**Website Content Pages**

**HP Inc.**

* **Image Classifier App**
* **Document Scanner**

**BLK J**

**National Team**

**Imperial College London**

* **C Project Extension – Capacitive Control Speaker**
* **Parkour Soc**

**Google Get Ahead Program**

**Raffles Institution / RGS**

**Dog Pictures + SPCA**

**Good Movies/TV Shows to watch + autographs**

**Internship at HP Inc.**

**July 2018 – August 2018**

I recently completed a two-month internship at HP Inc. Singapore. I was under the Home Printing Solutions R&D team, which takes charge of worldwide R&D for HP printers. During my time there, I worked on two software projects – an Image Recognition Android App, and a Document Scanner.

I thoroughly enjoyed my time at HP, as apart from my individual work, I also got involved in many other activities, including being involved in the running of a hackathon, and visiting their Indigo printing facility. This experience really opened my eyes to how R&D in a large MNC is run, and how much work is put into the development of a product.

~~On top of working on my projects, I also got involved in the organizing and running of HP PrintHack Asia 2018. This hackathon brought people from various departments in HP together to work on solving printing problems faced by their consumers in China. This really exposed me to many new ideas and I got the chance to talk to and meet many new people.~~

~~Also, I got the chance to tour some of the tech facilities in HP, which gave qtinrjfk HP’s leading tech offices, namely the HP Graphics Solutions Centre of Excellence, HP Indigo Press facility, and the SMARC office. They gave me a glimpse into how tech is rapidly evolving and how HP fnadjskfjnqeoi~~

**The biggest takeaway was learning how to teach myself.** Prior to this internship, I didn’t know anything about machine learning, image processing or android app development. But throughout this internship, I had to pick up these skills on my own, by watching tutorials on YouTube or by using Stack Overflow to diagnose any problems I run into.

In addition, I also found time to pick up some web development skills, which I plan to continue to improve upon. I hope to continue to use this new skill to make some really cool things! Watch this space.

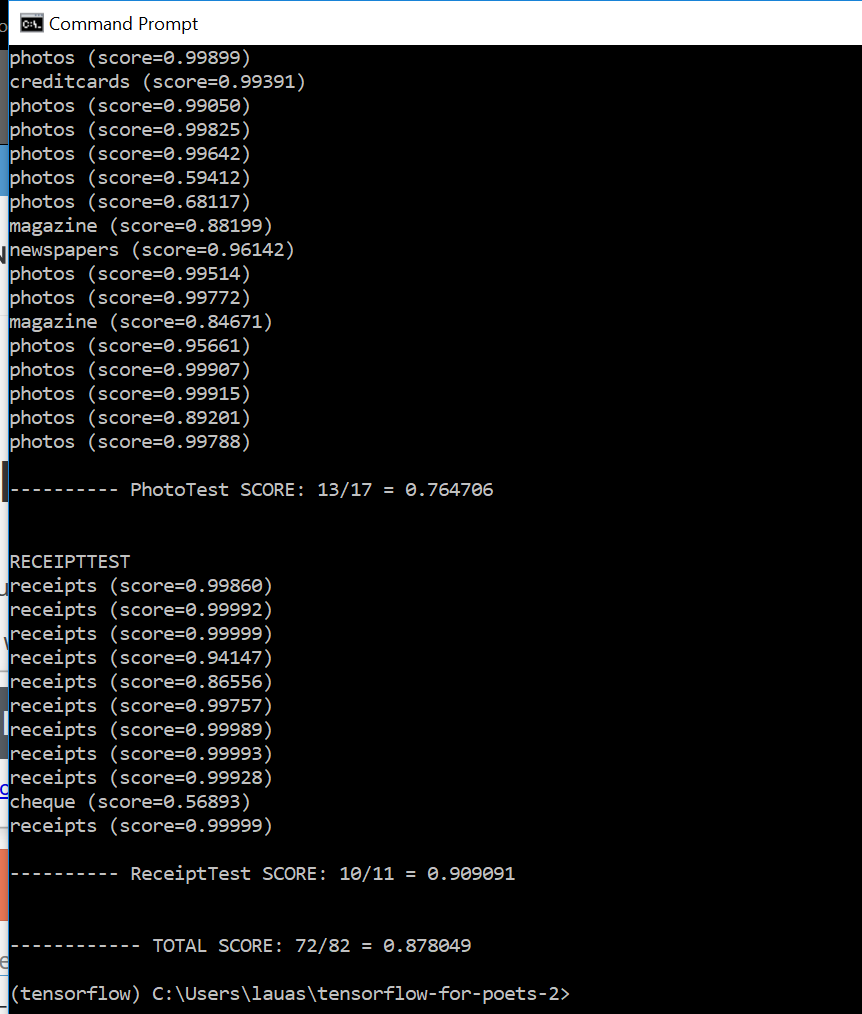
**Image Classifier Android App**

**2018**

For my internship project, I was tasked to build an image classification android app. I had no prior knowledge about image recognition, machine learning or how to build an android app, so I searched the web on what would be the best way to build my image classifier.

