Please make a copy of this document and include this in your GitHub repository for your submission, using the tag #AndroidDevChallenge

Tell us what your idea is.

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*My idea is to build an **Android application to help people sort waste**.*
*The idea comes from a new policy in China. In some cities, such as Shanghai, have started enforcing its regulation on making garbage classification compulsory since July 1th, 2019. This is a great policy to raise people's awareness of environmental protection. However, the biggest hurdle which has been found during the past few months is that **people often confuse with matching waste with bins because of the tricky sorting rules**. More specifically, there are many common items are error-prone, such as pencil and mirror. In addition, for those uncommon ones, most people just throw by guessing because looking up a notebook is both demanding and time-consuming.*
*I believe **Machine-learning-based methods** can be a great solution to these problems. Models can be trained with **TensorFlow** to recognize waste and match with bins. On top of that, **the offline model then can be integrated in an Android application**. Then People can easily figure out how to sort waste with an Android app.*
Here is a typical scenario. When a user opens "Garbage sorting" application, the network will be loaded first. If the user clicks the "sort" button, then frames from the camera will be input to the network and the result which contains category of the waste and corresponding bin will be displayed after classification.
In the future, this application also can be applied with different regulations in various areas by adding more matching rules.

Tell us how you plan on bringing it to life.

Since the idea just came up a few days, now I am beginning with analysing the feasibility of the project and choosing the technology. I have done some research on the details of the regulation and designed some prototypes of the application to illustrate my idea. For more information, you can read README.md on the repo.

I believe Google's support would definitely be a great help to make everything happen:

*(1) **Data Collection**: we need to collect a large number of images to train the model. A rather tricky*

problem we can foresee is that the "Household waste" is probably hard to recognize, since they are often shapeless.

(2) ***Hardware Resources****: several computers with GPUs will be necessary to train the dataset and a few Android devices in various platforms, such as Qualcomm 845, 855 and MTK 90, will help test the latency and accuracy of the algorithm.*

(3) ***UI/UX Design****: I am not professional with UI design, so it would be great if I could work with some professional designer to make the application cooler and handy.*

(4) ***Quality Assurance****: A good project also requires rigorous test to assure the quality before it formly releases to the market, and I believe Google 's team can give me great support in this.*

With your support, I am very sure that this project will roll out very soon, and the timeline would be as below:

December 2019

- *Draw up a plan for data collection*
  - *Scope of waste, details in regulation, rules for labeling…*
- *Research on selecting proper network structure*
  - *Options: Mobile net, Retinanet, RCNN..*

January 2020

- *Collect data and label*
  - *Perhaps this is the most time-consuming task*
- *Design network*

February 2020

- *Network training process will finish in this month*
- *Design the architecture of Android application and coding*
- *Design UI/UX*

March 2020

- *Developing the application*
- *Tuning the performance on major android platforms and cpu platforms*
  - *We have to ensure the latency is acceptable (maybe less than 500ms for one frame)*
- *Complete the main features of the application*

April 2020

- *Quality assurance*
- *Deploy and release the beta version into the Google Play*
- *Get feedback and improve*

Tell us about you.

Hi, I am Jiakang Zhang, a freelance at the moment. I started my career as an Android Software Engineer intern in **Alibaba Group** during my postgraduate in October 2014. I was responsible for developing new features on Alibaba's international business platform Aliexpress. After got my Master Degree in Computer Science, by 2015, I joined the NOW live-streaming Application Android team in **Tencent** and spent most of my time in improving user experience of short-video service. Then I decided to dive into machine learning, so I changed my job and worked for a start-up company **Face++**. I worked as a Machine Learning Application Engineer in algorithm platform team which took charge of developing and maintaining our own machine learning framework MegBrain (similar with Tensorflow).

Now, I am between jobs. I am taking some time to travel and participating activities in my city's environmental group.

Next steps.

- Be sure to include this cover letter in your GitHub repository
- Your GitHub repository should be tagged #AndroidDevChallenge
- Don't forget to include other items in your GitHub repository to help us evaluate your submission; you can include prior projects you've worked on, sample code you've already built for this project, or anything else you think could be helpful in evaluating your concept and your ability to build it
- **The final step is to fill out this form to officially submit your proposal.**