

Design Document

Image Classification

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Introduction

We wish to develop a smart phone based application for Android and iOS, which is easy to use for beginner to intermediate users who wish to learn more about the flora and fauna of the area that they are in. The main aim of the app is to provide people with safety critical information. Initially, it is proposed that this will be achieved by:

- Creating and using tools classify images of flora and fauna.
- Helping people learn more about the local fauna and flora.
- Creating an application with good usability.

Since there are many tourists and people moving to different areas of the world, we believe that our target users will appreciate this value proposition.

Business Case Summary

Not everyone is an expert on the local fauna and flora of an area, therefore, they may also be unaware of what dangers they may come across, and what to do in an emergency situation. This app will be developed for the tourists (and locals), who want to know more about what plants and animals are toxic, or want recommendations on what to do in an emergency situation (such as being bitten by a snake).

Stakeholders Description and Goals

We call the learner, a person who decides to identify plants and animals on the app. The learners' goals may be:

- To learn about local flora and fauna.
- To receive notifications depending on the location.
- To find safety critical information.

Software Overview

The idea behind the proposed application is simple; an application is needed to identify dangerous fauna and flora and provide useful information which could be health critical. The software must be simple looking and easy to use, and classify images to an acceptable standard. But the back end would be a lot more complex.

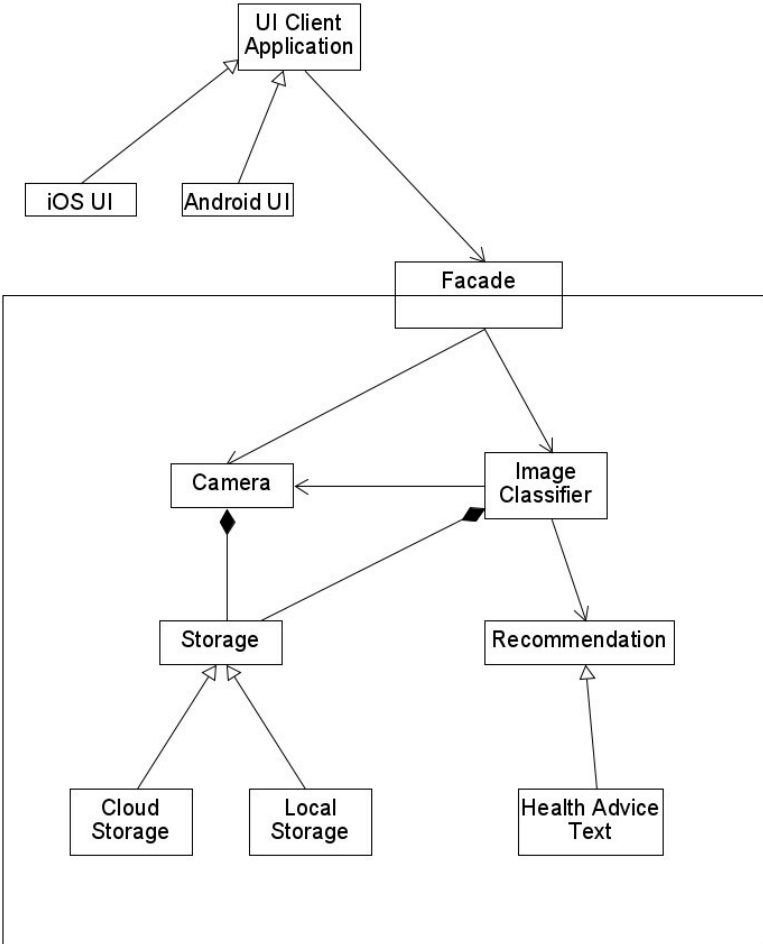


Fig. 1. System Layout, **Source:** Author's own

The application will be multi-platform (for Android and iOS). There will be different dependencies for the front-end elements, but the back-end should work well on both platforms.