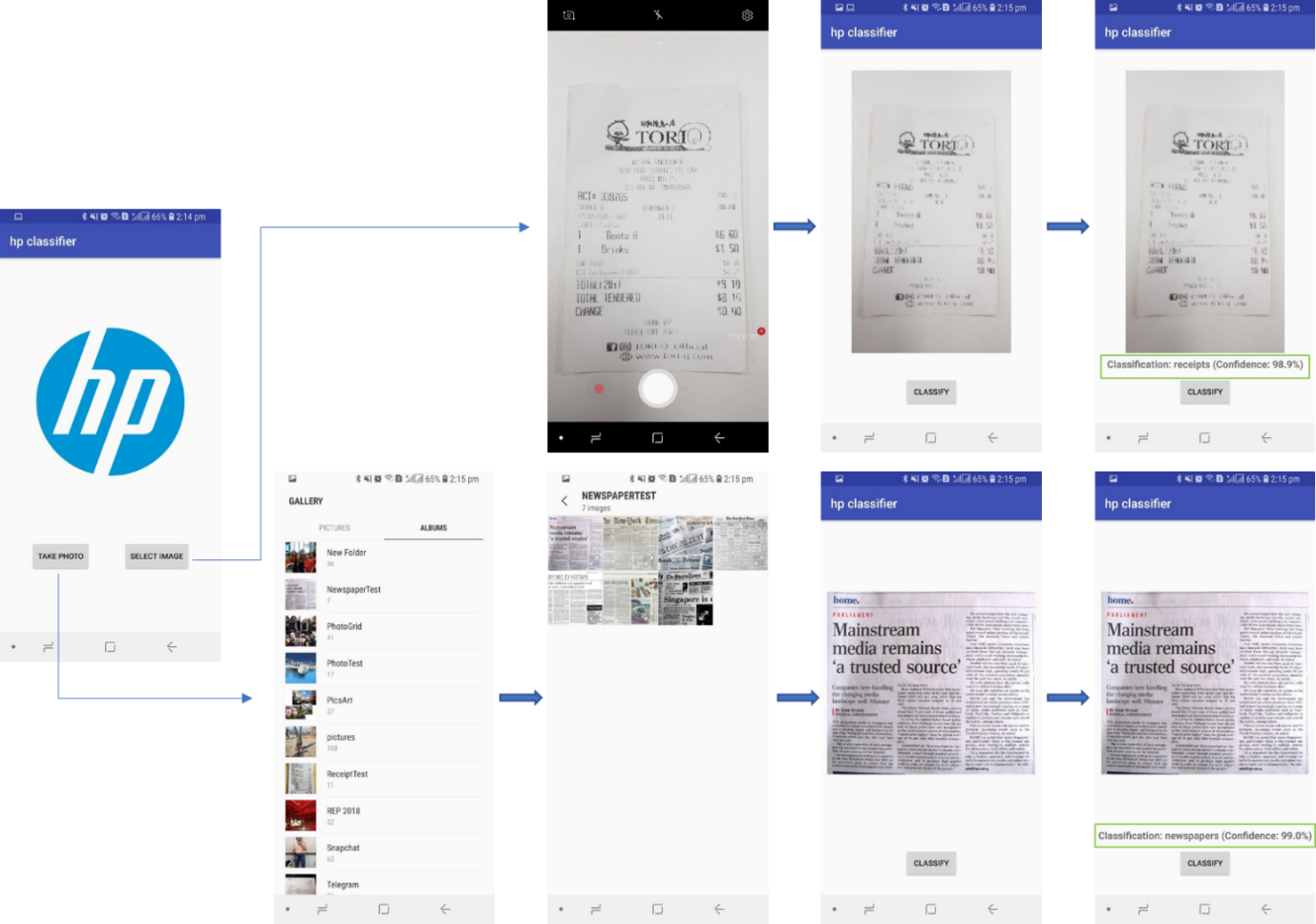
I settled on using Google’s TensorFlow machine learning framework, as it had some pretty comprehensive documentation. I followed the [TensorFlow For Poets](https://codelabs.developers.google.com/codelabs/tensorflow-for-poets/#0) tutorial, using my own dataset of images. My dataset was collated by mass downloading relevant images from Google Image Search using a python script.

