

```
# Required Libraries
import pandas as pd
import numpy as np
import os
from google.colab import files
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Flatten, Dense, Dropout
from tensorflow.keras.optimizers import Adam
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score

# For image processing
from tensorflow.keras.preprocessing.image import load_img, img_to_array

# For user interaction
import ipywidgets as widgets
from IPython.display import display, clear_output

# Step 1: Upload CSV datasets
uploaded_files = files.upload()

# Assuming the files are named 'yes_brain_tumor.csv' and 'no_brain_tumor.csv'
yes_brain_tumor_df = pd.read_csv('tumor.csv')
no_brain_tumor_df = pd.read_csv('no_tumor.csv')

# Check the first few rows
print(yes_brain_tumor_df.head())
print(no_brain_tumor_df.head())

# Function to prepare images and labels from the dataset
def prepare_images_and_labels(dataframe, label):
    images = []
    labels = []
    for index, row in dataframe.iterrows():
        pixels = row[1:].values.astype('float32') # All pixel values
        pixels = pixels.reshape(128, 128) # Reshape to 128x128 image
        images.append(pixels)
        labels.append(label)
    return np.array(images), np.array(labels)

# Preparing images and labels for both datasets
yes_images, yes_labels = prepare_images_and_labels(yes_brain_tumor_df, 1) # 1 for tumor
no_images, no_labels = prepare_images_and_labels(no_brain_tumor_df, 0) # 0 for no tumor

# Combine the datasets
X = np.concatenate((yes_images, no_images), axis=0)
y = np.concatenate((yes_labels, no_labels), axis=0)

# Reshape images to include channel dimension (128, 128, 1)
X = X.reshape(X.shape[0], 128, 128, 1)

# Normalize pixel values (0-255) to range [0, 1]
X = X / 255.0
```



Choose Files 2 files

- **no_tumor.csv**(text/csv) - 5286821 bytes, last modified: 10/24/2024 - 100% done
- **tumor.csv**(text/csv) - 10434694 bytes, last modified: 10/24/2024 - 100% done

Saving no_tumor.csv to no_tumor.csv

Saving tumor.csv to tumor.csv

	Filename	pixel_0	pixel_1	pixel_2	pixel_3	pixel_4	pixel_5	pixel_6	\
0	7 no.jpg	0	0	0	0	0	0	0	
1	15 no.jpg	102	36	2	4	4	4	1	
2	17 no.jpg	2	2	2	2	2	2	2	
3	18 no.jpg	0	0	0	0	0	0	0	
4	22 no.jpg	0	0	0	0	0	0	0	

	pixel_7	pixel_8	...	pixel_16374	pixel_16375	pixel_16376	pixel_16377	\
0	0	0	...	0	0	0	0	
1	5	5	...	0	0	0	0	
2	2	2	...	2	2	2	2	
3	0	0	...	0	0	0	0	
4	0	0	...	0	0	0	0	

	pixel_16378	pixel_16379	pixel_16380	pixel_16381	pixel_16382	\
0	0	0	0	0	0	
1	0	0	0	0	0	
2	2	2	2	2	2	
3	0	0	0	0	0	
4	0	0	0	0	0	

	pixel_16383
0	0
1	0
2	2
3	0
4	0

[5 rows x 16385 columns]

	Filename	pixel_0	pixel_1	pixel_2	pixel_3	pixel_4	pixel_5	pixel_6	\
0	1 no.jpeg	0	0	0	0	0	0	0	
1	2 no.jpeg	0	0	0	0	0	0	0	
2	3 no.jpg	0	0	0	0	1	1	0	
3	6 no.jpg	0	0	0	0	0	0	0	
4	8 no.jpg	3	3	3	3	3	3	3	

	pixel_7	pixel_8	...	pixel_16374	pixel_16375	pixel_16376	pixel_16377	\
0	0	0	...	0	0	0	0	
1	0	0	...	0	0	0	0	
2	2	7	...	10	6	1	0	
3	0	0	...	0	0	0	0	
4	3	3	...	2	2	2	2	

	pixel_16378	pixel_16379	pixel_16380	pixel_16381	pixel_16382	\
0	0	0	0	0	0	
1	0	0	0	0	0	
2	1	0	0	0	0	
3	0	0	0	0	0	
4	2	2	2	2	2	

	pixel_16383
0	0
1	0
2	0
3	0
4	2

[5 rows x 16385 columns]

/usr/local/lib/python3.10/dist-packages/keras/src/layers/convolutional/base_conv.py:107: UserWarning: Do not pass an `input_shape`
super().__init__(activity_regularizer=activity_regularizer, **kwargs)

Epoch 1/128

18/18 11s 418ms/step - accuracy: 0.7077 - loss: 0.8525 - val_accuracy: 0.8750 - val_loss: 0.5078

Epoch 2/128

18/18 9s 480ms/step - accuracy: 0.8110 - loss: 0.4979 - val_accuracy: 0.8125 - val_loss: 0.4703

Epoch 3/128

18/18 9s 421ms/step - accuracy: 0.8273 - loss: 0.4322 - val_accuracy: 0.8438 - val_loss: 0.3470

Epoch 4/128

18/18 9s 479ms/step - accuracy: 0.8657 - loss: 0.3260 - val_accuracy: 0.8438 - val_loss: 0.2829

Epoch 5/128

18/18 9s 428ms/step - accuracy: 0.9220 - loss: 0.2263 - val_accuracy: 0.9062 - val_loss: 0.1929

Epoch 6/128

18/18 9s 373ms/step - accuracy: 0.9466 - loss: 0.1526 - val_accuracy: 0.9062 - val_loss: 0.1966

Epoch 7/128

18/18 10s 376ms/step - accuracy: 0.9508 - loss: 0.1413 - val_accuracy: 0.9375 - val_loss: 0.1999

Epoch 8/128

18/18 9s 480ms/step - accuracy: 0.9578 - loss: 0.1153 - val_accuracy: 0.9062 - val_loss: 0.1736

Epoch 9/128

18/18 8s 363ms/step - accuracy: 0.9613 - loss: 0.0866 - val_accuracy: 0.9062 - val_loss: 0.1946

Epoch 10/128

18/18 10s 369ms/step - accuracy: 0.9845 - loss: 0.0677 - val_accuracy: 0.9375 - val_loss: 0.2007

Epoch 11/128

18/18 9s 478ms/step - accuracy: 0.9732 - loss: 0.0651 - val_accuracy: 0.9375 - val_loss: 0.2063

Epoch 12/128

18/18 8s 372ms/step - accuracy: 0.9931 - loss: 0.0299 - val_accuracy: 0.9375 - val_loss: 0.1939

