PROJECT DEVELOPMENT PHASE

SPRINT-II

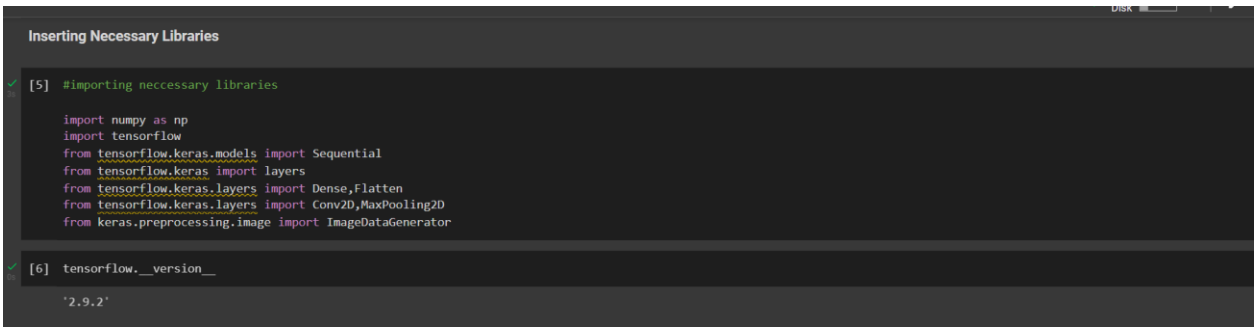
Date	08 November 2022
Team ID	PNT2022TMID16547
Project Name	Natural Disaster Intensity Analysis and Classification using Artificial Intelligence

INSERTING NECESSARY LIBRARIES:

Numpy: It is an open-source numerical python library. **Scikit-learn:** It is a machine learning library for python.

OpenCV: OpenCV is a library of programming functions mainly aimed at real-time computer vision.

Flask: Web framework used for building web application.



LOADING DATA AND PERFORMING DATA AUGUMENTATION:

Loading the data into the Jupyter notebook by using RR dataset path.

CREATING THE MODEL:

Creating the Model a Classifier Sequential. Classifier is a machine learning algorithm that determines the class of the input element based on the set of the feature. In this model using convolution2D function. Convolution2D parameter is a number of filters that convolution layer will be learn from. Then we will be using MaxPooling2D function. Then, using a Flatten () function that flatten the multidimensional input denser into the denser.

Using classifier. Summary () function summary of our model

```
[12] # Summary of our model

     model.summary()

     Model: "sequential"
     _________________________________________________________________
      Layer (type)                Output Shape              Param #
     =================================================================
      conv2d (Conv2D)             (None, 62, 62, 32)        896

      max_pooling2d (MaxPooling2D  (None, 31, 31, 32)       0
      )

      conv2d_1 (Conv2D)           (None, 29, 29, 32)        9248

      max_pooling2d_1 (MaxPooling  (None, 14, 14, 32)       0
      2D)

      flatten (Flatten)           (None, 6272)              0

      dense (Dense)               (None, 128)               802944

      dense_1 (Dense)             (None, 4)                 516

     =================================================================
     Total params: 813,604
     Trainable params: 813,604
     Non-trainable params: 0
     _________________________________________________________________
```

COMPILING THE MODEL:

The model is compiled using the following code.

```
[13] # Compiling the model

     model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
```

FITTING THE MODEL:

