- **Architecture used in the Paper(CNN)**

13 layers

(input,2Conv,2Relu,2BatchNormalization,2MaxPool,Dropout,Fc,Softmax,Classification)

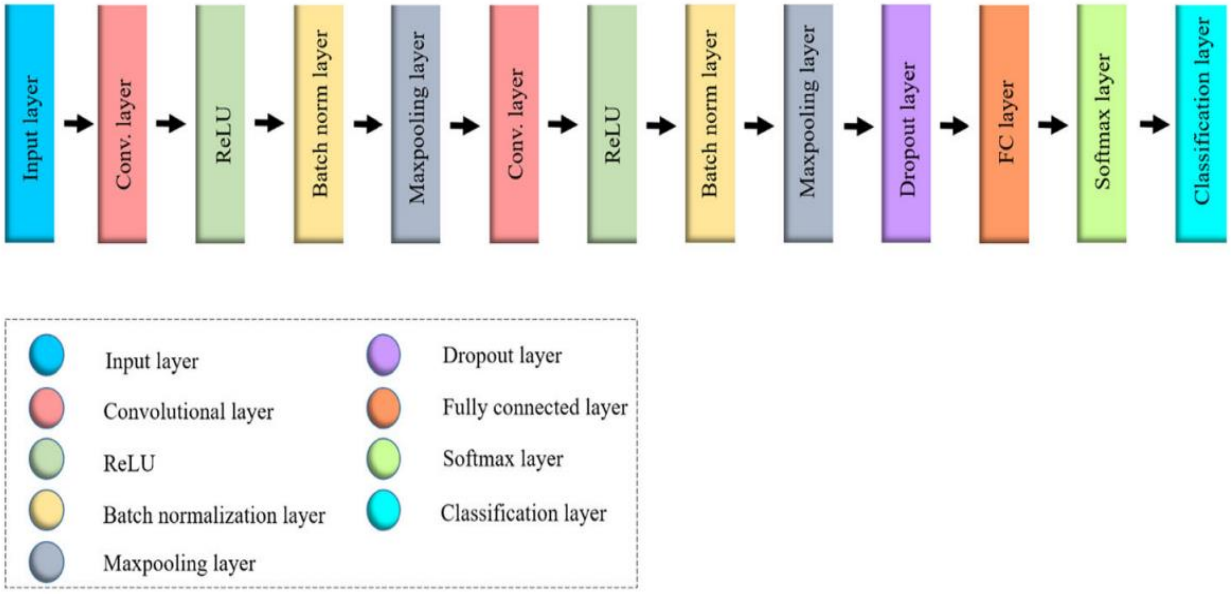


Fig. 3 Proposed CNN architecture

- **Dataset details**

Brain Tumor

A brain tumor is a collection, or mass, of abnormal cells in your brain. Your skull, which encloses your brain, is very rigid. Any growth inside such a restricted space can cause problems. Brain tumors can be cancerous (malignant) or noncancerous (benign). When benign or malignant tumors grow, they can cause the pressure inside your skull to increase. This can cause brain damage, and it can be life-threatening.

It includes 8222 files for (Training & Testing)

Training (4 directories)

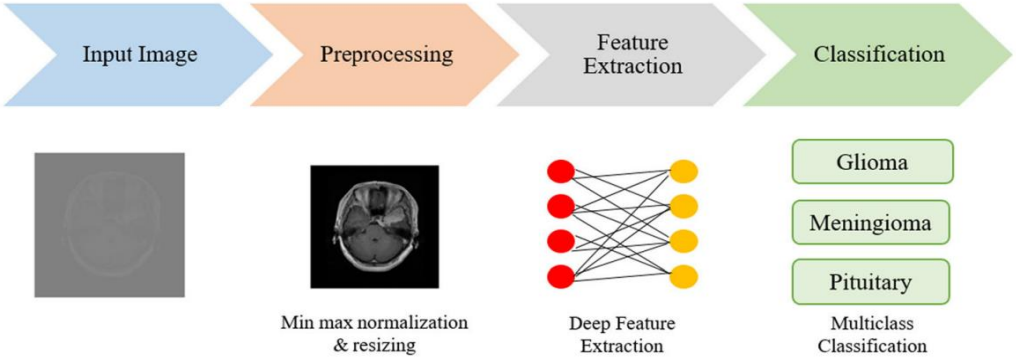
- Glioma
- Meningioma
- pituitary
- no tumor

Testing (4 directories)

