"Detecting tumors in different parts of the body using transfer learning on MRI images"

In this project, we are asking the following question: "Can we build a machine learning model capable of efficiently detecting tumours on MRI images of different parts of the body using transfer learning?"
Or, to put it another way: can we use the knowledge gained from training a model on one dataset (MRI of the brain) to improve its ability to detect tumours on another dataset (MRI of the liver and kidneys) using transfer learning?
This question is important for understanding the extent to which models trained on one dataset are versatile and applicable to other datasets, particularly in the field of medical imaging where access to labelled data may be limited.

Project stages:

1. Data preparation: two data sets of MRI images will be collected: the first contains images of the brain and the second images of the liver and kidneys. Each dataset will be labelled according to the presence or absence of tumours.

2- Training on brain MRI data: the model will be trained on a set of brain MRI images using the VGG model. For training, we will use code that has already been written by AMR ABDELLATIF "Brain Tumor Image DataSet : PyTorch" (https://www.kaggle.com/code/amrabdellatif/brain-tumor-image-dataset-pytorch/notebook) and that goes with the dataset. At this stage we will also compare the original model from the code and the VGG type model.

3- Transfer training on liver and kidney MRI data: the model will be trained on a set of liver and kidney MRI images. The model trained on the brain data will be pre-trained on this dataset in order to study its ability to detect tumours in other parts of the body.

4- Performance evaluation: Once the model has been trained, we will evaluate its performance on a test dataset comprising both MRI images of the brain and MRI images of the liver and kidneys. This will allow us to determine how well the model can detect tumours in different parts of the body after the transfer learning procedure. We also want to see whether the order of the training datasets affects the results.

Datasets:

1. Brain Tumor Image DataSet : Semantic Segmentation. https://www.kaggle.com/datasets/pkdarabi/brain-tumor-image-dataset-semantic-segmentation/data?select=test
2. Riñones - Cyst, Stone, Tumor, Normal - Dataset. https://www.kaggle.com/datasets/gonzajl/riones-cyst-stone-tumor-normal-dataset/code
3. 3D Liver and Liver Tumor Segmentation. https://www.kaggle.com/datasets/gauravduttakiit/3d-liver-and-liver-tumor-segmentation

Notebook used:
"Brain Tumor Image DataSet : PyTorch" . https://www.kaggle.com/code/amrabdellatif/brain-tumor-image-dataset-pytorch/notebook