Epoch 13/128

18/18 ————— 10s 376ms/step - accuracy: 0.9940 - loss: 0.0218 - val_accuracy: 0.9375 - val_loss: 0.2477
Epoch 14/128
18/18 ————— 8s 470ms/step - accuracy: 0.9755 - loss: 0.0395 - val_accuracy: 0.9062 - val_loss: 0.2076
Epoch 15/128
18/18 ————— 9s 386ms/step - accuracy: 0.9990 - loss: 0.0306 - val_accuracy: 0.9062 - val_loss: 0.2172
Epoch 16/128
18/18 ————— 10s 367ms/step - accuracy: 0.9796 - loss: 0.0408 - val_accuracy: 0.9062 - val_loss: 0.1874
Epoch 17/128
18/18 ————— 8s 458ms/step - accuracy: 0.9910 - loss: 0.0162 - val_accuracy: 0.9062 - val_loss: 0.1817
Epoch 18/128
18/18 ————— 10s 439ms/step - accuracy: 0.9901 - loss: 0.0400 - val_accuracy: 0.9062 - val_loss: 0.1969
Epoch 19/128
18/18 ————— 9s 369ms/step - accuracy: 0.9853 - loss: 0.0459 - val_accuracy: 0.9062 - val_loss: 0.2003
Epoch 20/128
18/18 ————— 9s 481ms/step - accuracy: 0.9901 - loss: 0.0161 - val_accuracy: 0.8750 - val_loss: 0.2363
Epoch 21/128
18/18 ————— 9s 402ms/step - accuracy: 0.9922 - loss: 0.0257 - val_accuracy: 0.9062 - val_loss: 0.1828
Epoch 22/128
18/18 ————— 10s 371ms/step - accuracy: 0.9931 - loss: 0.0134 - val_accuracy: 0.8750 - val_loss: 0.1957
Epoch 23/128
18/18 ————— 10s 373ms/step - accuracy: 0.9987 - loss: 0.0091 - val_accuracy: 0.9062 - val_loss: 0.2489
Epoch 24/128
18/18 ————— 12s 458ms/step - accuracy: 0.9938 - loss: 0.0152 - val_accuracy: 0.9062 - val_loss: 0.1825
Epoch 25/128
18/18 ————— 7s 405ms/step - accuracy: 0.9968 - loss: 0.0065 - val_accuracy: 0.9062 - val_loss: 0.1755
Epoch 26/128
18/18 ————— 10s 375ms/step - accuracy: 0.9920 - loss: 0.0192 - val_accuracy: 0.9062 - val_loss: 0.1794
Epoch 27/128
18/18 ————— 10s 371ms/step - accuracy: 0.9874 - loss: 0.0219 - val_accuracy: 0.9062 - val_loss: 0.2155
Epoch 28/128
18/18 ————— 14s 555ms/step - accuracy: 0.9943 - loss: 0.0148 - val_accuracy: 0.8750 - val_loss: 0.2199
Epoch 29/128
18/18 ————— 8s 472ms/step - accuracy: 0.9994 - loss: 0.0086 - val_accuracy: 0.9062 - val_loss: 0.1756
Epoch 30/128
18/18 ————— 8s 364ms/step - accuracy: 1.0000 - loss: 0.0057 - val_accuracy: 0.9375 - val_loss: 0.1931
Epoch 31/128
18/18 ————— 9s 478ms/step - accuracy: 0.9964 - loss: 0.0094 - val_accuracy: 0.9375 - val_loss: 0.2272
Epoch 32/128
18/18 ————— 9s 417ms/step - accuracy: 0.9878 - loss: 0.0200 - val_accuracy: 0.9375 - val_loss: 0.2226
Epoch 33/128
18/18 ————— 9s 374ms/step - accuracy: 0.9863 - loss: 0.0145 - val_accuracy: 0.9375 - val_loss: 0.2023
Epoch 34/128
18/18 ————— 10s 371ms/step - accuracy: 0.9965 - loss: 0.0224 - val_accuracy: 0.8750 - val_loss: 0.1852
Epoch 35/128
18/18 ————— 9s 480ms/step - accuracy: 0.9976 - loss: 0.0078 - val_accuracy: 0.9062 - val_loss: 0.1935
Epoch 36/128
18/18 ————— 8s 370ms/step - accuracy: 0.9831 - loss: 0.0404 - val_accuracy: 0.8750 - val_loss: 0.1897
Epoch 37/128
18/18 ————— 9s 482ms/step - accuracy: 0.9959 - loss: 0.0079 - val_accuracy: 0.8750 - val_loss: 0.1980
Epoch 38/128
18/18 ————— 9s 432ms/step - accuracy: 0.9976 - loss: 0.0123 - val_accuracy: 0.9062 - val_loss: 0.2041
Epoch 39/128
18/18 ————— 9s 374ms/step - accuracy: 0.9828 - loss: 0.0239 - val_accuracy: 0.8750 - val_loss: 0.2161
Epoch 40/128
18/18 ————— 10s 382ms/step - accuracy: 0.9834 - loss: 0.0367 - val_accuracy: 0.8750 - val_loss: 0.1852
Epoch 41/128
18/18 ————— 12s 451ms/step - accuracy: 0.9941 - loss: 0.0105 - val_accuracy: 0.8750 - val_loss: 0.1873
Epoch 42/128
18/18 ————— 11s 482ms/step - accuracy: 0.9937 - loss: 0.0129 - val_accuracy: 0.9062 - val_loss: 0.1644
Epoch 43/128
18/18 ————— 8s 365ms/step - accuracy: 0.9868 - loss: 0.0170 - val_accuracy: 0.9062 - val_loss: 0.1556
Epoch 44/128
18/18 ————— 8s 473ms/step - accuracy: 0.9943 - loss: 0.0138 - val_accuracy: 0.9062 - val_loss: 0.1645
Epoch 45/128
18/18 ————— 10s 433ms/step - accuracy: 0.9884 - loss: 0.0303 - val_accuracy: 0.9062 - val_loss: 0.1827
Epoch 46/128
18/18 ————— 9s 364ms/step - accuracy: 0.9952 - loss: 0.0116 - val_accuracy: 0.9375 - val_loss: 0.1610
Epoch 47/128
18/18 ————— 11s 379ms/step - accuracy: 0.9923 - loss: 0.0158 - val_accuracy: 0.8750 - val_loss: 0.1947
Epoch 48/128
18/18 ————— 9s 483ms/step - accuracy: 0.9933 - loss: 0.0253 - val_accuracy: 0.9375 - val_loss: 0.2024
Epoch 49/128
18/18 ————— 7s 372ms/step - accuracy: 0.9908 - loss: 0.0360 - val_accuracy: 0.8750 - val_loss: 0.1957
Epoch 50/128
18/18 ————— 11s 383ms/step - accuracy: 0.9930 - loss: 0.0118 - val_accuracy: 0.9062 - val_loss: 0.2082
Epoch 51/128
18/18 ————— 12s 477ms/step - accuracy: 0.9806 - loss: 0.0309 - val_accuracy: 0.9062 - val_loss: 0.2405
Epoch 52/128
18/18 ————— 7s 370ms/step - accuracy: 0.9898 - loss: 0.0131 - val_accuracy: 0.8750 - val_loss: 0.2517
Epoch 53/128
18/18 ————— 10s 375ms/step - accuracy: 0.9939 - loss: 0.0106 - val_accuracy: 0.8750 - val_loss: 0.2193
Epoch 54/128
18/18 ————— 9s 482ms/step - accuracy: 0.9984 - loss: 0.0083 - val_accuracy: 0.9062 - val_loss: 0.1818
Epoch 55/128
18/18 ————— 7s 364ms/step - accuracy: 0.9958 - loss: 0.0106 - val_accuracy: 0.9062 - val_loss: 0.2309
Epoch 56/128
18/18 ————— 10s 361ms/step - accuracy: 0.9880 - loss: 0.0221 - val_accuracy: 0.9062 - val_loss: 0.2480
Epoch 57/128
18/18 ————— 12s 434ms/step - accuracy: 0.9946 - loss: 0.0097 - val_accuracy: 0.8750 - val_loss: 0.2026
Epoch 58/128
18/18 ————— 11s 405ms/step - accuracy: 0.9947 - loss: 0.0120 - val_accuracy: 0.9375 - val_loss: 0.1505