Here is a general idea of how the system UI will look:

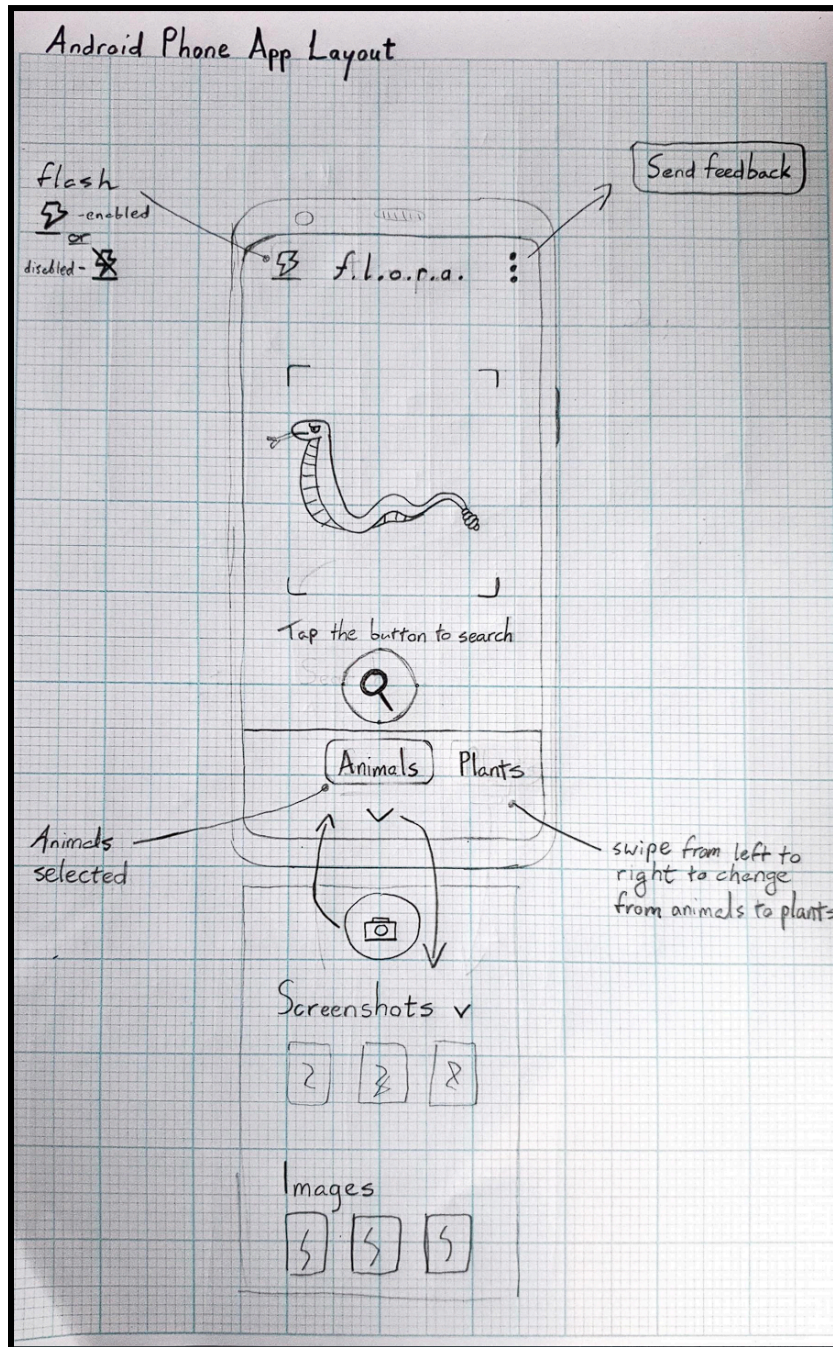


Fig. 2. Initial App Design, **Source:** Author's own

Prototype

Here is an image of what the prototype looks like during the first iteration:

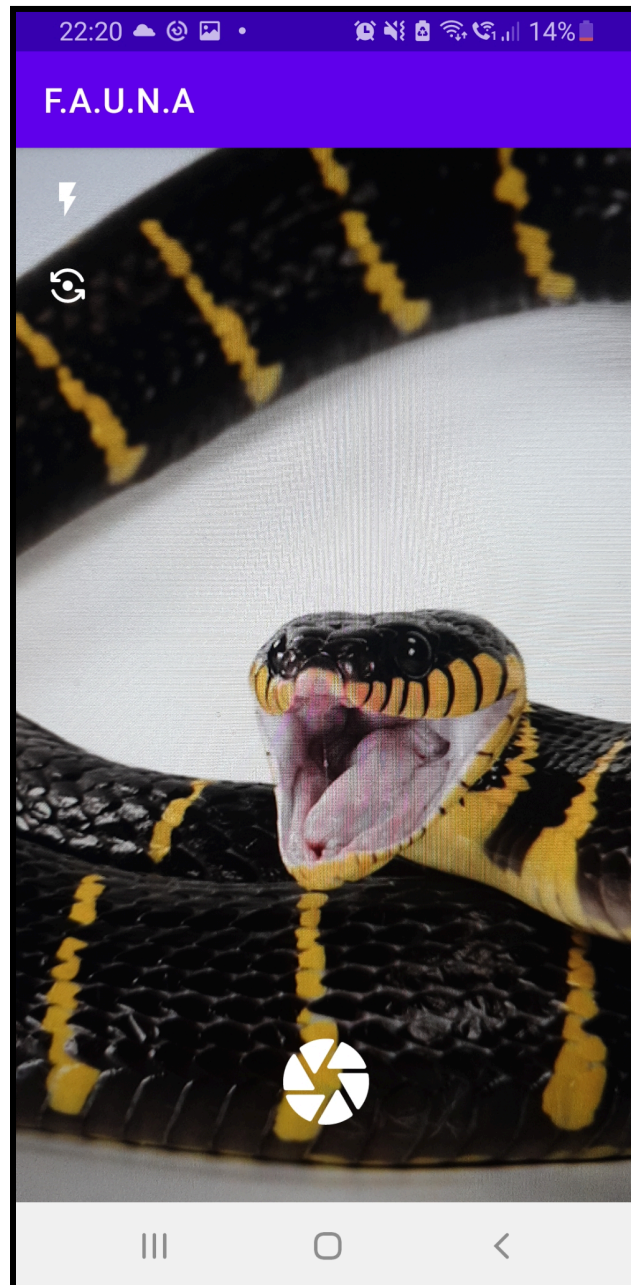


Fig. 3. Prototype App Design, **Source:** Author's own

Data Storage

First let's ask: What needs to be stored? The answer: The pre-trained Machine Learning model. The idea for this application is to store the latest model locally, and then use the cloud to update it when the application has access to the internet. There are a few options for doing this. Saving a model as a JSON file is supported out of the box in [Pickle](#).

```
model.save_model('model_file_name.json')
```

Fig. 4. Python code to save a M.L. model to JSON, **Source:** Author's own

However, Android Studio has better support for [tflite](#) files, when tensorflow is used, so that is what I have chosen.

```
converter = tf.lite.TFLiteConverter.from_keras_model(cnn_model)
tflite_model = converter.convert()
```

Fig. 5. Python code to save a M.L. model to tflite, **Source:** Author's own

What else needs to be stored? In the

Summary of Software Features

- Provides health information.
- Helps users learn about the fauna/flora of an area.
- Provides information using generative AI, sometimes safety critical.
- High usability for interfaces.
- Android and iOS application.
- Provides notifications based on GPS location data.
- Provides a map containing areas of previous sightings of flora and fauna by users.

- Software that is open to the addition of more features.

Main Risks Summary

Business Risks:

- Value proposition: not validated.

Technological Risks:

- The machine learning model may not cover every animal.
- Machine Learning Model Accuracy.

Project Risks:

- Response of the users could be negative if the program is not beginner friendly.
- There could be a more negative response if the health information is not accurate, or if the machine learning model is consistently wrong.