Once I trained the TensorFlow model, I proceeded to write a python script to test its accuracy. I collated a folder of test images, and my script would go through each of the pictures in the folder, classify it and compare the results with the actual label. It would then calculate the accuracy for each label, as well as the overall accuracy.



With my trained TensorFlow model, I began integrating it into my simple mobile application. It being my first time using Android Studio to make an android app, it was quite tough figuring out how to invoke the trained TensorFlow model from my Java program. But after 4 days of experimenting (and YouTube tutorials), I managed to make this basic application:

~~I initially tried adapting the TensorFlow demo app on GitHub, but I soon realised that there were too many unnecessary files in that project. So instead I started a new project, wrote out the app framework, and then cloned TensorFlowImageClassifier.java and ImagePreprocessor.java to my project files. I then used the methods in those classes to invoke my classifier model.~~



**Further Improvements**

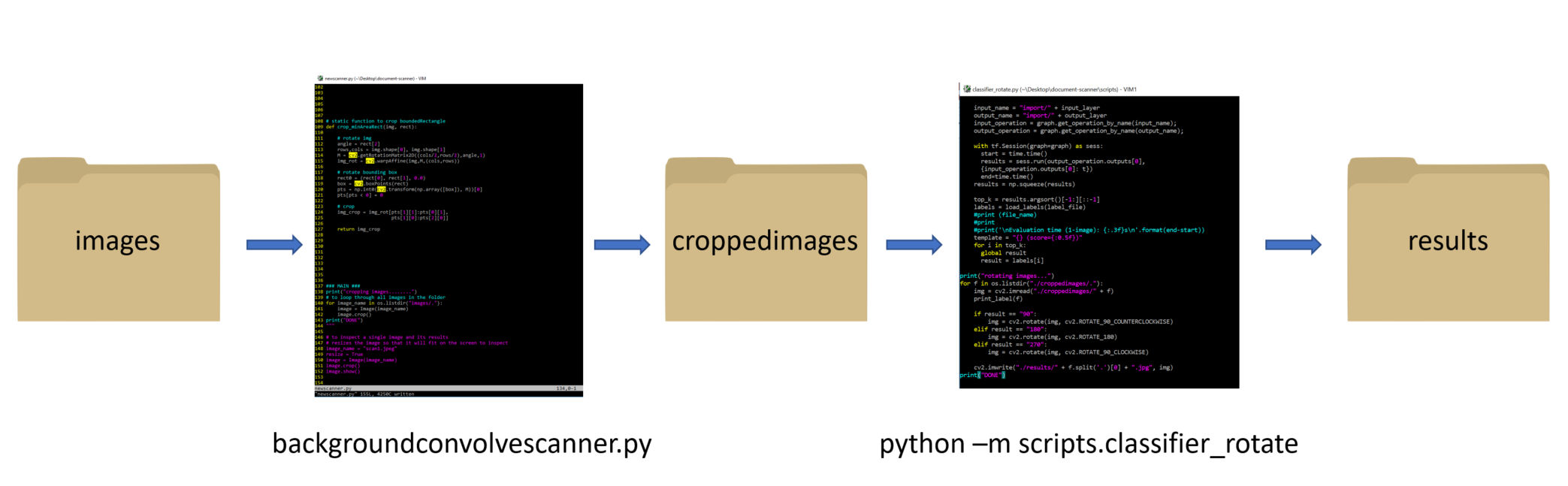
As I just wanted to show a proof of concept, I only trained my TensorFlow model till it had an accuracy of about 87%. Further refinement to the training could be done by:

* Increasing the number of training steps
* Tweaking the learning rate
* Using a larger dataset (I currently only have about 200 images per category)
* Distorting the images by passing –random\_crop, --random\_scale, --random\_brightness to the training script

