Selected 2 Project

FCAI-HU

Team Number: 14

Team Members Names & IDs:

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Paper details

Paper Name: Brain Tumor Classification Using Convolutional Neural Network (CNN).

Paper authors: Sunanda Das, Nishat Nayla Labiba
Paper link:
Brain-Tumor-Classification-Using-Convolutional-Neural-Network.pdf (researchgate.net)

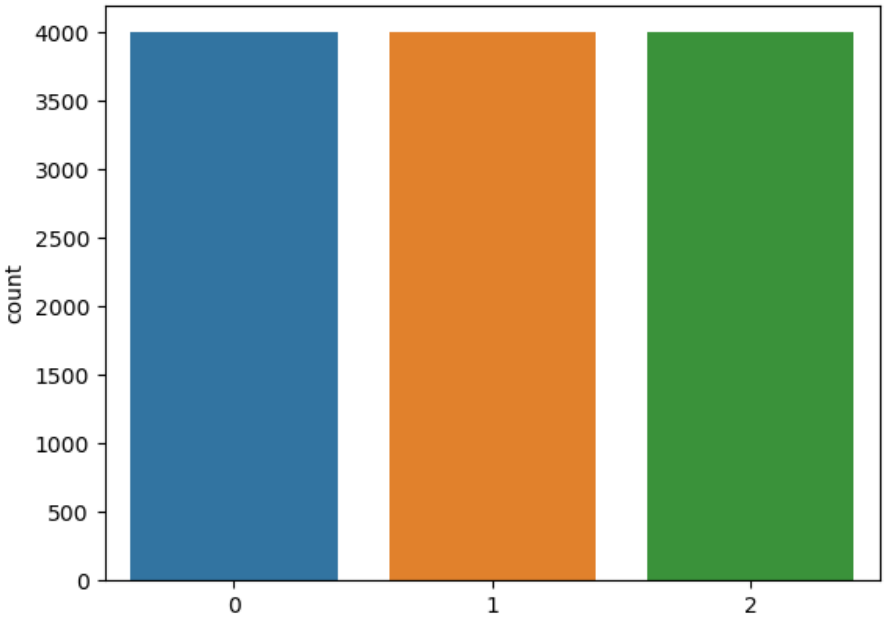
Dataset name: Brain Cancer
Dataset link:
https://www.kaggle.com/datasets/obulisainaren/multi-cancer

Number of samples: 15000
[Train : Test] Ratio -> 12000 image : 3000 image = **80% : 20%**

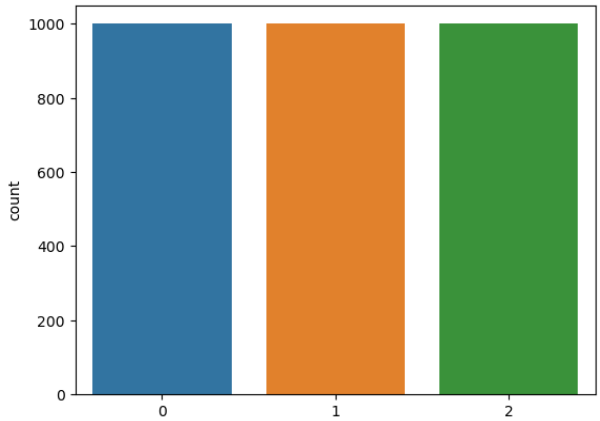
Diminution of image: 112*112
Classes number: 3
Classes Labels: brain glioma, brain menin, brain pituitary