Fitting the Model with 20 epochs.

```
[25] Epoch 4/20
     149/149 [==============================] - 40s 266ms/step - loss: 0.7471 - accuracy: 0.6873 - val_loss: 0.8075 - val_accuracy: 0.6919
     Epoch 5/20
     149/149 [==============================] - 38s 259ms/step - loss: 0.6727 - accuracy: 0.7264 - val_loss: 0.6708 - val_accuracy: 0.7879
     Epoch 6/20
     149/149 [==============================] - 40s 267ms/step - loss: 0.5779 - accuracy: 0.7682 - val_loss: 0.7330 - val_accuracy: 0.7071
     Epoch 7/20
     149/149 [==============================] - 40s 267ms/step - loss: 0.5556 - accuracy: 0.7817 - val_loss: 0.7700 - val_accuracy: 0.7020
     Epoch 8/20
     149/149 [==============================] - 40s 272ms/step - loss: 0.4917 - accuracy: 0.8154 - val_loss: 0.7167 - val_accuracy: 0.7475
     Epoch 9/20
     149/149 [==============================] - 44s 296ms/step - loss: 0.4037 - accuracy: 0.8544 - val_loss: 1.0250 - val_accuracy: 0.6768
     Epoch 10/20
     149/149 [==============================] - 40s 269ms/step - loss: 0.4380 - accuracy: 0.8383 - val_loss: 0.7964 - val_accuracy: 0.7727
     Epoch 11/20
     149/149 [==============================] - 40s 272ms/step - loss: 0.3941 - accuracy: 0.8558 - val_loss: 0.6930 - val_accuracy: 0.7929
     Epoch 12/20
     149/149 [==============================] - 40s 267ms/step - loss: 0.3716 - accuracy: 0.8679 - val_loss: 0.9208 - val_accuracy: 0.7222
     Epoch 13/20
     149/149 [==============================] - 43s 288ms/step - loss: 0.3313 - accuracy: 0.8733 - val_loss: 0.8335 - val_accuracy: 0.7828
     Epoch 14/20
     149/149 [==============================] - 39s 260ms/step - loss: 0.2898 - accuracy: 0.8881 - val_loss: 0.8075 - val_accuracy: 0.7980
     Epoch 15/20
     149/149 [==============================] - 44s 294ms/step - loss: 0.3099 - accuracy: 0.8908 - val_loss: 0.7624 - val_accuracy: 0.7778
     Epoch 16/20
     149/149 [==============================] - 40s 267ms/step - loss: 0.2878 - accuracy: 0.8935 - val_loss: 0.9509 - val_accuracy: 0.7172
     Epoch 17/20
     149/149 [==============================] - 40s 266ms/step - loss: 0.2442 - accuracy: 0.9191 - val_loss: 0.8569 - val_accuracy: 0.7576
     Epoch 18/20
     149/149 [==============================] - 45s 300ms/step - loss: 0.2249 - accuracy: 0.9191 - val_loss: 0.9880 - val_accuracy: 0.7879
     Epoch 19/20
     149/149 [==============================] - 40s 267ms/step - loss: 0.1853 - accuracy: 0.9245 - val_loss: 1.0102 - val_accuracy: 0.7879
     Epoch 20/20
     149/149 [==============================] - 40s 272ms/step - loss: 0.1931 - accuracy: 0.9272 - val_loss: 0.8715 - val_accuracy: 0.7828
     <keras.callbacks.History at 0x7f7062d79250>
```

SAVING THE MODEL:

Saving the Model as disaster.h5. disaster.h5 file is used to find the image classification files. Model.json represents that Jason stands for JavaScript object rotation, Jason is a lite weight data format used for data inserting between multiple different language.

```
[26] # Save the model

     model.save('disaster.h5')
     model_json = model.to_json()
     with open("model-bw.json", "w") as json_file:
       json_file.write(model_json)
```

PREDICTING RESULTS:

Loading model from the TensorFlow keras models and loading the image then converting image into array. Then predicting our model.

```
# Load the saved model

from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model = load_model('disaster.h5')
```

```
[28] x_train.class_indices

     {'Cyclone': 0, 'Earthquake': 1, 'Flood': 2, 'Wildfire': 3}
```

```
[40] # taking image as input

     img = image.load_img(r"/content/dataset/test_set/Earthquake/1330.jpg",target_size=(64,64))
     x=image.img_to_array(img)
     x=np.expand_dims(x,axis=0)
     index=['Cyclone','Earthquake','Flood','Wildfire']
     y=np.argmax(model.predict(x),axis=1)
     print(index[int(y)])

     1/1 [==============================] - 0s 29ms/step
     Earthquake
```

```
# input 2

img = image.load_img('/content/dataset/test_set/Wildfire/1065.jpg',target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
index=['Cyclone','Earthquake','Flood','Wildfire']
y=np.argmax(model.predict(x),axis=1)
print(index[int(y)])

1/1 [==============================] - 0s 33ms/step
Wildfire
```