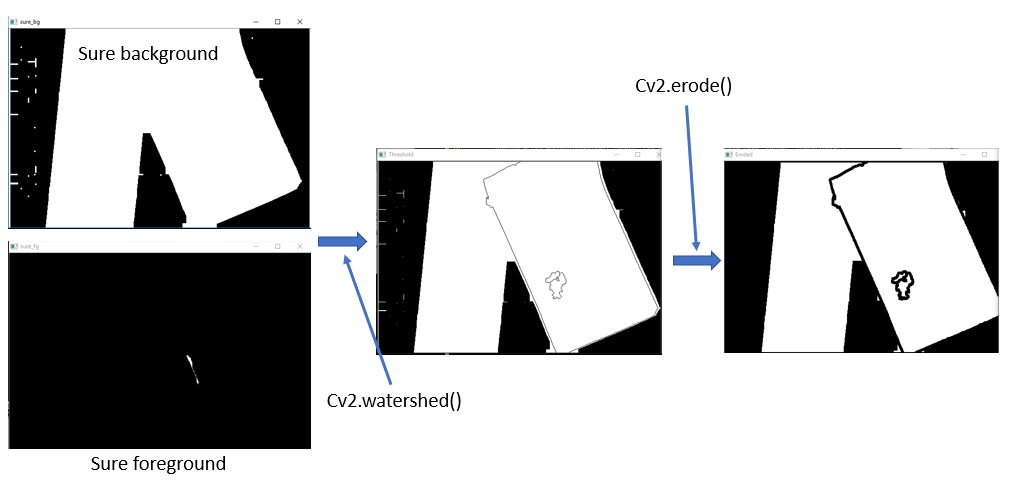
**Document Scanner**

**2018**

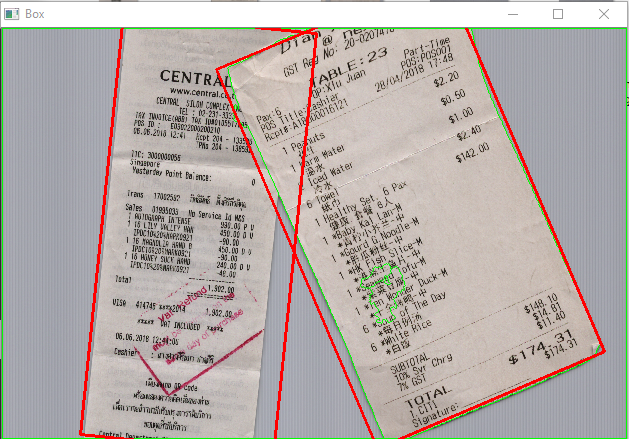
As I had completed my main project and still had one month left of my internship, they assigned me another project to do. I was tasked to design a smart document scanner, which automatically crops and rotates scanned images from a printer scanner.

There are two parts to the solution I came up with. The first script crops out the relevant documents from the scanned image, while the second uses TensorFlow to identify the image’s angle of rotation and corrects it accordingly. 

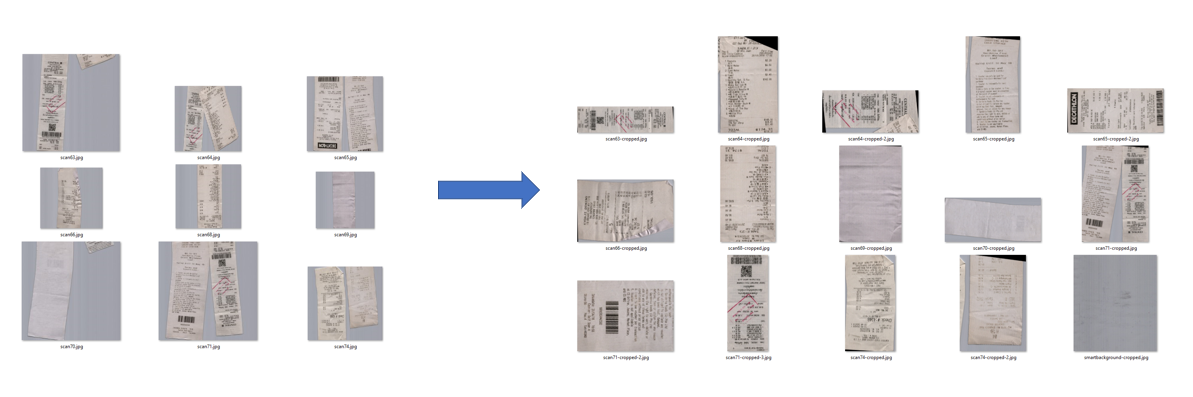
Auto Crop

My auto crop script uses OpenCV functions to crop out scanned receipts and name cards. 

~~I used a watershed algorithm to find the borders of the individual documents. Then I subtracted those border values from a thresholded image, and eroded it to make the individual parts more distinct. Then I was able to find the bounding rectangles of the individual documents.~~



These are the results of running the script on a few test images:



**Improvements**

As I only had a few days to test the algorithm, I did not test the script on many scanned images. More could be done (experimenting with different threshold values) to improve robustness of the algorithm to make it work on more general cases.

