# TOWARDS CAMERA-BASED DETECTION OF VISUALISATIONS USING DEEP LEARNING

INTRODUCTION

The overall aim behind the research carried out within this project is to gain a better understanding of the use of data visualisation for graph data, focusing towards camera-based detection of visualisations using deep learning techniques to develop a mechanism for reading data visualisations using machine learning and being able to extract the data from those visualisations.

Taking a deeper look into data set creation for deep learning based models and training a custom model to detect objects within graph visualisations.

The second aim of this project is the development of a web application that uses the customised model to do real time object detection using the user devices webcam to detect graph objects.

TECHNOLOGY USED
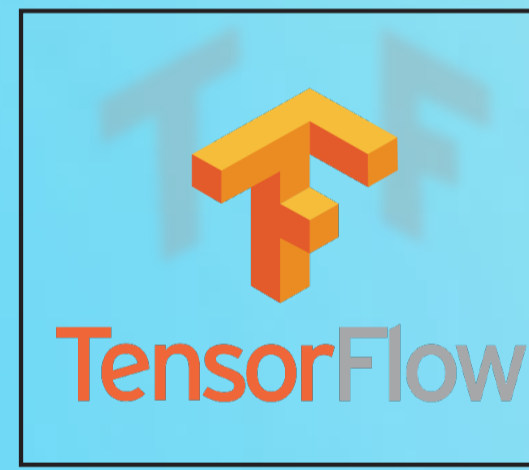
TensorFlow is a machine learning API created by Google Brain Teams in 2015 and has been at the front of the machine learning sector. TensorFlow is built on C++ and Python.
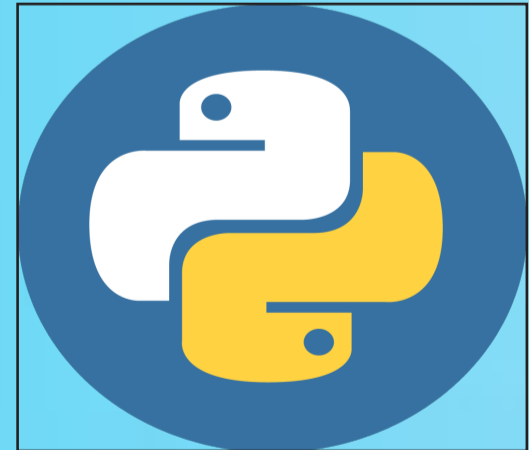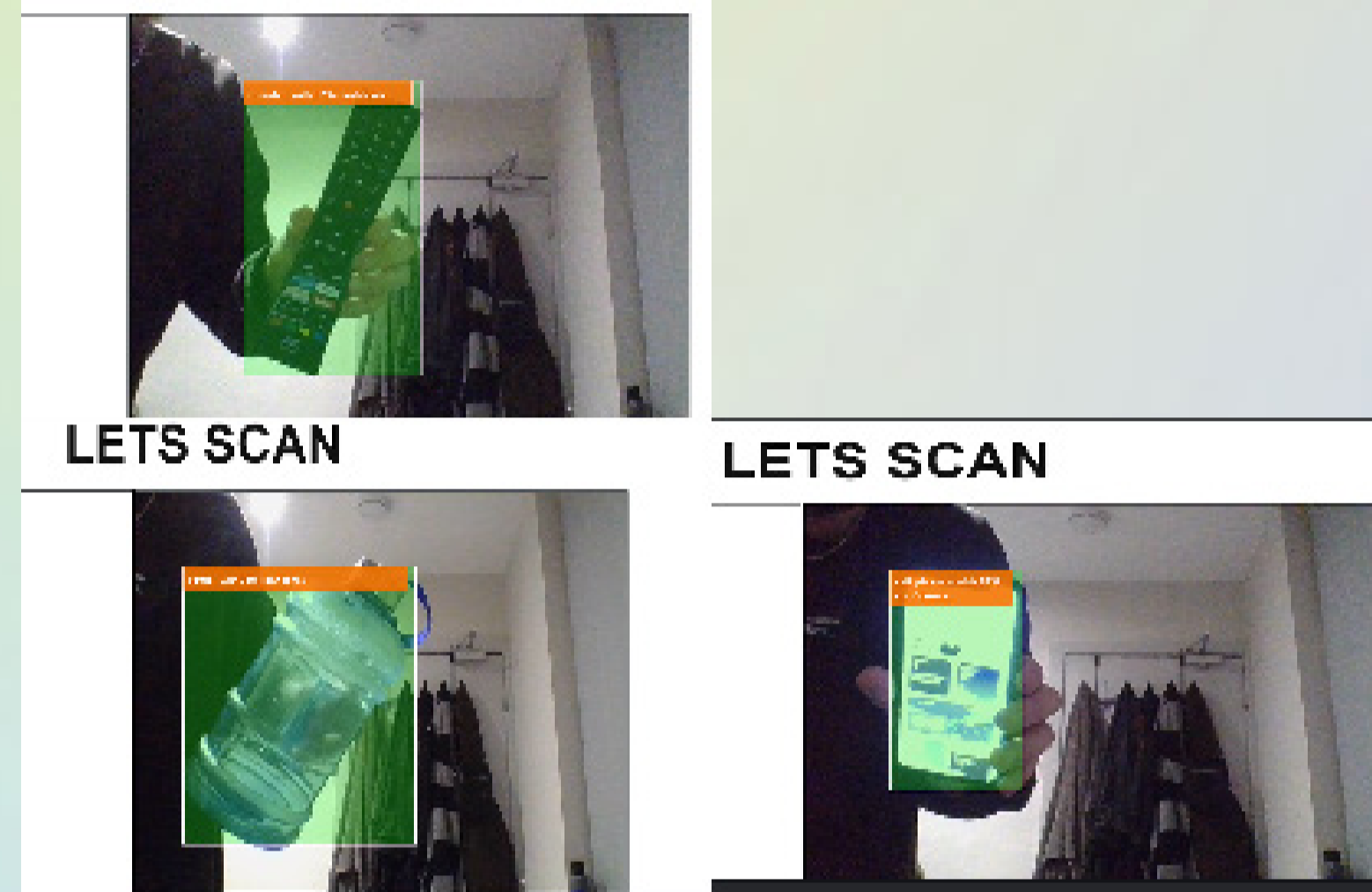
Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together.
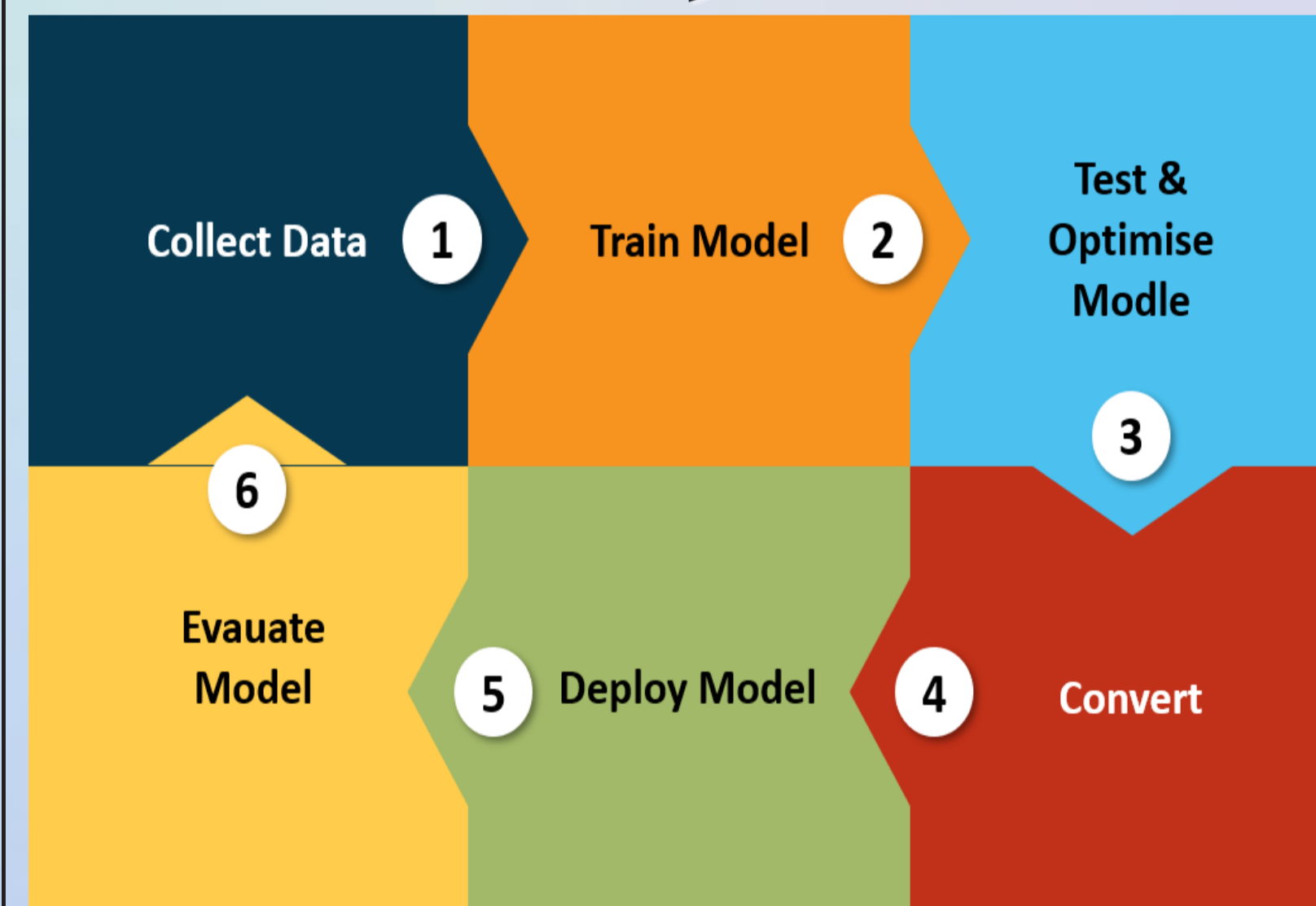
HTML, CSS and JavaScript are the 3 languages used in building my web application. HTML is the standard mark-up language for Web pages. CSS describes how HTML elements are to be displayed on screen, paper, or in other media. JavaScript is a scripting or programming language.

