TECHNOLOGY STACK FOR WEB APPLICATION

The technology stack utilized to develop the deep learning image classifier web application is as follows,
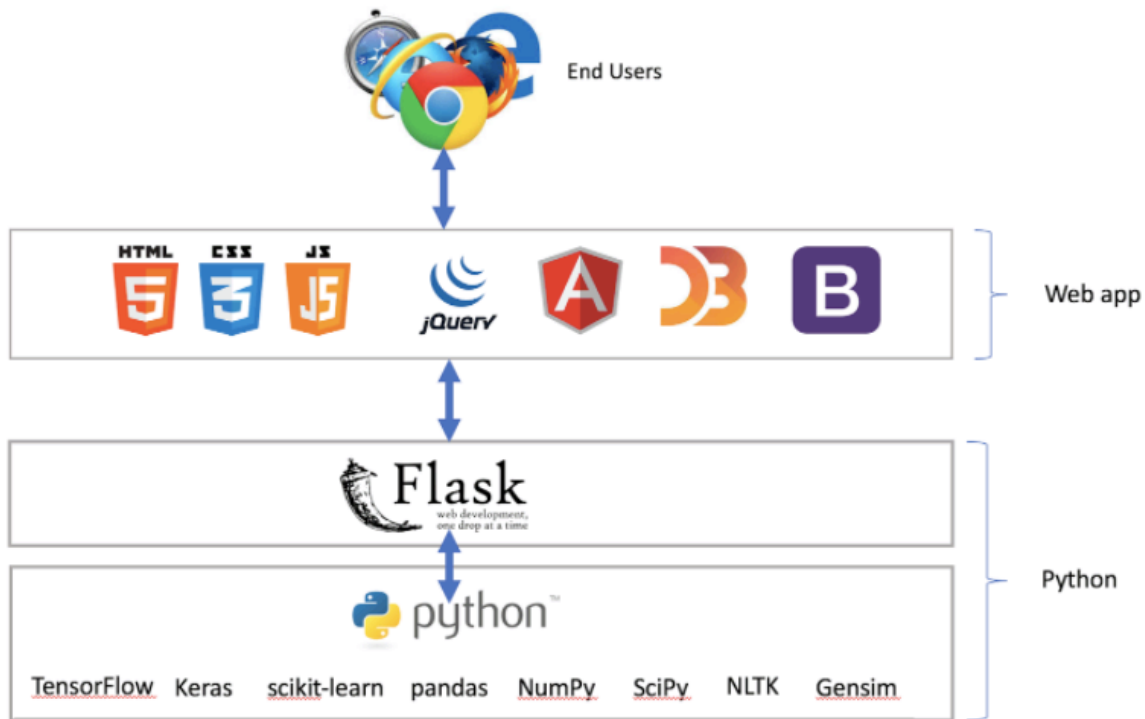

Figure 7: Technology stack

The technology stack consists of Python software libraries such as TensorFlow, Keras and NumPy for importing the pre-trained Inception-v3 deep convolutional neural network model and carrying out mathematical operations required for effective machine learning and inference.

Flask is a micro web framework in python used to expose the neural network python methods as representational state transfer (REST) API's that the deep learning image classifier web application will call. Flask serves as a bridge between the python code and the web technologies used in the application. The results from the Inception-v3 deep convolutional neural network model are in JSON format.

The web technologies such as HTML5, CSS3, Javascript, Bootstrap, etc. are used to create the web interface (develop the front end) of the deep learning image classifier web application.

