RAJAT RASAL

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EDUCATION

Imperial College London
MEng Computing (Sept 2017 - July 2021)
Achieved **1st Class** in 3rd year

Ilford County High School
Secondary School (Sept 2010 - July 2017)
A level - 3 A*, 2 A ||| GCSE - 12 A*, 1 A, 1 A* with Distinction

WORK EXPERIENCE

Rebellion Defense
AI/ML Intern (May-Sept 2020)

- Regression testing platform for fleet of **Object Detection** Machine Learning models. Tested the speed and predictive performance of the models.
- Pipeline to ingest heterogenous data sources into a **Knowledge Graph**, using NLP. Used the graph for behavioural analytics.
- Deployed and maintained an instance of CVAT (https://github.com/opencv/cvat) on AWS for Computer Vision data labelling.
- **Explainable AI** interface to get feedback from users about ML predictions —> won the annual hackathon!

ALLOT LIMITED
Freelance Consultant (Sept-Oct 2019)

- Webapp to help pharmaceutical salespeople launch better targeted marketing campaigns.
- Backend: Python, SQLAlchemy, Flask; Frontend: ReactJS; Deployed on AWS with RDS

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

- Gained experience with the **Hadoop ecosystem** by using a **10 PTB cluster.**
  1. Large table joins using **SparkSQL** across unstructured data sources in order to detect unnecessary funds being held in reserve. My algorithm ran within 30 minutes and identified billions of dollars of discrepancies.
  2. Built a machine learning model to generate a prioritised list of factors contributing to missing or inconsistent data.
- Used Elasticsearch to speed up large remote table joins (using semi-join technique).
- Migrated internal cluster analytics data into Elasticsearch cluster for analysis using Kibana.

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

- Machine learning model to solve an inversion problem where gradient calculations were performed by the Devito engine.
- Hyperparameter optimisation using grid search and **Bayesian optimisation techniques.**
- Distributed gradient calculations over a Kubernetes cluster hosted on **Google Cloud Platform** (on GKE).
- My work has contributed to various conference presentations and academic papers.

PythonAnywhere
Intern (Aug 2016)

- Redesigning the layout for the quickstart guide using JS and Bootstrap
- Churn analysis for paying users

Bank Of Tokyo Mitsubishi
Intern (Aug 2015)

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

TECHNICAL SKILLS

Proficient In

Python3+
- Standard Library
- Web frameworks: Flask, Django, FastAPI
- App deployment with Gunicorn + Nginx
- Asynchronous Scripting
- Contributing to open source projects

Java 8-10

Experience with

Machine Learning:
- Frameworks: **Tensorflow 2.0**, Scikit-Learn, Keras, PyTorch, ONNX, Spark
- GPU interference and training
- Distributed Training + ETL with Tensorflow
- **Natural Language Processing, Computer Vision, Explainable AI, Financial Analysis, Knowledge Graph**s
- Data Science and Analysis

Bash

Test Driven Development

Frontend: Javascript, ReactJS, CSS, HTML

DevOps: Docker, CI/CD with Gitlab Runner and TravisCI

Relational Databases: Sqlite, Postgres

Hadoop Ecosystem: Spark, Pig, HDFS

NoSql: MongoDB, Redis

ELK Stack: Elasticsearch, Kibana, Logstash

AndroidSDK

Functional Programming: Elixir, Haskell

C/C++ 11-14

AWS: EC2, S3, Lambda, Sagemaker, RDS, CloudWatch, etc.

GCP: App Engine, Storage, Cloud functions; AutoML, etc.

Exposed to

Graph Database: Neo4J and Cypher

DevOps: Kubernetes, Terraform

Google ARCore

Linux System Admin tools: networked file system (NFS), performance tools

PTO for my Projects ➢

NOTABLE PROJECTS

Explainable Machine Learning Dashboard — Oct-Dec 2019

- **Deep neural network visualisations dashboard** to display explanations for the results of black box models
- Techniques: saliency and occlusion mapping, feature maps, autogenerated text descriptions and word embedding to provide novel data driven interpretations also.
- Frontend - ReactJS; Backend - Python (ONNX, Tensorflow, Keras), MongoDB; Deployed using GCP.

NotespaceAR — May-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 **augmented reality technology,** which they can later view for interactive revision on their own or with friends.
- **Used Google AR Core for AR components** 🤳; Frontend - written in Java; Backend - Flask (Python), MongoDB for data warehousing; Deployed using GCP

WACC Compiler — Jan-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-Dec 2018

- Optimised/developed key features of a simple OS framework for the 80x86 architecture in a small team using C.
- Features include MLFQS scheduling, system calls for user programs and virtual memory.

Other Projects

- May 2020 - Where's Wally 🤡 using Object Detection machine learning models (YoloV3, R-CNN, EfficientDet).
- Feb 2020 - Implementation of **RAFT distributed consensus** algorithm using Elixir to simulate a simple distributed database.
- 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**
- Dec 2018 - Forecasting stock prices based on Sentiment Analysis (NLP) 📉 of Trump's Tweets in King College London Annual Hackathon using Word Embeddings and Deep Stacked RNNs. **Won runner up in Capital One Financial Challenge.**
- Oct 2018 - Performed a detailed data analysis and made predictions on the UK Road Accident's dataset for **Imperial AI Hack 2018.**
- May-Jun 2018 - Used conductive paint to create a handsfree music control interface for a Raspberry Pi
- Aug 2018 - Multivariate RNNs and Statistical Models to do time series forecasting of Bitcoin prices.

ACTIVITIES AND INTERESTS

Extra-Curricular Interests

- 2020 - present - **President Imperial College Cricket Club**; built an app to track club finances + redesigned the club website
- 2019 - **Imperial Advance Data Science Team;** entering competitions to do ML and data science challenges
- 2019 - Treasurer for Imperial Cricket Club
- 2018 - present - Kaggle Competitions
- 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.

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

Hobbies

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

REFERENCES

Dr Paul Kelly - p.kelly@imperial.ac.uk