**~~Previous Iterations~~**

~~scanner.py – original scanner script cloned from this git repo:~~ [~~https://github.com/vipul-sharma20/document-scanner~~](https://github.com/vipul-sharma20/document-scanner)

~~myscanner.py – edited script that uses contours; able to extract multiple documents~~

~~newscanner.py – cleaned up version of myscanner.py (works well for non-overlapping images)~~

~~watershed.py – first attempt at using watershed algorithm (works well for coloured name cards)~~

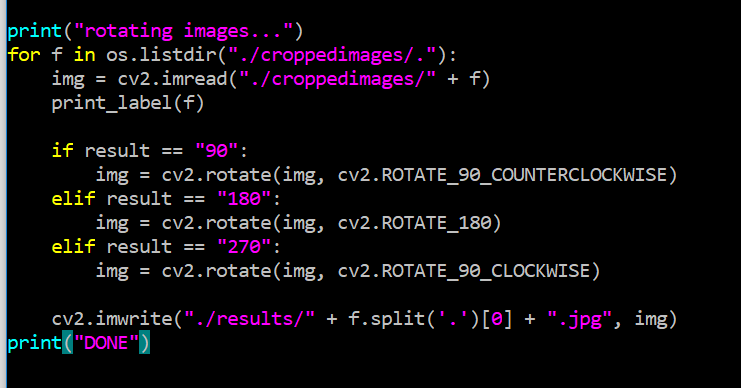
~~backgroundsubtractscanner.py – subtracts background image from original image to get better threshold~~

~~smartbackgroundscanner.py – subtracts smart background image from original image~~

Auto Rotation

The auto rotation algorithm is fairly straightforward. The script uses a trained TensorFlow model to identify the angle of rotation of the images. The TensorFlow model is trained with 4 categories: 0, 90, 180 and 270 degrees, where each category had the same training images but rotated in the respective degrees.

After identifying the accurate angle of rotation, it then uses cv2 to rotate the image to the accurate position accordingly.



**Improvements**

* Having a larger dataset (currently only about 100 images per category)
* Classifier can be trained to be more specific (ie. One model just for receipts, another just for name cards)
* Another method could be by using OCR – the angle of rotation where the OCR engine would be able to extract the most text.

**BLK J Internship**

**January 2017 – March 2017**

I've had experience interning for 3 months at a marketing company DDB, as an accounts executive intern. During this internship, I worked with a team to manage client accounts and projects, and assisted with the formulation of marketing strategies. This internship helped develop my communication and presentation skills, each being essential for swift and effective completion of projects.

**Gymnastics**

Gymnastics has been an integral part of my life for almost a whole decade, and it has been a very memorable chapter indeed. Unlike most, I started gymnastics pretty late. I was eight when I decided to join recreational gymnastics classes, training twice a week. Starting off at level 2, I slowly built up my skills and eventually had the chance to train with the National Team, where we trained **six** times a week, **five** hours a day.  
  
Throughout my gymnastics career, I was privileged to have many opportunities to represent Singapore. Here are some competitions I took part in:

* 2014, Doha: 7th FIG Gymnastics World Challenge Cup
* 2014, Glasgow: Commonwealth Games
* 2015, Singapore: 28th Southeast Asian Games
* 2015, Glasgow: World Artistic Gymnastics Championships

Here’s my athlete bio from FIG Gymnastics.

<http://www.fig-gymnastics.com/publicdir/athletes/bio_detail.php?id=20605&type=licence>

**Doha World Cup 2014**

Uneven Bars final – 7th | Balance Beam final – 7th

~~This was my first overseas competition competing in the senior category, and also my most memorable one. As this was my first competition on the world stage, I got the chance to see many of my sporting idols competing in real life. I vividly recall having goose bumps while watching Larisa Iordache perform her routine on the floor exercise (please watch it its amazing). During qualifications, I even managed to get my personal best score of 14.150 on the balance beam!~~

Straits Times Article: <https://www.straitstimes.com/sport/gymnast-ashly-lau-finishes-seventh-in-doha-world-challenge-cup-balance-beam-event> | AsiaOne Article: <http://www.asiaone.com/news/sports/ashly-posts-solid-score>

**CWG 2014**

Team – 6th

~~This competition was also memorable, but in a less pleasant way. In the trainings leading up to the Games, I had a really sharp pain in my knee, which made training unbearable. But I still pushed through, (you know, because it’s The Games), and during my competition routine, my knee just gave way, and I was unable to compete for the rest of the competition. Turns out, I had broken my knee, and I had to get surgery to put a screw in my knee. Fun stuff.~~

~~So I flew back to Singapore on business class (a silver lining), got my surgery, and started rehab. It was very difficult to recover and get back to my original form but after 6 months I managed to.~~

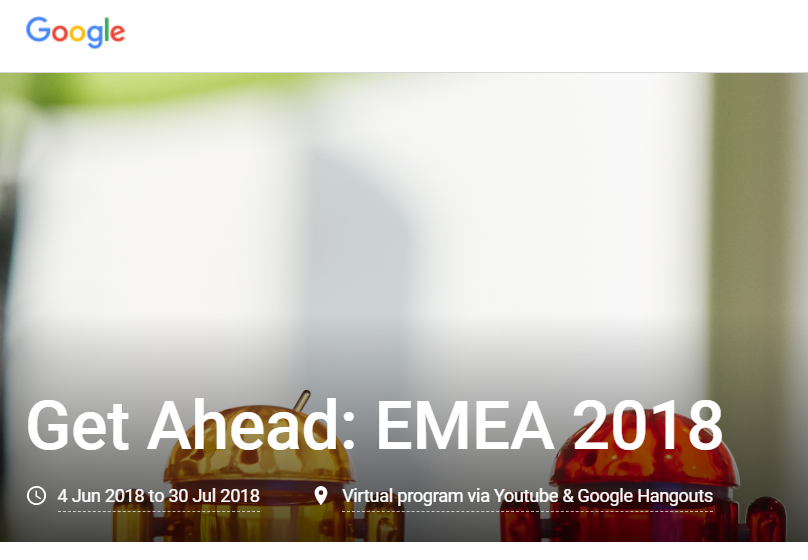
**SEA Games 2015**

Team – Silver | Uneven Bars final – 4th | Balance Beam final – 8th

**World Champs 2015**

Here are some other awards I received:

* Meritorious Sportsgirl Award
* Sport Singapore Sports Excellence Award (SPEX Scholarship) 2013 & 2014 (<https://www.todayonline.com/sports/first-66-spexscholars-unveiled>)
* EAGLES (Edusave Awards for Achievement, Good Leadership and Service)
* Cecily Hinchliffe Award for Academic and Sporting Excellence

**Google Get Ahead Program**

Get Ahead is a self-study program for students interested in developing their technical skill set and knowing more about future employment opportunities at Google. This program includes interactive Google Hangouts, YouTube Live events, as well as weekly newsletters with suggested material to complete each week.

I was invited to participate in the 6-week program, where I solved the problems posed to us each week and even took part in the Codejam Kickstart competition (where I placed 32nd out of the 87 people around the world who took part). Here are my implementations of the problems posed to us: GITHUB link <https://github.com/ashlylau/google-challenges-practice>

**Imperial College London**

**Computing – Artificial Intelligence (MEng)**

**2017 - 2021**

I am currently starting my second year of studying Computing at Imperial College London. ~~Looking back at my first year, I realise that I’ve come a long way since then.~~

**First Year**

First year courses: Programming (Java, C, Haskell), Databases, Hardware, Mathematical Methods, Graphs and Algorithms, Architecture, Logic, Discrete Structures, Reasoning about Programs   
Year 1 Overall Grade: A

I entered university with no prior programming experience at all, unlike most of my course mates who’ve all had at least 2 years of experience. (I didn’t even know what a command line was!) School was very tough, especially at the start. ~~The reasons why I didn’t give up were because firstly, uni is expensive ☹ Secondly, I didn’t want to give up before giving my best shot at it.~~ But I worked at it and eventually, lectures were getting easier to understand, and I started to find my passion for programming 😊

For our last term, we had to complete a group project in C. You can find out more about it here.

**Second Year**

Coming soon!

**Extra-curricular Activities**

Parkour Soc

In year 1 I joined the Parkour, Free-Running and Gymnastics Society, which was a great way for me to unwind after school. I am now in the club exco for second year, and I am looking forward to getting more people to join and learn parkour :-)

Singapore Society

Singapore Society (or Singsoc) is a student-led organisation for Singaporeans in Imperial College. They organize many events each year, the most noteworthy being Major Event, which is a musical production put up each year. Last year, I participated in the musical as part of a dance number and got to bond with many of my fellow Singaporeans.

Another event is an orientation camp held in Singapore every summer, for freshers to meet each other before they head off to London. This summer, I participated in the camp as an orientation group leader, to facilitate engagement and bonding among the freshers.

This year, I am also the Academic Representative for Computing and Mathematics.

Horizons

As part of the Imperial Horizons Course, I took Entrepreneurship in Year 1 and am going to take Spanish Level 1 for the coming year.

**C Project Extension**

**2018**

In our last term of school, we were tasked to do a group project using C. We had to implement an ARM emulator, an ARM assembler and an ARM assembly program that flashed an LED on a Raspberry Pi. This group project allowed me to learn how to work on code as a group, and how to manage forks/branches using Git.

For the extension of our project, we had an idea to use a Pi Cap hat for the Raspberry Pi and conductive paint to create a proximity sensitive audio controller. By just waving your hand close to the audio box, one can control playback of a playlist of songs. Here is a demo of our final product:

**Tertiary Education**

**Raffles Institution**

**2015 – 2016**

GCE-A Level – 7 Distinctions

Subjects Taken: Physics, Chemistry, Mathematics, Economics, General Paper, Higher Chinese, Project Work

Awarded the Raffles Diploma (Distinction)

**Raffles Girls’ School (Secondary)**

**2011 – 2014**

Year 4 Overall GPA: 3.77 (out of 4.0)

Subjects Taken: Physics, Chemistry, Biology, Mathematics (1&2), Literature, Geography, History, Philosophy, Social Studies, Higher Chinese, English Language

* RI – grades, subjects
* RGS – grades, subjects, projects
* Gymnastics training & balancing school work

**Dog Pictures**

Hi, here are some pictures of my dog. He’s slightly weird.

Here are also some good doggos and cats that I met during my volunteering stint at SPCA.

**Some good TV shows and movies to watch**

I watch lots of tv shows and movies (I don’t even know how I find the time??). But here’s a list of my favourite shows:

* Westworld HBO
* Game of Thrones (everything after S3 is amazing)
* Grey’s Anatomy
* Brooklyn Nine-Nine!!
* Oceans 8
* Crazy Rich Asians
* Ladybird
* Pitch Perfect
* The Force Awakens
* The Last Jedi

If you have any good movie/tv series suggestions, please leave them here!

Also what about some song suggestions while you’re at it:

And some book recommendations:

* Autograph collection

**Favourite Articles**

* List of fav news articles
* Quotes?

**Some nice photos**

Photo gallery (with captions) (3-2-1 responsive gallery)

* Ts concert
* Hfk concert
* Paramore concert
* Red carpet events
* Photos w ppl
* James corden

**AI Hack 2018**

October 2018

During this 2-day long hackathon, we worked as a team to clean, visualise and analyse a large set of data regarding traffic accidents in the UK in 2015.

The aim of our project was to come up with some sort of model that would predict the class of severity of accident casualties. To do this, we thought of various models we could use, including using a Time Series Analysis using RNN, and using a Random Tree Classifier to make sense of the various features given to us in the data. We soon also realised that a major part of this task was cleaning up the data to remove noise and make it more analysable.