As a result, the technology stack is adequate to develop the deep learning image classifier web application that can be accessed be end users via a suitable web browser.
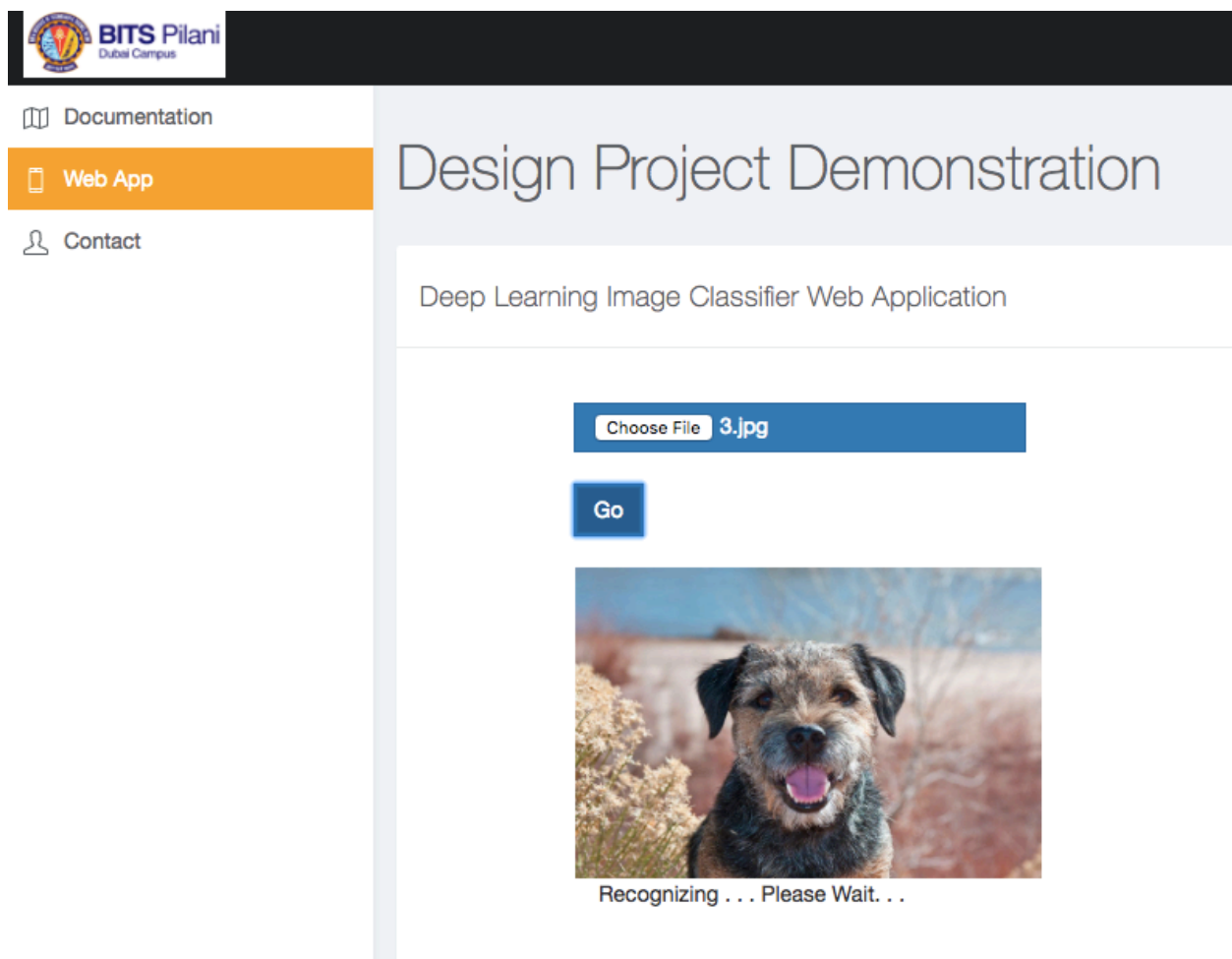
APP DEMONSTRATION

Figure 1: Image classification preview

The web interface illustrated in figure 1 allows an end user to upload an image from his or her system that he or she wishes to classify. The web application displays a preview of the image the user wants to classify. Once the button 'Go' is clicked, the web

application utilizes the deep convolutional neural network model in python running at the backend to classify the uploaded image.

Once the network model arrives at a result, the probability scores of the classes the image is classified into is displayed on the web page via JSON, as shown in figure 2.
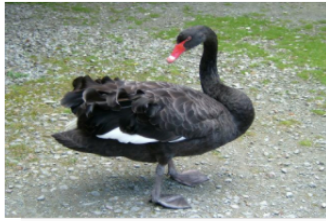

Class Name	Score
soccer_ball	0.9999175071716309
volleyball	0.00001119778971769847
silky_terrier	0.0000027395108190830797
sea_urchin	0.0000025569579520379193
screen	0.0000001268763867301459

Figure 2: Image classification result

Test cases:

Below are the results of five test cases of image classifications that have been performed using the developed deep learning image classifier web application. The five

test cases are pictures of a black swan, a soccer ball, a border terrier dog, an acoustic guitar and a bookcase respectively.

Class Name	Score
black_swan	0.9382145404815674
goose	0.007246517110615969
albatross	0.0005612668464891613
cowboy_boot	0.0004760422161780298
ostrich	0.0004325557965785265

Class Name	Score
soccer_ball	0.9999175071716309
volleyball	0.00001119778971769847
silky_terrier	0.0000027395108190830797
sea_urchin	0.0000025569579520379193
screen	0.000001268763867301459

Class Name	Score
Border_terrier	0.6766512989997864
miniature_schnauzer	0.06031447649002075
Lakeland_terrier	0.0552276186645031
standard_schnauzer	0.03967121243476868
Airedale	0.012624263763427734

Class Name	Score
acoustic_guitar	0.9679226279258728
pick	0.007936294190585613
electric_guitar	0.0017503427807241678
cowboy_hat	0.0009236540645360947
banjo	0.0009201325010508299

Class Name	Score
bookcase	0.9627053141593933
library	0.020810849964618683
bookshop	0.0039548566564917564
entertainment_center	0.0017278676386922598
file	0.0009656443726271391

Figure 3: 5 test cases