

Specification Document

Image Classification

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Introduction

The purpose of this document is to provide specifications to build an Android and IOS based application which uses machine learning algorithms to classify an image to check whether an animal or plant is toxic or poisonous. The application is aimed towards tourists and people in general who want to learn more about the flora and fauna of an area. The scope of the project is to have an easy to use application for a variety of users. Please view the [design document](#) for more details.

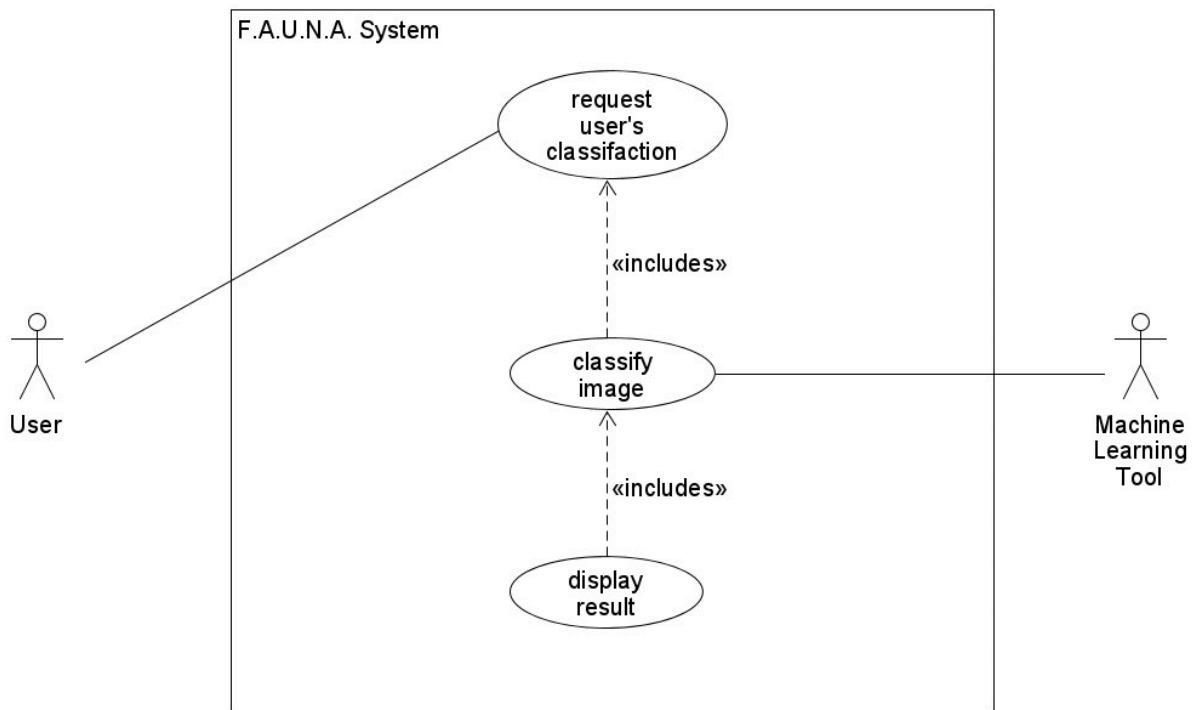


Fig. 1. Use Case Diagram, **Source:** Author's own

Here are some brief use case examples:

Name: request user's classification

Actors: User

Description: This use case begins when a **User** opens the application and has taken/chosen an image. From there the machine learning model classifies the image and returns the **display result**.

Assumptions & Dependencies

Users should be able to use an image taken from their phone to get a result, whether it comes from their phone's gallery or camera. The user should be able to do all of the following:

- Select an image and receive useful, sometimes safety critical information.
- Use their location to receive notifications on the local flora and fauna.
- Find out the area of previous flora and fauna sightings.

The operating systems that this project will be based on are Android and iOS. The programming languages used to create the application will be Python, Java and C++, and the IDEs will be Visual Studio Code and Android Studio.

System Features & Requirements

Functional Requirements

The following list represents the most vital requirements for the project:

Name:	Description:
Capture and Classify	The application should provide a button to capture an image from the phone's camera and come back with a result on the image taken. The result should return a screen with the following information: <ul style="list-style-type: none">• The name of what is in the picture.• Any useful information, i.e. How dangerous it is.• Health information (if requested).
Image Library Search	The application should provide a button to go to their images stored on the phone's memory and select an image to classify.

Send Feedback	The application should provide a button that when pressed, prompts the user with a text box and a submit button to write their constructive feedback to a feedback email.
Flash	The application should provide a button to enable/disable flash on a phone's camera.

And here is a list of less important requirements (may evolve over time):

Name:	Description:
View Map	A button could be added to allow the user to view a map using their GPS location, and see sightings of particular flora and fauna by other users. This would be represented by circles on the map.
Settings	A button which shows a screen, where one can enable/disable different settings, such as opting in to share data to improve the machine learning model, GPS services, etc.