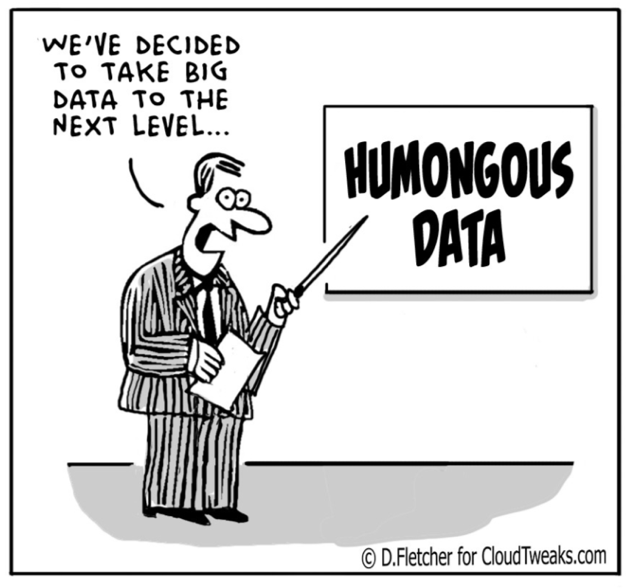
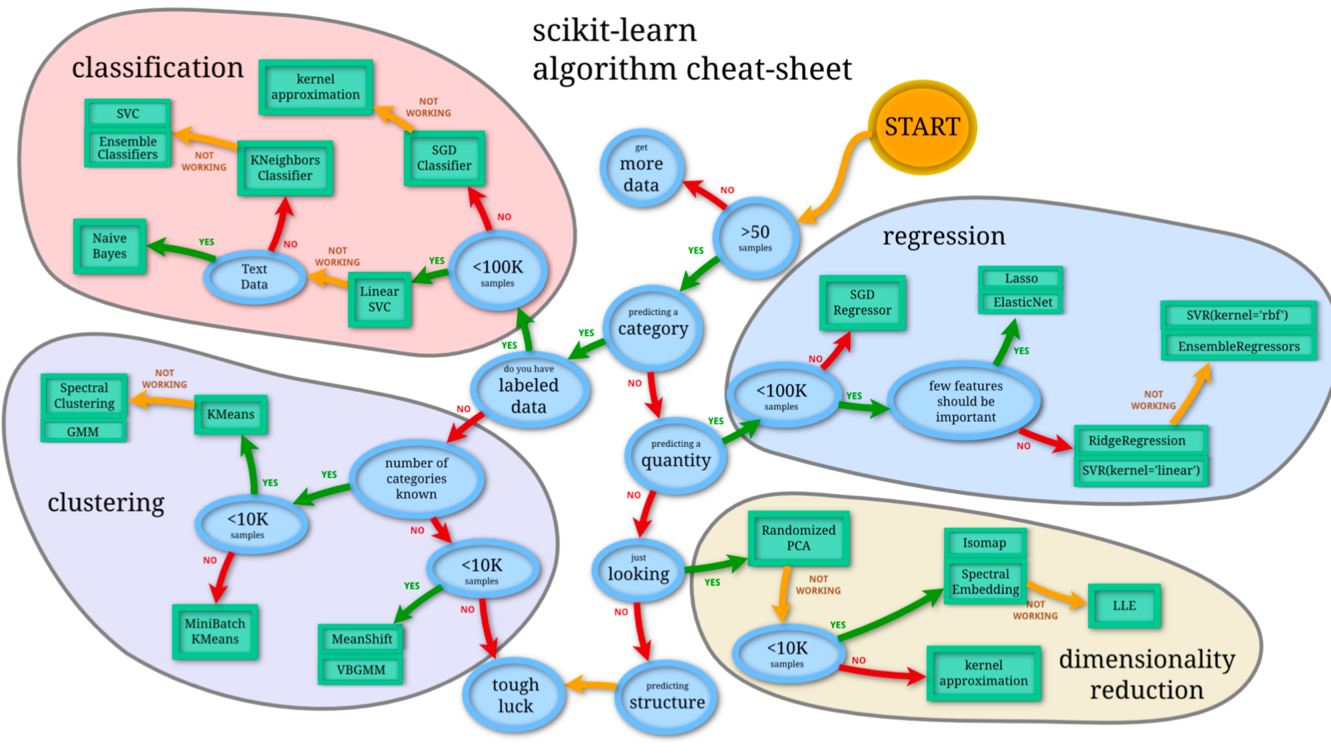
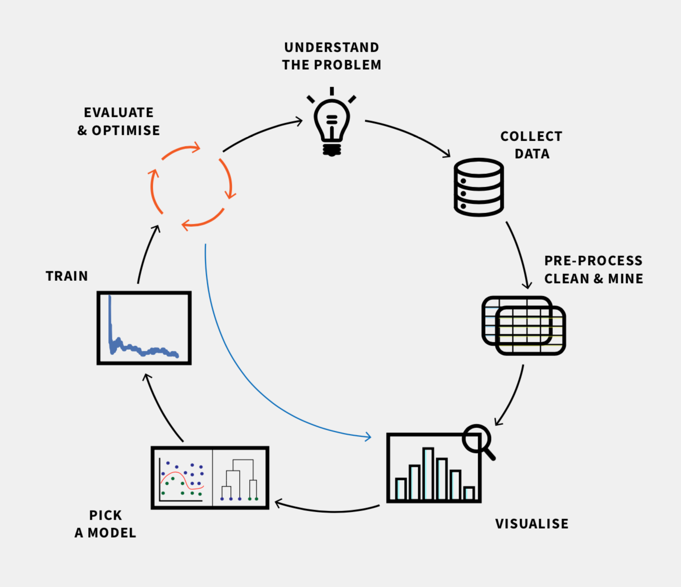
You can view our GitHub repository for the project here.

<https://github.com/RajatRasal/Road-Accidents-Analysis-AI-Hack>

**JP Morgan Data Science and Machine Learning Workshop**

October 2018

I attended a full-day workshop at the JP Morgan office in London. We learnt how to clean, explore and visualise real-world data, identify important features and trends, and understand how to develop, evaluate and refine state-of-the-art machine learning models. The workshop was very interesting and helpful because we attained useful skills like data manipulation with Pandas and numpy, and we learnt about Decision Tree Classifiers and Random Forest Classifiers.

**Pintos Project**

2018

As part of our year 2 project coursework, I led a group of four to implement features in the Pintos operating system (in C). Pintos is a simple operating system framework for the 80x86 architecture. It supports kernel threads, loading and running user programs, and a file system, but it implements all of these in a very simple way. During the Pintos tasks, we strengthened its support in thread scheduling and running user programs. We also add a virtual memory implementation.

We worked with a pretty large code base, and this project reinforced our understanding of operating systems and taught us useful project management skills.

**JP Morgan Code For Good 2018**

November 2018

I took part in the JP Morgan Code For Good hackathon last winter, where I collaborated with other coders to develop innovative technology solutions for non-profit organizations. Our organization was the The Mix, and we developed a chat bot function for their website to engage and help the large number of users who visit the page. Our chat bot used Google’s Dialogflow to help people get access to bespoke information, support and data as quickly as possible with the organisation’s limited human resource.

You can view our GitHub repository for this project here.

<https://github.com/London18/team-19>