



Tender Bid for Project Number: 22P21

Project Title: App to scan pool water test strips
Group Number: 22G51

Project Overview:

This project will focus on using the camera of a mobile phone to correctly scan a pool water test strip, isolate the various squares on the test strip, identify the colours for the pH balance and chlorine levels and approximate the chemical ranges. The app should recommend a course of action (for example "Add more chlorine"). The data should be logged, and the app should be able to perform reliably in different light conditions.

This will be done by designing and implementing an image classification tool on water test strip images. Data sets will be used to train a machine learning tool. Algorithms will be used on the training sets to process information which will then be presented in the app. The data that is to be used is images of water test strips and therefore, no human participants are required. The main project has four main steps. (1) Create machine learning models from image data sets. (2) Image and result matching for a variety of categories. (3) Outcomes based on results from images. (4) Integrate into a mobile app.

Preliminary Budget & Resources:

Budget:

This project has no need for a budget as there is nothing that needs to be purchased to perform the steps outlined in the project overview. The project also has the benefit of being able to be completed remotely.

Resources:

- Python and Matlab software for Machine Learning algorithms.
- React Native or Unity (Investigation needs to be done on deciding which cross-platform framework to use to develop the app).
- Teachable Machine with Google software (can be used to test our image classification model).
- Water test strip images or water test strips to take images to train the model.

Weekly Milestones:

Week 1: Planning and setup

The project specifications need to be clearly defined and understood. This step will also include choosing an effective image classification tool and outlining some algorithms to be used.

Week 2: Data collection and processing

Once the image classification tool is set up, the water test strip images need to be extracted and processed into a format/training set for the algorithms. The quality of the information needs to be evaluated to identify any shortcoming or bias which may be present.

Week 3: Algorithms and Frontend app setup

A script will be created to process the information. This will be a general model which will work in conjunction with the various algorithms. The algorithms to be used will also be chosen. The app UI will be designed.

Week 4: Algorithm refinement and back-end application

The final solutions should be developed, all bugs need to have been removed and testing will begin. Backend of app will be developed.

Week 5: Processing, testing and evaluation.

Frontend development of the application. Conclusions will be made which will include an error analysis to determine the accuracy of the developed systems.

Risks and Mitigation:

1. Time management:

The project members currently have not completed a machine learning project before however to mitigate this completely the members chose the course Software Engineering which has a focus on machine learning and AI. This will allow smooth and timeous operations of the project.

2. Project setbacks:

Unseen requirements may appear which may create setbacks. To mitigate this, there will be effective communication with the supervisor, Dr. Estelle Trengove, to ensure that these are identified as soon as possible so that they may be dealt with.

3. Bias:

Bias is a serious problem which can cause extreme inaccuracies. To mitigate this all forms of bias, need to be understood in the early stages of the project so that it can be avoided when choosing algorithms and selecting applicable data.

4. Data quantity and quality:

Low data quantity and quality will lead to inaccuracy. To mitigate this an understanding of how much data is needed for accurate results will be obtained. If this is not possible a full breakdown as to why the results were skewed, will be given.