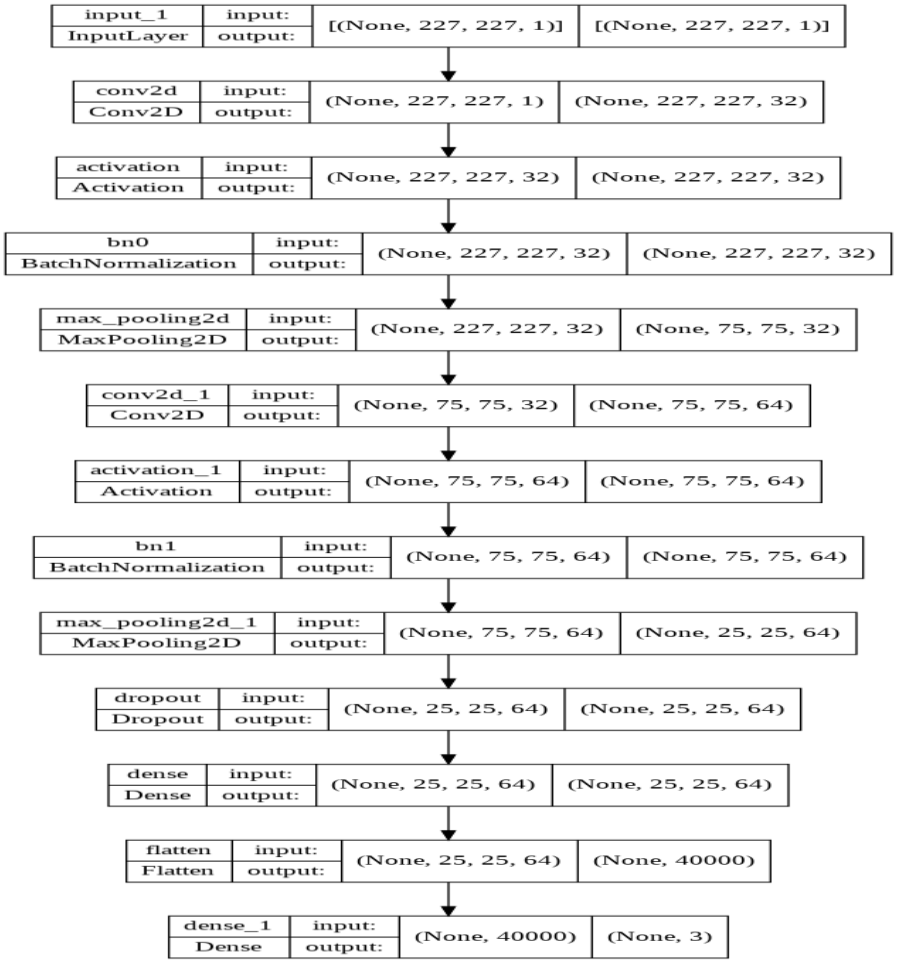
- Glioma
- Meningioma
- pituitary
- no tumor

dimension of images = 512*512px

- **Implementation details**

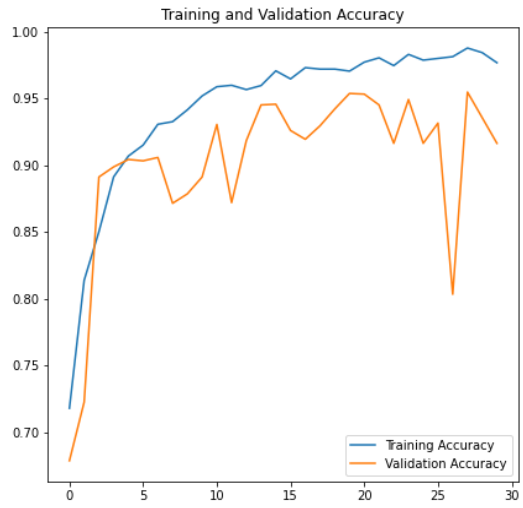


- **CNN Model**



• Results and visualizations

Loss (Training-Validation)



Accuracy :

```
from keras.models import load_model
loaded_model = load_model("network.h5")
loss, accuracy = loaded_model.evaluate(x_test, y_test)

print('test accuracy : %.2f' % accuracy, "%")
```

```
62/62 [==============================] - 1s 19ms/step - loss: 0.5322 - accuracy: 0.9585
test accuracy : 0.96 %
```

Recall, Percision, f1-Score :

```
[16] pred = model.predict(test_X)
     pred = np.argmax(pred,axis=1)
     print(classification_report(test_y,pred))
```

```
                precision    recall  f1-score   support

             0       0.93      0.77      0.84       400
             1       0.79      0.94      0.86       421
             2       0.96      0.93      0.94       374

      accuracy                           0.88      1195
     macro avg       0.89      0.88      0.88      1195
  weighted avg       0.89      0.88      0.88      1195
```

Confusion matrix: