Project Proposal

TITLE:
BRAIN TUMOR DETECTION USING DEEP LEARNING TECHNIQUES

PROBLEM:
BRAIN TUMOR IS CONSIDERED AS ONE OF THE AGGRESSIVE DISEASES, AMONG CHILDREN AND ADULTS. BRAIN TUMORS GROW VERY FAST AND IF NOT TREATED WELL, THE SURVIVAL CHANCES OF THE PATIENT ARE VERY LESS. EARLY DETECTION OF BRAIN TUMORS IS VERY IMPORTANT. PROPER TREATMENT PLANNING AND ACCURATE DIAGNOSTICS IS AT THE TOPMOST PRIORITY TO IMPROVE LIFE EXPECTANCY OF THE PATIENTS. THE BEST TECHNIQUE TO DETECT BRAIN TUMOR IS MAGNETIC RESONANCE IMAGING. THE MRI IMAGES ARE EXAMINED BY THE RADIOLOGIST. MANUAL EXAMINATION CAN BE ERROR PRONE DUE TO THE LEVEL OF COMPLEXITIES INVOLVED IN BRAIN TUMORS AND THEIR PROPERTIES.

HENCE AN AUTOMATED BRAIN TUMOR DETECTION SYSTEM IS REQUIRED TO DETECT TUMORS AT ITS EARLY STAGE.

CHALLENGES:
CHALLENGE IS TO DETECT THE TUMOR AT THE EARLY STAGE AND DECREASE THE FALSE NEGATIVITY RATE.

DATASETS:
HTTPS://WWW.KAGGLE.COM/DATASETS/NAVONEEL/BRAIN-MRI-IMAGES-FOR-BRAIN-TUMOR-DETECTION
HTTPS://WWW.KAGGLE.COM/DATASETS/AHMEDHAMADA0/BRAIN-TUMOR-DETECTION

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METHOD OR ALGORITHM:
CNN ALGORITHM WILL BE USED FOR THE TUMOR DETECTION. WE WILL BE USING OPEN CV AND KERAS LIBRARY TO IMPLEMENT THIS DETECTION SYSTEM. THE CNN SEQUENTIAL MODEL IS GENERATED BY IMPLEMENTING DIFFERENT LAYERS. THE INPUT IMAGE IS RESHAPED INTO 128X128. THE CONVOLVE LAYER IS APPLIED ON THE INPUT IMAGE WITH THE RELU AS ACTIVATION FUNCTION, PADDING AS SAME WHICH MEANS THE OUTPUT IMAGES LOOKS LIKE THE INPUT IMAGE AND THE NUMBER OF FILTERS ARE 32,64,128 FOR DIFFERENT CONVOLVE LAYERS. THE MAX

POOLING APPLIED WITH THE 2X2 WINDOW SIZE AND DROPOUTS' FUNCTION IS CALLED WITH 25% OF DROPOUTS. FLATTEN METHOD IS APPLIED TO CONVERT THE FEATURES INTO ONE DIMENSIONAL ARRAY. THE FULLY CONNECTED LAYER IS DONE BY CALLING THE DENSE METHOD WITH THE NUMBER OF UNITS AS 128 AND RE AS THE ACTIVATION FUNCTION. THE OUTPUT LAYER HAS 2 UNIT TO REPRESENT THE TWO CLASSES AND THE SOFTMAX AS ACTIVATION FUNCTION

Convolutional Neural Network
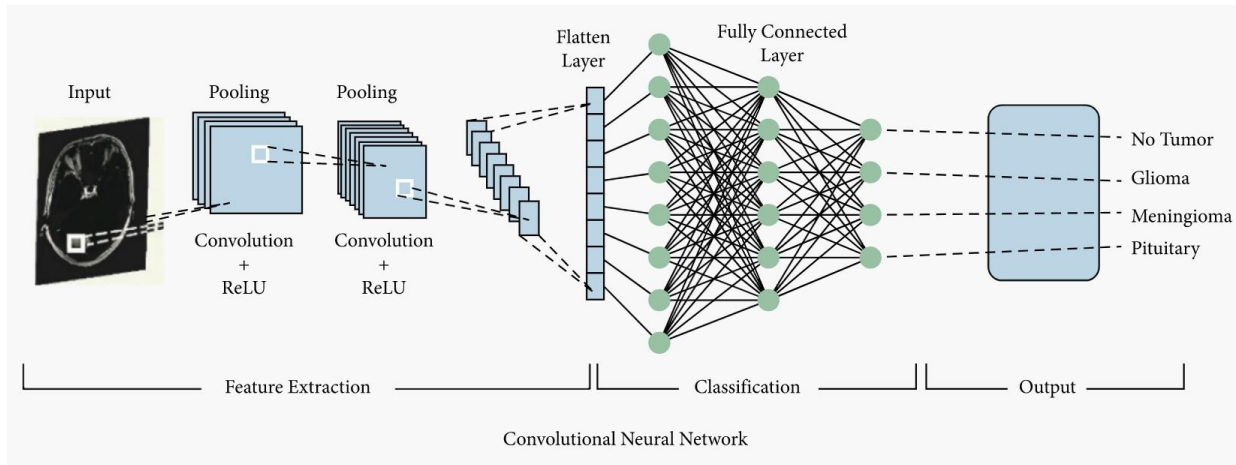
READING:

WE WILL BE STUDYING CONVOLUTION NEURAL NETWORKS IN DEPTH AS WELL AS HOW TO USE THE TENSORFLOW AND KERAS LIBRARY. ALSO FOLLOWING ARE THE RESEARCH PAPERS THAT WILL BE READ IN ORDER TO IMPLEMENT THIS SOLUTION.

HTTPS://IOPSCIENCE.IOP.ORG/ARTICLE/10.1088/1757-899X/1055/1/012115
HTTPS://WWW.MEDRXIV.ORG/CONTENT/10.1101/2022.01.19.22269457V1.FULL.PDF
HTTPS://WWW.HINDAWI.COM/JOURNALS/ACISC/2022/8104054/
HTTPS://PAPERS.SSRN.COM/SOL3/PAPERS.CFM?ABSTRACT_ID=3867216

RESULTS:

THE RESULTS WILL BE EVALUATED WITH THE HELP OF CONFUSION MATRIX. THERE WILL BE MAINLY TWO OUTPUTS I.E. IF TUMOR PRESENT THEN 1 AND IF TUMOR NOT PRESENT THEN 0.

THE ACCURACY WILL BE DETERMINED ON THE CALCULATION OF FALSE NEGATIVE RATE.