: 9.4/10 (6 Semesters)

Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland
Semester Exchange in Computer Science (One Semester)   *Sept'17 - Feb' 18 (Expected)*
Ongoing

Paramount Academy, India
All India Senior School Certificate Examination, Class XII   *May' 12 - Apr' 14*
Percentage: 94.6%

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

RESEARCH INTERESTS

Computer Vision, Deep Learning, Machine Learning, Image Processing

PUBLICATIONS

Karttikeya Mangalam, K S Venkatesh "Bitwise Operations of Cellular Automaton on Grayscale Images" *28th Irish Signals and Systems Conference (ISSC'17)* Killarney, Ireland

Karttikeya Mangalam, Tanaya Guha "Using Spontaneity of Speech to Improve Emotion Recognition" Submitted to *IEEE Signal Processing Letters*

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

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** bestowed to only 30 students nationwide annually *for demonstrating extraordinary talent in pre-college mathematics*

Received **Summer Undergraduate Research Grant** 2016 for Excellence by IIT Kanpur
Academic Excellence Award 2015-16 awarded to Top 5% students in 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 & Scientists (Y-E-S) Fellowship** 2017 and **10,000$** grant awarded to 14 undergraduates nationally for appreciating their research work

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

Recipient of **Kishore Vaigyanik Protsahan Yojana (KVPY)** Fellowship in 2013, awarded annually to **1100 students from 100,000** applicants by the Dept. of Science and Technology

---

RESEARCH
PROJECTS

First-Person Human Trajectory Prediction
Summer Internship, Prof. Yoichi Sato, CV Lab, University of Tokyo   *May '17 - Nov'17*

- Developed Deep Multi-stream Convolution-Deconvolution Architecture for estimating the position of pedestrians in future frames from a first person recoded video
- Incorporated several 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
- Collaborated to investigate a number of Pose Estimation, Segmentation, Depth Estimation, Social Interaction Layers and other state of the art networks centered around Human Affective CV
- Trained and tweaked many different Deep/Shallow Convolutional and sequential architectures and collaborated to record and propose a net dataset for first person vision research in path prediction.
- Paper is submitted to Computer Vision and Pattern Recognition (CVPR) 2018

Binary Image Recombination after Bitwise Operations Of Cellular Automaton
SURGE Research Internship, Prof. K S Venkatesh, CV Lab, IIT Kanpur   *May'16 - May'17*

- Improved the performance of *Median filtering algorithm for Salt & Pepper noise by 5-7 %* with minimal space-time overheads using cellular automaton
- Designed a novel algorithm to extend the use of Cellular Automaton of Image Processing tasks
- Results of the project are published in IISC 2017 & further details are present on homepage

Joint Estimation of Spontaneity and Emotion from speech in Dyadic Conversations
Prof. Tanaya Guha, Multimedia & Signal Processing Lab, IIT Kanpur   *Jan'17 - Nov'17*

- Proposed a *Novel SVM based framework for classifying speech* in 3-way emotion classification by joint estimation of spontaneity or planning of the action
- Identified spontaneity of speech (planned/scripted or improvised) as a key feature to emotion classification and demonstrated role of context in identification
- Paper on the findings is currently submitted for review to the journal Signal Processing Letters

Distillation of Neural Net with Residual Connections (U-Net)
Dr. Mathieu Salzamann, CV Lab, EPFL   *Oct '17 - Present*

- Implemented the U-net architecture and distillation setup in Pytorch
- Trained a number of different models with varying channel layer depth and softmax temperature
- Implemented distillation code (Pytorch) and successfully demonstrated the application of distillation procedure to architecture with residual connections

---

INTERNSHIP &
OTHER
RELEVANT
PROJECTS

Generative Visual Manipulation using Manifold learning
EE558 - Network tour of Data Science, EPFL   *Sept. '17 - Present*

- Devised a pipeline chaining SoTA methods for Manifold learning, sampling along the learned manifold and reconstructing through FCN regressors to generate a "new" face image using the FERRET dataset
- Improved the appearance of the generated image by incorporating a GAN learned latent space

Hybrid Recommender Systems using feature selection by Markov Blanket
Busigence Technologies, Machine Learning Internship   *December 2016*

