EDUCATION

RAJAT RASAL

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Imperial College London
MEng Computing
Sept 2017 - July 2021
Achieved <u>1st Class</u> in 2nd year

Ilford County High School
Secondary School
Sept 2010 - July 2017

- A level - 3 A*, 2 A : Mathematics, Physics and Computing, EPQ (research project) and Further Mathematics.
- GCSE - 12 A*, 1 A, 1 A* with Distinction in Further Mathematics

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WORK EXPERIENCE

HSBC (Global Banking and Markets)
Data Science and Engineering Intern (July-Sept 2019)

- Gained experience with the **Hadoop ecosystem by using the 10 PTB cluster.** Engineered two new innovative big data projects:
  1. Large table joins using **SparkSQL** across multiple unstructured data sources, in order to detect unnecessary RWAs being held in reserve. <u>Identified major RWA discrepancies</u> within our data lake alone.
  2. Using **Spark MLlib** to predict whether the foreign key in a table was present as primary key in another table across unstructured data sources anywhere in the data lake. Used feature importance to produce a prioritised list of factors contributing to missing or inconsistent data for feedback to data quality teams across the bank.
- Used Elasticsearch REST API, through Bash and Python, to write high speed algorithms to search the cluster for foreign-key strings to assist with dataset joining.
- Assisted with migration of internal cluster analytics platform to using **Elasticsearch** backend.
- Introduced good Python software engineering practices to the team: Pytest, PyLint, effective Jupyter notebook usage, standard library.

Devito Project Research Group @ Imperial College London
Software Research Intern (July-Sept 2018)

- Implemented an ML regression algorithms using **TensorFlow** in Python to solve an inversion problem in which gradient calculations were performed by the Devito engine.
- Performance tuning using grid search and **Bayesian optimisation techniques** for hyperparameter optimisation
- Used Dask to distribute each shot within the gradient calculation using Docker containers over a Kubernetes cluster hosted on Google Kubernetes engine on **Google Cloud Platform**.
- My work has contributed to various conference presentations and academic papers, in which I will be a co-author.

PythonAnywhere (Python web-based startup)
Intern (Aug 2016)

- Took part in a number of full-stack pair programming projects; redesigning the layout for the quickstart guide using JS and Bootstrap, linking pages hosted on the help server to a live PythonAnywhere IDE, churn analysis for paying users.
- Used **agile development methodologies**: pair programming, extreme programming, TDD, CI/CD, IID.

Bank Of Tokyo Mitsubishi
Intern (Aug 2015)

- Improved their internal web portal design using HTML, CSS and Javascript.

TECHNICAL SKILLS

	Proficient in	Comfortable with	Exposed to
Languages and Technologies	**Python 3+** (5 years): Numpy, Sklearn, Pandas, Flask, Pyspark, Pytest + mock (TDD), PyLint + PEP8, Standard Lib; **Java 8-10**; HTML5 + CSS;	**C**; **Bash**; Django; SQL; **Machine Learning:** Tensorflow, Scikit-Learn, Keras, Spark Mllib; C++11-14; Elasticsearch; **Hadoop Ecosystem:** Spark, Hive, Yarn, HDFS; **Docker;** Javascript; JQuery; Haskell; **TDD**: JUnit4+, pytest; Concurrency in Java; MongoDB; Android SDK;	**Google ARCore**; NodeJS; **Kubernetes;** Dask; **Google Cloud Platform Tools** (Kubernetes Engine, App Engine, Buckets); Scratch; Prolog; **React**; Scala;
Software and Tools	**Jupyter Notebooks;** VIM; Slack; Github; GitLab; Markdown;	Intellij IDE; Latex; Android Studio and Material Design; Github Pages; Gitlab Runner;	ServiceNow; Gradle; Ansible;

NOTABLE PROJECTS

NotespaceAR   (May 2019 - June 2019)
- An innovative mobile app for students who are visual-spacial learners. **Students can post interactive virtual post-it notes through their camera using AR technology**, which they can later view for interactive revision on their own or with friends.
- **Camera View used Google AR Core** 🔭; Frontend - written in **Java and used Material Design**; Backend - REST API using **Flask** server (Python), **MongoDB** for scalable data warehousing and Gitlab Runner + **Google App Engine** for CI/CD pipeline.