External Interface Requirements

The following are software that are used for the project:

Software:	Description:
Operating Systems	Android, iOS
IDEs (Integrated Developer Environment)	Android Studio, Visual Studio Code

Non Functional Requirements

Performance Requirements

The average acceptable response time for the software should be 0.1 seconds, but the maximum acceptable response time, before the software is deemed to have failed, should be 10 seconds.

Reliability Requirements

The Mean Time Between Failures of the software should be 5 days of continuous use.

Usability Requirements

Here are the main usability requirements:

- The main target platforms are Android and iOS. This was chosen because of their user friendliness and high userbases.
- The user should be able to run the app and do what they want within 30 seconds, in case of health critical situations. In order to achieve this, the user interface (UI) must be intuitive and responsive. This can be measured through testing real users.

Supportability Requirements

The supportability requirements encompass the operation, logistics and modifiability of the software. For people installing the program, the software should be downloaded from the relevant app store, otherwise, from the project website. There should also be a user support email to leave constructive feedback.

Iteration Plan

The development process used must be well considered for this project. The development process will be an Agile methodology, scrum for individuals.

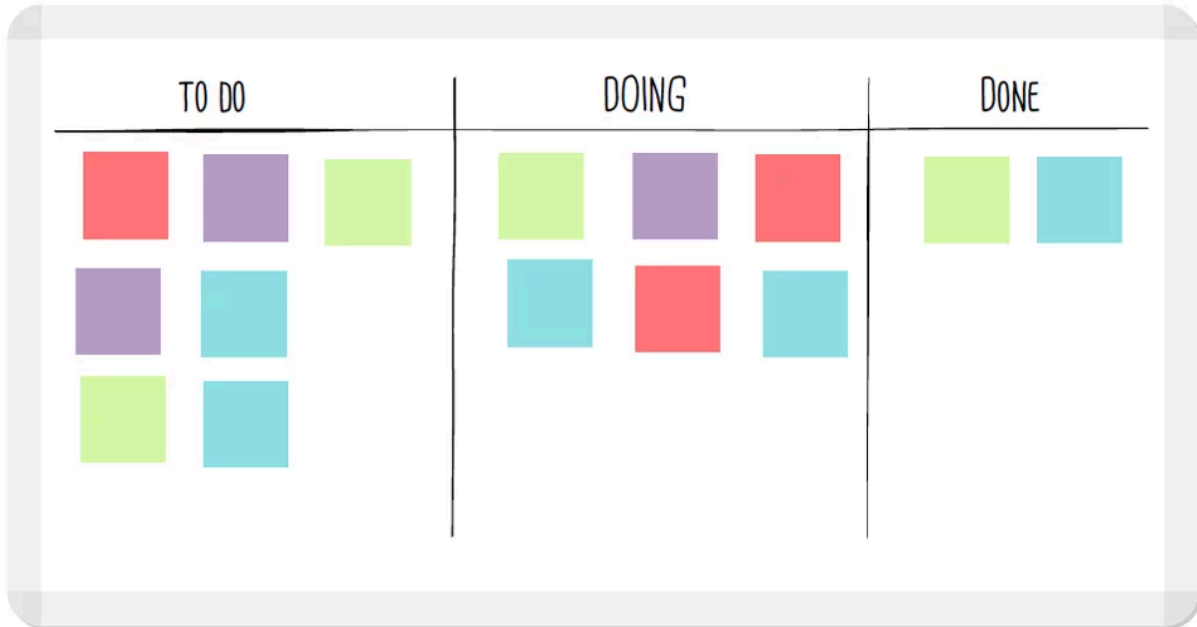


Fig. 2. Kanban board[1], **Source:** kanbanchi

Iteration 0

For iteration 0 we are interested in getting a good start on the documentation for the Functional Specification, Design Document, and the Research Poster before coding begins.

Iteration 1

For this iteration, work will start on a prototype of the application. We are interested in first getting it running on Android with the Machine Learning algorithm (without worrying about having high accuracy), a multiclass convolution neural network (CNN). Android Studio will be used to create a simple camera application, and the CNN will be made using Jupyter notebooks. Along with that, I will be updating my documentation.

Further Iterations?

Into the future, the requirements may evolve, so I will of course be changing this document and others as development continues. The focus will mainly be on developing the application.

Has it been done before?

From what I have seen, there are quite a few classification projects that have been made about different animals, such as snakes, or spiders. However, this project will have a bit of a larger scope; providing things such as safety critical information, and user friendly design. The goal is that the average person visiting another country can easily get information about the local flora and fauna, and use it to their advantage.

Inspiration

I knew I wanted to use a machine learning algorithm for this project, however, I did not know what I would use it for. I was watching Youtube videos one day when I came across one of [some guy in the Amazon rainforest just grabbing potentially dangerous animals like snakes and frogs](#) and showing them to the camera, which to his credit, he seems to know a lot about. But that's what got me thinking about making a mobile application to identify dangerous flora and fauna, and possibly provide safety critical information to less informed people, such as tourists.

References

[1] kanbanchi, Kanban board example image - www.kanbanchi.com