# ANKIT KUMAR

**Junior Undergraduate, Mathematics and Computing**
**Indian Institute of Technology, New Delhi, India**

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## POSITIONS

### Research Assistant: Prof. Heinis Thomas

**Imperial College London**

Dec 2019 – Present

Working on modifications of Learned Index Structures

### Teaching Assistant: Database Systems

Dec 2019 – Present  IIT Delhi

### Software Developer/ Data Analyst

**Elucidata Corporation**

May 2019 – July 2019  New Delhi,India

- Developed an Abstract Factory Pattern based smart package reducing data analysis time by 95%, using python and R shiny
- Generates Jupyter Notebook from YAML (input file), allowing user to focus more on interpretation of results instead of code
- Designed to be highly scalable, with seemless integration of new features/algorithms, and no version incompatibility issues

### Technical Coordinator: Rendezvous 2019

July 2019 – October 2019  IIT Delhi

Developed two apps, RDV and CAP, for both Android and iOS platforms using React-Native

## ACHIEVEMENTS/ AWARDS

- All India Rank 11 among the top 35 students selected across India in CBSE Mathematical Olympiad 2015-16
- AIR 25 or below thrice in SOF International Mathematical Olympiad 2014-15, 2015-16 and 2016-17
- KVPY, NTSE Scholar: Awarded by Govt. of India, based on National level aptitude tests

## EDUCATION/ SKILLS

| | |
|---|---|
| Intro. To Computer Science | Analysis of Algorithms |
| Data Structures | Computer Vision |
| Database Systems | Information Retrieval |
| Digital Electronics | Computer Architecture |
| Machine Learning | Spl. Topics in Databases |
| Linear Algebra | Statistical Methods* |
| Optimization & Applications | Data Mining* |
| Probability Theory | Digital Image Processing* |
| Discrete Mathematics | System Design Lab* |

**C, C++, Java, MATLAB, Php, Python, SQL** ●●●●●

**C#, JS, R, React-native, Unity 3D, Android Studio, Keras, Tensorflow, Sklearn, numpy, OpenCV** ●●●●○

## PROJECTS

### Optimizing End-to-End Machine Learning Pipelines for Model Training

- Implemented LARA to enable holistic optimization of ML training pipelines
- Achieves speedups of up to 10X

### Estimating Correlated Joins with Deep Learning

- Developed a DeepSets based model to estimate correlated join cardinalities
- Higher accuracy compared to the current state-of-the-art model, IBJS

### Okapi BM 25++

- Implemented a modified BM 25 document retrieval model on a collection of 100K docs
- Retrieved in less than a second per query, achieving $nDCG_{50}$ score of $0.39$.

### Marker Based Augemented Reality

- Generated a script for calibrating the external matrices for any given camera
- Created a 2D AR car motion and a 3D AR ping pong game using markers as racquets

### Virtual Reality based Game

- Developed a VR game to be used in rehab after life threatening spinal injuries
- Provided in-game stats of limb movement

### Robust Hand Gesture Recognition

- Designed a CNN model to train over hand images, segmented in the pre-processing step

### Retinal Nerve Segmentation

- Segmented retinal nerves from fundus images using wavelets and morphological processing

### Earthquake Prediction

- Using Linear Regression, SVR, Random Forest, NN, CNN, Catboost Regression and ensemble, predicted when will an earthquake occur

### Performance Analysis of Test-bed for 5G Networks

- Implemented Discontinuous Reception (DRX) mechanism in 5G networks
- Simulated 1-way & 2-way communication, modelling it as a CTMC, with and without DRX to compare power consumption

### ProvChain

- Implemented a secure model using provenance database & blockchain in cloud
- Implemented multi-threading, SHA256 & RSA

### Website

- Developed automated portal for matching mentors and mentees based on interests