The first pre-trained object detection modelused within the web application to detect a number of objects through the user devices webcam. The first model had only been trained on a small dataset of basic objects

LETS SCAN

LETS SCAN

LETS SCAN

MODEL LIFE CYCLE

1 Collect Data
2 Train Model
3 Test & Optimise Modle
4 Convert
5 Deploy Model
6 Evauate Model

Author
Callum Fawcett
clf18ftf@bangor.ac.uk

Supervisor
DR PANAGIOTIS D. RITSOS
p.ritsos@bangor.ac.uk

Prifysgol
BANGOR
UNIVERSITY

PROCESS

Custom Model

To build a customised object detection model to detect graph objects, a custom dataset must be created containing test and train visualisations that have the graph objects labelled. Once labelled the images will have a corresponding .XML file containing the Name, Location and size of the label and where on the visualisation it is and then the model begins training on the training data.

Web Application

HTML & CSS will be used for the mark-up of the web application and JavaScript will be used for functionality within the web application, specifically loading the custom TensorFlow model and the opening the users webcam so that the model is able to conduct real time detection of graph objects. The web application will read the graph visualisation using the custom model and extract the data in real time. The ectracted data can be then used by the user for a range of functions.

RESULTS

The end results of this project is to have an extensive understanding of data visualisations, machine learning and object detection. The result of this research project will also be a web application that uses a custom machine learning that has been trained with a custom dataset to detect objects within graph visualisations in real time.

FUTURE WORK

Having larger more precise data set in the future will mean that the machine learning model that is being trained will have more accurate ability of being able to detect what object it is being shown with higher confidence. The work carried out in the project could be furthered by implementing multiple models into the current web application that have been trained on a wider variety of data sets and could be used to detect objects not only within graph visualisations but all data visualisations to give users the ability to better understand and interpret their data.