ObjectIdentifier

**Executive Summary:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

There have been many advancements in digital image processing in the last decade. For example, Google Goggles, an image recognition application released in 2010, is able to identify commonly photographed objects and famous landmarks. Using mathematical models, Google Goggles compares a photographed image to its database of images and returns the closest matches. However, Goggles does not correctly identify less commonly photographed images such as household objects and animals.

ObjectIdentifier is an image recognition application for mobile phones that is designed to recognize everyday objects. The application is trained on a set of test inputs. From the test data, ObjectIdentifier creates a set of “rules” by which to match inputs to the most desirable output. Users will select an existing image on their phone and have the application identify the objects in the image. ObjectIdentifier will display the closest match(es).

ObjectIdentifier will be developed in Java for the Android OS.

**Project Success:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_**

* ObjectIdentifier decomposes an image into measurable features through image processing algorithms such as edge detection, corner detection, and segmentation
* ObjectIdentifier uses an artificial neural network (ANN) with supervised learning to classify a household object based on shared features

The focus of this project is machine learning and not image decomposition. Therefore, I will be using OpenCV for Android to do the image decomposition. I will be building the supervised learning framework myself. The model will be trained on a few unique household items (ex. a chair, a drawer, a lamp) and compare future objects it encounters to those it already knows about.

**Target Users:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_**

ObjectIdentifier will only be trained on a limited number of household objects so it is more of a proof of concept than a fully functional business application. As such, ObjectIdentifier is targeted at the general public but more so people that want to use the application as a learning tool.

**User Stories:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_**

1. As a user, I want to be able to input a series of different objects with custom classifications and have the application recognize a new object based on the previous input
   * The user selects an image and associates it with a classification. Ex. The user selects an image of a book and labels it “book”. The user then repeats the process as many times as they want for different objects. The application is now trained on a set of input objects. If the program is given a new object and is asked to classify it, the program will compare the features of the new object to those that it already has classified.
2. As a user, I want to be able to import a picture from my mobile device to my personal picture library and associate it with a classification
3. As a user, I want to be able to select an image to be classified by the application
   * The application will not generate new classifications. It will compare features of the object to be classified to objects it has already classified. If it finds a close match, the application will suggest the classification of the already classified object.
4. As a user, I want to be able to reject the application’s classification(s) and enter a custom classification or cancel
5. As a user, I want to be able to view all of the images and associated classifications in my personal picture library
6. As a user, I want to be able to change classifications or remove picture-classification pairs
7. As a user, I want to be able to distinguish between classifications the application generated and classifications I assigned

**2-Week Plan:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_**

During the first two weeks of the project I will be developing the artificial neural network. I will be designing a system of interconnected neurons. These connections will have adjustable weights. When the system is given an input image, it will generate an output classification. This classification is compared to the correct classification that the user provides. If the network generates the incorrect classification, the weights are adjusted. If the network generates the correct classification, the weights are unchanged.

The ANN is the core part of the application that I want to focus on as well as the most complex part so that is where I want to start working. I have studied neural networks, but I do not have any experience programming them. I chose to use a neural network as the machine learning implementation because neural networks are ideal for the pattern matching required in image comparisons.