18/18 11s 480ms/step - accuracy: 0.9917 - loss: 0.0128 - val_accuracy: 0.9375 - val_loss: 0.1505
Epoch 59/128
18/18 8s 375ms/step - accuracy: 0.9873 - loss: 0.0335 - val_accuracy: 0.9062 - val_loss: 0.1334
Epoch 60/128
18/18 10s 378ms/step - accuracy: 0.9927 - loss: 0.0118 - val_accuracy: 0.9375 - val_loss: 0.1376
Epoch 61/128
18/18 13s 528ms/step - accuracy: 0.9883 - loss: 0.0332 - val_accuracy: 0.9375 - val_loss: 0.1353
Epoch 62/128
18/18 9s 481ms/step - accuracy: 0.9984 - loss: 0.0086 - val_accuracy: 0.9375 - val_loss: 0.1236
Epoch 63/128
18/18 8s 376ms/step - accuracy: 0.9931 - loss: 0.0129 - val_accuracy: 0.9062 - val_loss: 0.1212
Epoch 64/128
18/18 10s 381ms/step - accuracy: 0.9916 - loss: 0.0095 - val_accuracy: 0.9062 - val_loss: 0.1255
Epoch 65/128
18/18 9s 491ms/step - accuracy: 0.9938 - loss: 0.0168 - val_accuracy: 0.9062 - val_loss: 0.1354
Epoch 66/128
18/18 7s 369ms/step - accuracy: 0.9923 - loss: 0.0157 - val_accuracy: 0.9688 - val_loss: 0.1386
Epoch 67/128
18/18 9s 477ms/step - accuracy: 0.9911 - loss: 0.0112 - val_accuracy: 0.9062 - val_loss: 0.1218
Epoch 68/128
18/18 9s 428ms/step - accuracy: 0.9994 - loss: 0.0062 - val_accuracy: 0.9375 - val_loss: 0.1279
Epoch 69/128
18/18 9s 371ms/step - accuracy: 0.9799 - loss: 0.0286 - val_accuracy: 0.9062 - val_loss: 0.1349
Epoch 70/128
18/18 10s 375ms/step - accuracy: 0.9932 - loss: 0.0120 - val_accuracy: 0.9062 - val_loss: 0.1207
Epoch 71/128
18/18 12s 441ms/step - accuracy: 0.9916 - loss: 0.0103 - val_accuracy: 0.9375 - val_loss: 0.1191
Epoch 72/128
18/18 7s 408ms/step - accuracy: 0.9884 - loss: 0.0129 - val_accuracy: 0.9375 - val_loss: 0.1292
Epoch 73/128
18/18 10s 371ms/step - accuracy: 0.9853 - loss: 0.0145 - val_accuracy: 0.9375 - val_loss: 0.1379
Epoch 74/128
18/18 10s 374ms/step - accuracy: 0.9963 - loss: 0.0082 - val_accuracy: 0.9375 - val_loss: 0.1368
Epoch 75/128
18/18 8s 471ms/step - accuracy: 0.9974 - loss: 0.0121 - val_accuracy: 0.9062 - val_loss: 0.1317
Epoch 76/128
18/18 9s 372ms/step - accuracy: 0.9951 - loss: 0.0068 - val_accuracy: 0.9062 - val_loss: 0.1285
Epoch 77/128
18/18 10s 377ms/step - accuracy: 0.9955 - loss: 0.0061 - val_accuracy: 0.9062 - val_loss: 0.1283
Epoch 78/128
18/18 11s 423ms/step - accuracy: 0.9852 - loss: 0.0133 - val_accuracy: 0.8750 - val_loss: 0.1466
Epoch 79/128
18/18 11s 485ms/step - accuracy: 0.9859 - loss: 0.0162 - val_accuracy: 0.8750 - val_loss: 0.1577
Epoch 80/128
18/18 8s 380ms/step - accuracy: 0.9830 - loss: 0.0135 - val_accuracy: 0.9062 - val_loss: 0.1578
Epoch 81/128
18/18 10s 373ms/step - accuracy: 0.9890 - loss: 0.0105 - val_accuracy: 0.9062 - val_loss: 0.1290
Epoch 82/128
18/18 10s 378ms/step - accuracy: 0.9868 - loss: 0.0162 - val_accuracy: 0.9375 - val_loss: 0.1285
Epoch 83/128
18/18 12s 450ms/step - accuracy: 0.9972 - loss: 0.0067 - val_accuracy: 0.9062 - val_loss: 0.1268
Epoch 84/128
18/18 10s 463ms/step - accuracy: 0.9875 - loss: 0.0134 - val_accuracy: 0.9375 - val_loss: 0.1208
Epoch 85/128
18/18 9s 380ms/step - accuracy: 0.9994 - loss: 0.0101 - val_accuracy: 0.9375 - val_loss: 0.1173
Epoch 86/128
18/18 10s 374ms/step - accuracy: 0.9897 - loss: 0.0085 - val_accuracy: 0.9375 - val_loss: 0.1163
Epoch 87/128
18/18 8s 474ms/step - accuracy: 1.0000 - loss: 0.0078 - val_accuracy: 0.9375 - val_loss: 0.1180
Epoch 88/128
18/18 7s 372ms/step - accuracy: 0.9880 - loss: 0.0122 - val_accuracy: 0.9375 - val_loss: 0.1150
Epoch 89/128
18/18 11s 411ms/step - accuracy: 0.9858 - loss: 0.0142 - val_accuracy: 0.9375 - val_loss: 0.1138
Epoch 90/128
18/18 11s 476ms/step - accuracy: 0.9929 - loss: 0.0109 - val_accuracy: 0.9375 - val_loss: 0.1171
Epoch 91/128
18/18 9s 388ms/step - accuracy: 0.9883 - loss: 0.0109 - val_accuracy: 0.9375 - val_loss: 0.1189
Epoch 92/128
18/18 10s 370ms/step - accuracy: 0.9969 - loss: 0.0095 - val_accuracy: 0.9375 - val_loss: 0.1116
Epoch 93/128
18/18 12s 496ms/step - accuracy: 0.9946 - loss: 0.0082 - val_accuracy: 0.9062 - val_loss: 0.1060
Epoch 94/128
18/18 10s 444ms/step - accuracy: 0.9900 - loss: 0.0105 - val_accuracy: 0.9375 - val_loss: 0.1095
Epoch 95/128
18/18 8s 448ms/step - accuracy: 0.9944 - loss: 0.0131 - val_accuracy: 0.9062 - val_loss: 0.1079
Epoch 96/128
18/18 9s 384ms/step - accuracy: 0.9904 - loss: 0.0115 - val_accuracy: 0.9375 - val_loss: 0.1150
Epoch 97/128
18/18 10s 390ms/step - accuracy: 0.9806 - loss: 0.0211 - val_accuracy: 0.9375 - val_loss: 0.1195
Epoch 98/128
18/18 11s 467ms/step - accuracy: 0.9968 - loss: 0.0106 - val_accuracy: 0.9062 - val_loss: 0.1249
Epoch 99/128
18/18 10s 450ms/step - accuracy: 1.0000 - loss: 0.0044 - val_accuracy: 0.9062 - val_loss: 0.1315
Epoch 100/128
18/18 7s 353ms/step - accuracy: 0.9942 - loss: 0.0104 - val_accuracy: 0.9062 - val_loss: 0.1322
Epoch 101/128
18/18 12s 445ms/step - accuracy: 0.9879 - loss: 0.0126 - val_accuracy: 0.9062 - val_loss: 0.1365
Epoch 102/128
18/18 7s 385ms/step - accuracy: 0.9983 - loss: 0.0024 - val_accuracy: 0.9062 - val_loss: 0.1398
Epoch 103/128
18/18 10s 375ms/step - accuracy: 0.9978 - loss: 0.0043 - val_accuracy: 0.9375 - val_loss: 0.1106