Analysis & Distribution Data

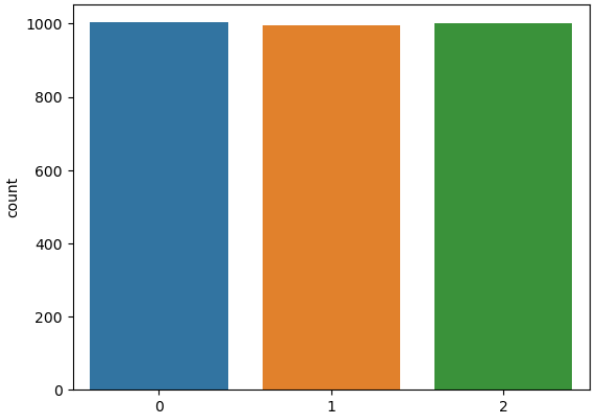
Training Data



Testing Data



Predicting Data



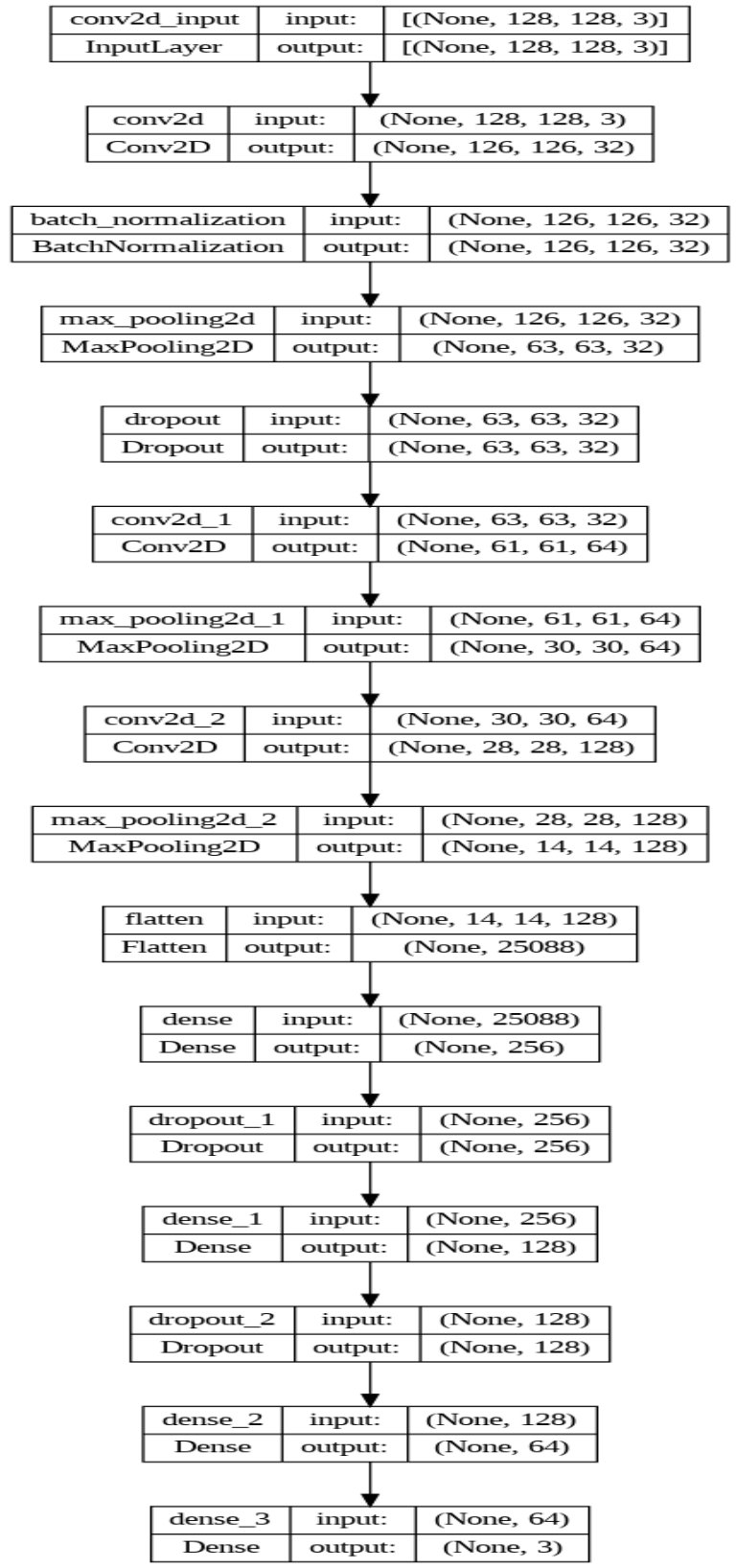
These graphs show that data is balanced

Model

```
model = Sequential()

model.add(Conv2D(filters = 32, kernel_size = (3, 3), activation = 'relu', input_shape = (IMGSIZE, IMGSIZE, 3)))
model.add(BatchNormalization())
model.add(MaxPooling2D((2,2)))
model.add(Dropout(0.25))

model.add(Conv2D(filters = 64, kernel_size = (3, 3), activation = 'relu'))
model.add(MaxPooling2D((2,2)))
model.add(Dropout(0.25))

model.add(Conv2D(filters = 128, kernel_size = (3, 3), activation = 'relu'))
model.add(MaxPooling2D((2,2)))
model.add(Dropout(0.25))

model.add(Conv2D(filters = 256, kernel_size = (3, 3), activation = 'relu'))
model.add(MaxPooling2D((2,2)))
model.add(Dropout(0.25))

model.add(Flatten())
model.add(Dense(256, activation = 'relu'))
model.add(Dropout(0.25))

model.add(Dense(128, activation = 'relu'))
model.add(Dropout(0.25))

model.add(Dense(64, activation = 'relu'))
model.add(Dense(3, activation = 'softmax'))

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