WACC Compiler   (Jan 2019 - Apr 2019)
- Used Java and ANTLR tool to create a compiler for the WACC programming language.
- Added a number of optimisations, such as Constant Propagation and Array Bounds Checking, and an Intellij IDE plugin for the language.

PintOS   (Sept 2018 - Dec 2018)
- **Optimised/developed key features of a simple OS framework for the 80x86 architecture in a small team using C**.
- The main features we implemented include: 1) system timer for sleeping threads, 2) priority scheduling with donations, 3) MLFQS scheduling, 4) system calls, 5) user programs in C and Bash using the implemented system calls, 6) virtual memory.

ARM11 Assembler and Emulator   (May 2018 - Jun 2018)
- Created an assembler and emulator for the ARM11 assembly language using C to run on a Raspberry Pi.
- **Used conductive paint with the Pi to create a handsfree music control interface** which allowed you to pause, play, change volume and shuffle between songs using hand gestures without having to touch the surfaces of the box. Written in Python.

Other Projects
- (Mar-Apr 2019) - **Facebook Hack-a-project**, designed a webapp using React to help connect local care-homes and volunteers.
- (Apr 2018) - Led 1st year group research project on **cloud computing with Tensorflow**, Spark and MapReduce; **we won the 2nd place prize overall** (Score: 100%)
- (Dec 2018) - **Predicted Stocks Movements based on Sentiment Analysis (NLP)** 📈 of Trump's Tweets in King College London Annual Hackathon using Word2Vec and Deep Stacked RNNs, **won runner up in Capital One Financial Challenge.**
- (Oct 2018) - Performed a detailed analysis and made predictions on the UK Road Accident's dataset for **Imperial AI Hack 2018,** using Random Forests Classifiers and Regressors, PCA, and Neural Networks.
- (Aug 2018) - **Multivariate RNN and Statistical Models to do time series forecasting on Bitcoin prices** using Keras, ARIMA models and Facebook's Prophet.
- (2016) - Web based cricket scorecard using Django, JQuery and a Node.js server to post real-time score updates to Twitter.
- (2016) - Browser security research project - used Kali Linux tools to explore developments in web security, focusing on SQL injection, XXS, HTTPS and SSL and click-jacking.
- (2015 - onwards) - Using Bootstrap, JQuery, JS to make mobile-friendly, responsive webpages for friends and family.

ACTIVITIES AND INTERESTS

Extra-Curricular Interests
- (2019 - onwards) - Treasurer for Imperial Cricket Club; aside from handling finances I'm making an app to help committee members manage internal processes and updating the club website also.
- (2018 - onwards) - **Data Science & ML - Kaggle Competitions**, attended Cambridge Spark Data Science courses at JP Morgan and HSBC, Imperial AI Hack, AI academy in Imperial Data Science society, Kings College London Annual Hackathon, Google DevFest 2018.
- (Mar 2017) - Imperial Robotics Society - Raspberry pi programming and robotics course.
- (Sept - Nov 2017) - Department of Computing Society education scheme - teaching weekly coding lectures to non-computing students.
- (2015) - Taught programming at local primary schools - ran after-school computer science course at a local primary schools, teaching year 5/6 students programming techniques in Python and Scratch. Won the Jack Petchey Award.

Awards
- (Dec 2018) - **2nd place Capital One Financial programming challenge** in Kings College London Annual Hackathon
- (Apr 2018) - **2nd place Imperial College corporate partnership programming prize** for projects in topics in Computing
- (Apr 2018) - **2nd place Imperial College partnership programming prize** for presentations in topics in Computing
- (Dec 2015) - Bebreas Higher Computational Thinking Challenge - Distinction Award
- (2015) - Royal Society's Bronze Crest Award for Physics

Hobbies

🏏 Played semi professional county cricket for Essex and the Essex academy; 🎻Played the violin - attained ABRSM Grade 5 exam.

REFERENCES

Dr Paul Kelly - p.kelly@imperial.ac.uk (reference below); **Dr Gerard Gorman** - g.gorman@imperial.ac.uk (available on request);