- Designed a Probabilistic Graphical Model Based procedure to select features using an improved Incremental Association Markov Blanket (IAMB) algorithm
- Devised a hybrid recommender system using Restricted Boltzmann Machine based Collaborative Filtering and applied it on e-commerce and retail domain. Code available on Github page

Computer Vision Subsystem, Varun
Autonomous Underwater Vehicle, Robotics Club, IITK   *Sept. '14 - Sept. '15*

- Implemented standard image processing algorithms for line following and object detection in OpenCV to develop an AUV capable of maneuvering autonomously underwater
- Integrated the computer vision system with onboard odroid and turbine actuators for 360 maneuver

Automated Modeling for Course Recommendation (C.R.A.M)
Google DevFest 2016   *October 2016*

-Developed a web-app to recommend next semester courses to IITK students using model trained from alumni career paths and curriculum at IITK
- **Stood Overall best winner** (application + business plan) amongst more than 50 competing teams

Emotion Recognition from Static Human faces
CS771A - Machine Learning, Prof. Piyush Rai, IITK   *Aug. '16 - Dec. '16*

- Annotated the database for Emotion Recognition in the Wild challenge 2016 using Google Cloud Vision API
- Trained Convolutional Models on Pytorch and benchmarked against state of the art methods

Online Recommendation under Log-normal likelihood
CS773A - Online Learning & Optimization, Prof. Purushottam Kar, IITK   *Jan.'17 - May'17*

- Analyzed classical SGD-based matrix completion recommendation approaches like Jin's algorithm
- Designed an online recommendation scheme under the case of Log-normal likelihood models for a given reward function, as well as it's offline variants for matrix completion

Prominent Features in Product Advertisements
CS401 - Applied Data Analysis, Prof. Robert West, EPFL   *Nov.'14 - Dec. '14*

- In a team of three, investigated the Amazon Review dataset to hypothesize textual and visual features of the product's advertisement that affect consumer reviews
- Employed several statistical hypothesis testing methods aided by CV and NLP techniques
- Developed a "data story" website to present results : https://adamazon.github.io/

Solutions To Non-Causal Difference Equations
Prof. KS Venkatesh, CV Lab, IITK   *Nov.'14 - Dec. '14*

- Designed a novel algorithm for finding solutions to Non-Causal difference equations efficiently
- Mapped the discrete problem to an equivalent problem in differential equations and then, sampled in continuous domain to obtain the discrete domain results. Benchmarked with existing algorithms

---

COMPUTER SKILLS

Languages: Python, R, C/C++ , LaTeX, Mathematica
Packages (ML) : Scikit-learn, Scikit-Multilearn, Weka, Matlab ML Package, CatBoost
Packages (CV/DL) : OpenCV, Pillow, Pytorch, Tensorflow, Keras, Chainer, Keras, Theano

---

RELEVANT COURSEWORK

Mathematics: Linear Algebra, Probability and Statistics, Convex Optimization*, Discrete Opimization (Coursera), Calculus - II
Machine Learning: Machine Learning Techniques, Online Learning and Optimization, Machine Learning (Coursera), Neural Networks (Coursera)
Data Science: Applied Data Science*, Machine Learning Programming*, Intelligent Agents*, Image processing I* , A Network Tour Of Data Science*
* indicates ongoing at EPFL

VOLUNTARY WORK

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

Webmaster, Counselling Service
Counselling Service, IIT Kanpur   *Jan'16 - Present*

- Developed the Counseling service's website : http://www.iitk.ac.in/counsel/
- Overhauled the institute's freshman forum; aimed for providing support during admission counselling

Academic Mentor
Counselling Service, IIT Kanpur   *Feb.'15 - Jan.'16*

-Assisted academically weak students in the undergraduate course through institute-level remedial lectures and one-on-one doubt clearing sessions

Team Leader, Operations
Alumni Contact Program, IIT Kanpur   *Aug'14 - Feb'15*

- Reached out to institute's alumni for organizing batch re-unions, get together and institute's almuni donation program
- Organized over 25 information sessions for aspiring undergraduates from successful alumni in industry

HOBBIES

Machine Learning Hackathons and Kaggle Challenges
Philosophical debates and discussions on scientific methods and major canons such as Nihilism, Atheism and Logical Positivism.