

# Project Proposal

## Project title

The project title is ***Brain Tumors Classification***.

## Team member(s)

There is only me (**Mouhammad Bazzi**) as a team member.

## Description of the problem

One of the more severe disorders that affect both children and adults is a **brain tumor**. 85 to 90 percent of all primary Central Nervous System (CNS) malignancies are brain tumors. For those who have a cancerous brain or CNS tumor, the 5-year survival rate is roughly 35%. To extend patient lives, appropriate care, careful planning, and precise diagnostics must be used. Magnetic Resonance Imaging is the most effective method for finding brain cancers (MRI). The scans provide a high-quality picture. **The radiologist examines these pictures. Because of the complexity of brain tumors and their characteristics, a manual examination can be prone to inaccuracy.**

Automated classification methods based on Machine Learning (ML) and Artificial Intelligence (AI) have consistently outperformed manual categorization in terms of accuracy. So, it would be beneficial for doctors all over the world to propose a system that does **detection and classification** utilizing Machine Learning (ML) algorithms.

Brain tumors are intricate. The sizes and locations of the brain tumor are quite aberrant. Because of this, it is quite difficult to comprehend the tumor's nature completely. In the dataset we have we distinguish 3 types of tumors: **glioma, meningioma, and pituitary**. And there are also some MRIs of **healthy brains**. (so, there are **4 classes**).

## What has been done and how the proposed work is different?

A lot of models have been done in order to classify the 3 kinds of tumors: glioma, meningioma, and pituitary. They essentially use all CNN classification models. Some of them, in order to have a better classification, used some augmentation data methods, etc. The lowest accuracy is around 0.81 and the highest obtained is 0.97. So, some existing models are efficient.

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What I will try to do, is try to implement the data and some models as they did, and the new thing that I will try to do is to introduce a pre-processing step where I will apply a filter on all the images to try to have better results while using some neural networks as a model.

## Preliminary Plan

What I plan to do is first pre-process the data:

By pre-processing the data, I mean, normalizing the vector split the training dataset in validation and training set, etc.

Then I will try to train a model using first a classic Artificial Neural Network. After that, I will use a convolutional neural network and look if it improves the model. And I will probably try other models.

After that, I plan to re-pre-process the data, I will do the same things but this time I will also apply some filters on the MRIs in order to try to detect more easily the edges in order to improve the results of the previous models.

## References

I downloaded the data from Kaggle: <https://www.kaggle.com/datasets/sartajbhuvaaji/brain-tumor-classification-mri?resource=download>

I also read some papers to have an idea of what has been done:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4598126/>

<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8723045>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7912940/#B27-healthcare-09-00153>