



**\*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.

*Describe in 250 words what the feature or service will do and how you'll use Machine Learning to push the bar:*

My app will provide a tool so that Android users in detecting possible skin diseases. According to the Google post "Using Deep Learning to Inform Differential Diagnoses of Skin Diseases", an estimated 1.9 billion people worldwide suffer from a skin condition at any given time, and due to a shortage of dermatologists, many cases are seen by general practitioners instead. A common skin disease, melanoma, was expected to have 7000 deaths this year (curemelanoma.org). My idea is to implement the latest research and make it part of a mobile application that people can use when needed. It will do this by letting them take a photo of lesions on skin and have a model such as the model used in the Google post mentioned above using EfficientNet and enhanced image augmentation. This will help provide a quicker and more accurate classification of skin diseases for people (for initial diagnosis) without access to a dermatologist or doctors even if they do not have an Internet connection by running a production "lite" model on-device. The professionals would be able to search inputted metadata through a cached Firebase Database to find data about the diagnosis of previous patients.

## Tell us how you plan on bringing it to life.

*Describe where your project is, how you could use Google's help in the endeavor, and how you plan on using On-Device ML technology to bring the concept to life. The best submissions have a great idea combined with a concrete path of where you plan on going, which should include:*

- (1) any potential sample code you've already written,
- (2) a list of the ways you could use Google's help,
- (3) as well as the timeline on how you plan on bringing it to life by May 1, 2020.

1. I completed the proof of concept using a smaller (more popular dataset), the ISIC dataset to train the model using Firebase MLKit's AutoML Edge. After this, school started, and I started doing research on different and better datasets. I read several papers on the topic and found a paper by researchers at Stanford University doing a similar thing in 2017. However, it has been a couple years since that paper was published, and I believe that with enhanced image augmentation and



new state-of-the-art models, we can achieve higher accuracy, and package it in an app that can help save lives. To demonstrate my ideas for image augmentation, I created an image augmentation script on another dataset that has more diseases than the one that I was using, but has few images for each class. This is in the ai-scripts folder.

- a. I originally had a model and a Firebase backend created, but I have since deleted it on Firebase. I have the model file with the smaller dataset in the project within the assets folder.
2. Google can help me get -
  - a. access to more relevant data,
  - b. access to high-power instances to train the models,
  - c. the latest research for image classification and enhancing accuracy, especially in this field.
  - d. access to the appropriate people to get feedback from.
  - e. access to services that ensure that my product can be sold.
  - f. Finally, they can also ensure that the code is fully secure and that it is not susceptible to attacks. Google, as a leader in image classification technologies, can also make sure that the model is best optimized to serve our use case.
3. Timeline
  - a. November 28, 2019 - I have my proof of concept.
  - b. December 15, 2019: work on different components, such as augmentation, model, and/or user interface.
  - c. Early-mid Jan 2020: obtain necessary data (most extensive dataset used so far is the data used in "Dermatologist-level Classification of Skin Cancer with Deep Neural Networks"). I already made several attempts to reach the team at Stanford Dermatology regarding this and am hopeful to get an update shortly.
  - d. End of Jan 2020: Finish data augmentation, have full dataset ready. Finish training model & have it deployed for next version.
  - e. Early-Mid Feb 2020: Get help on places where I had roadblocks/issues, make optimizations, and ensure that the systems don't have security flaws.
  - f. Mid-Late Feb 2020 & Early March: Implement everything that I still need to implement after getting feedback. Work on making sure that this is viable as a product by making sure I meet regulatory guidelines.
  - g. March 2020: Release closed alpha version. Get feedback from people and use time implement feature requests and fixes. Work on making sure that this is viable as a product by making sure I meet regulatory guidelines.
  - h. April 2020: Release open beta version. Get feedback and feature requests from more people, outside of people I directly know. Work on making sure that this is viable as a product by making sure I meet regulatory guidelines.
  - i. May: Make marketing material and release!



My name is Vijay Daita. I am a 9th grader at Bloomfield Hills High School. I enjoy programming and have made several apps. I started programming when I was 7, and at 8, released my first Android app on Google Play Store. I worked on other projects with Arduino, web apps, and learning C. At the start of freshman year, when I turned 13, I got my Android Associate Developer Certificate. I am interested in seeing how the speed and accuracy of artificial intelligence can be used to enhance the services given to those that already have it, and extend those services to those who don't have them yet. During summer, along with two of my friends, I taught middle-schoolers the basics of programming in Python. More about me, including my projects, here - <https://daita.com/>.

## 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.**