```
history = model.fit(X_train, y_train, validation_data = (X_test, y_test), epochs = 25)
# val_loss, val_acc = model.evaluate(X_test, y_test)

y_pred = model.predict(X_test)

model.summary()
```

Block Diagram:



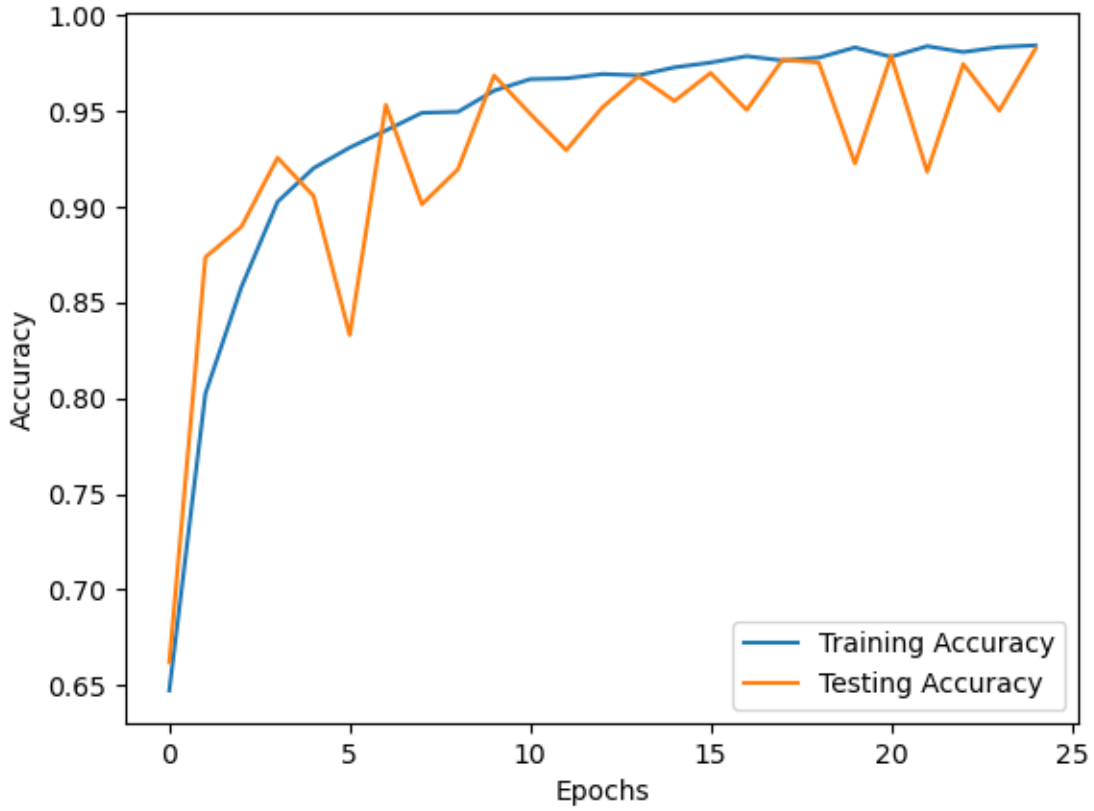
Hyper-parameters:

```
numOfCNNLayers = 4 & Activation_functhion = ‘relu’
kernal_size = (3,3)& MaxPooling = (2,2)
numOfDenseLayers = 4 & Activation_functhion = ‘relu’, ‘softmax’ for output
optimizer = 'adam'
loss = 'sparse_categorical_crossentropy'
epochs = 25
batch_size = 32 (Defualt)
image_size = 128 * 128
channels = 3 (RGB)
```

We have changed the hyperparameters in model many times to get the best results.

Result Details:

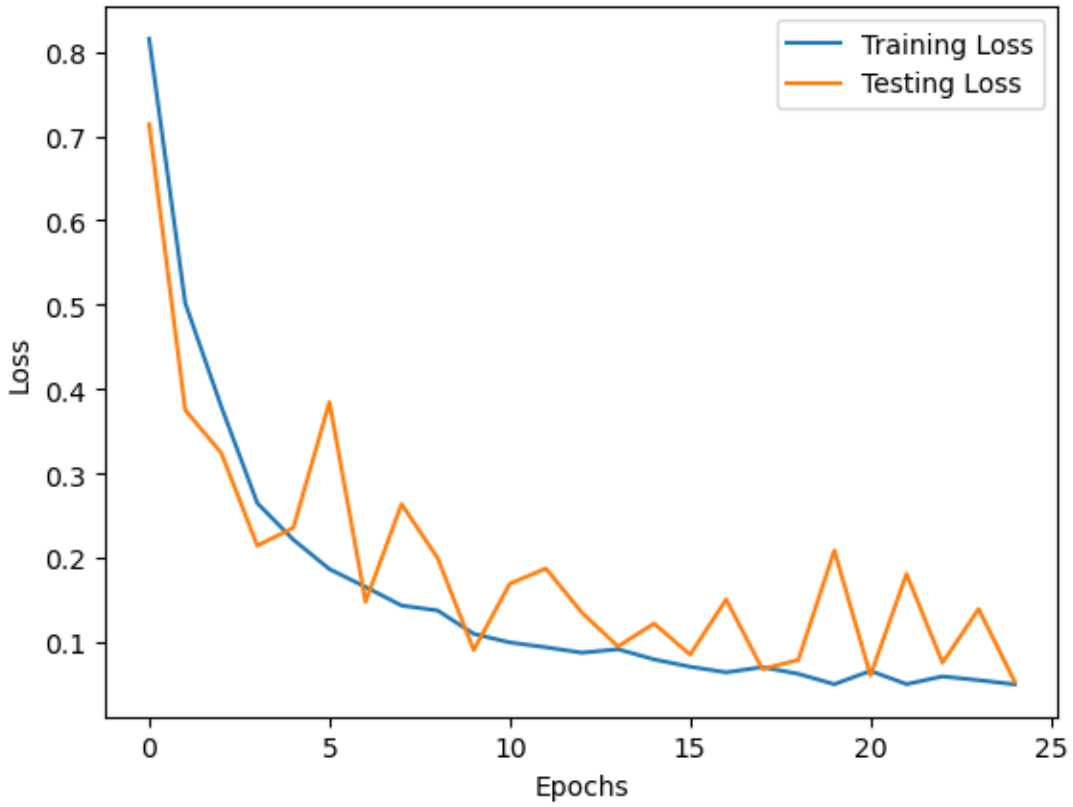
1) Accuracy Graph:



Training Accuracy = 98.44 %

Validation Accuracy = 98.27 %

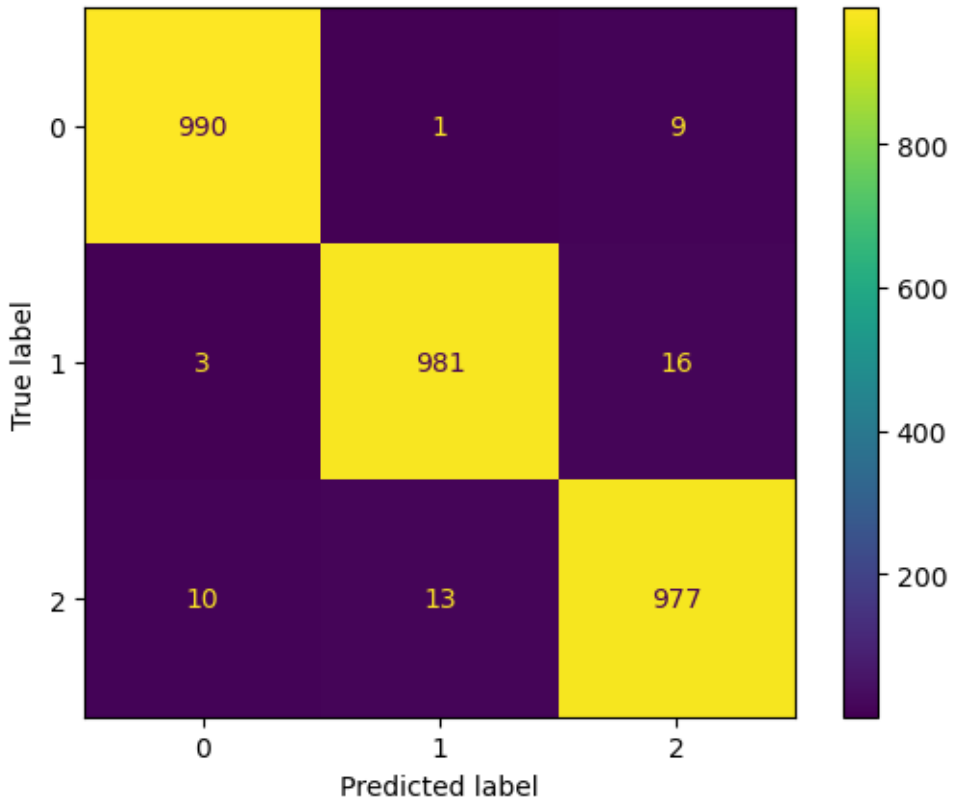
2) Loss Graph:



Training Loss = 5.00 %

Validation Loss = 5.30 %

3) Confusion Matrix:



4) Zero One Loss: -> Only 52 of 3000 image

There are 2948 of 3000 image that Model Predicted Correctly.

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