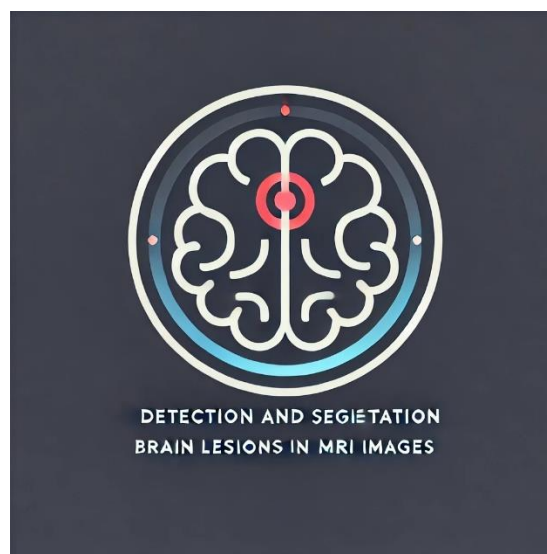




**Faculté des Sciences El Jadida**

## **Documentation of the Project**

### **Detection and Segmentation of Brain Lesions in MRI Images**



#### **Authors:**

El Aouni Hajar, Ifadaden Abed-El Hak

#### **Supervised by:**

Mr. Abedessadek Aaroud

#### **Field:**

Business Intelligence and Big Data Analytics (BEDA)

**2024/2025**



# Practical Guide for Using Applications for Detection and Segmentation of Brain Lesions in MRI Images

## Introduction

This guide explains how to use applications for detection, classification, and segmentation of brain lesions in MRI images. These applications rely on artificial intelligence models:

- **CNN-VGG** for classification and detection.
- **U-Net ResNeXt50** for segmentation.

## 1. Installation and Prerequisites

### 1.1. Required Environment

- Python 3.10.0
- TensorFlow/Keras
- PyTorch (for U-Net ResNeXt50)
- OpenCV, NumPy, Matplotlib
- User interface developed (provided with the project)
- streamlit

### 1.2. Installing Dependencies

Run the following command to install the necessary libraries:

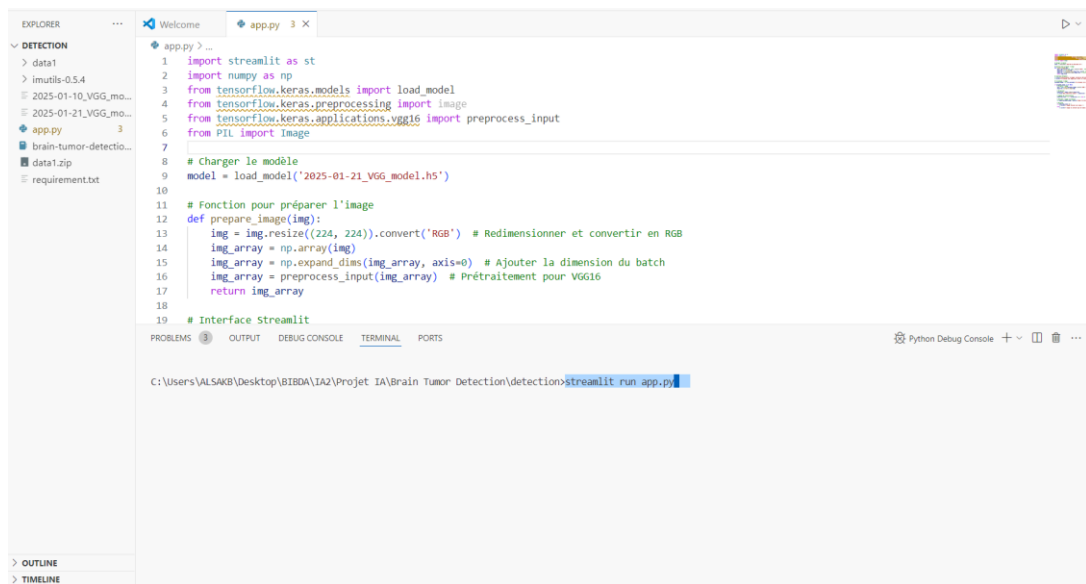
```
pip install -r requirements.txt
```

## 2. Using the Application

### 2.1. Classification and Detection Interface (CNN-VGG)

1. Launch the application with:

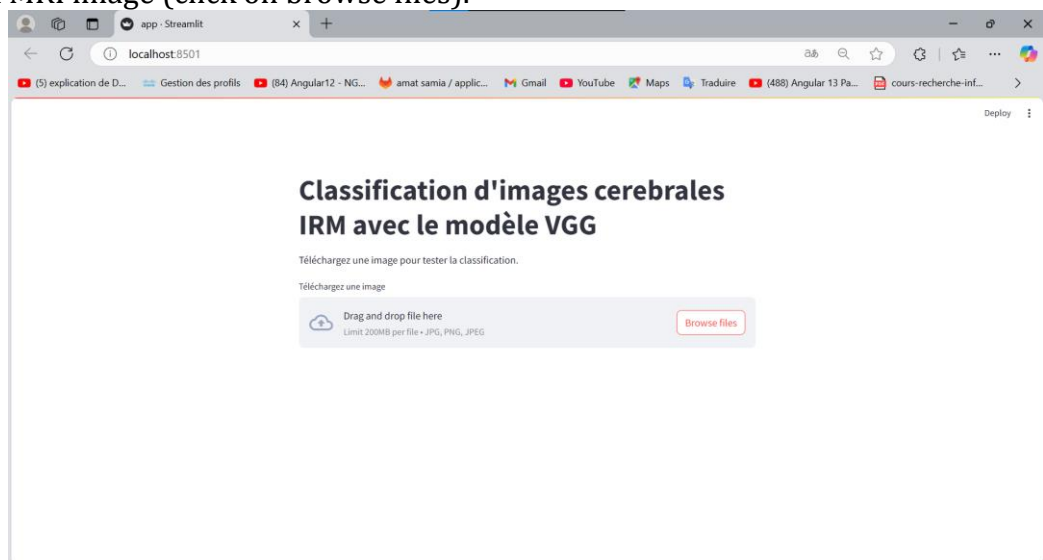
```
streamlit run app.py
```



```
1 import streamlit as st
2 import numpy as np
3 from tensorflow.keras.models import load_model
4 from tensorflow.keras.preprocessing import image
5 from tensorflow.keras.applications.vgg16 import preprocess_input
6 from PIL import Image
7
8 # Charger le modèle
9 model = load_model('2025-01-21_VGG_model.hs')
10
11 # Fonction pour préparer l'image
12 def prepare_image(img):
13     img = img.resize((224, 224)).convert('RGB') # Redimensionner et convertir en RGB
14     img_array = np.array(img)
15     img_array = np.expand_dims(img_array, axis=0) # Ajouter la dimension du batch
16     img_array = preprocess_input(img_array) # Prétraitement pour VGG16
17     return img_array
18
19 # Interface Streamlit
```

C:\Users\ALSANB\Desktop\BIBDA\IA2\Projet IA\Brain Tumor Detection\detection>streamlit run app.py

2. Load an MRI image (click on browse files).

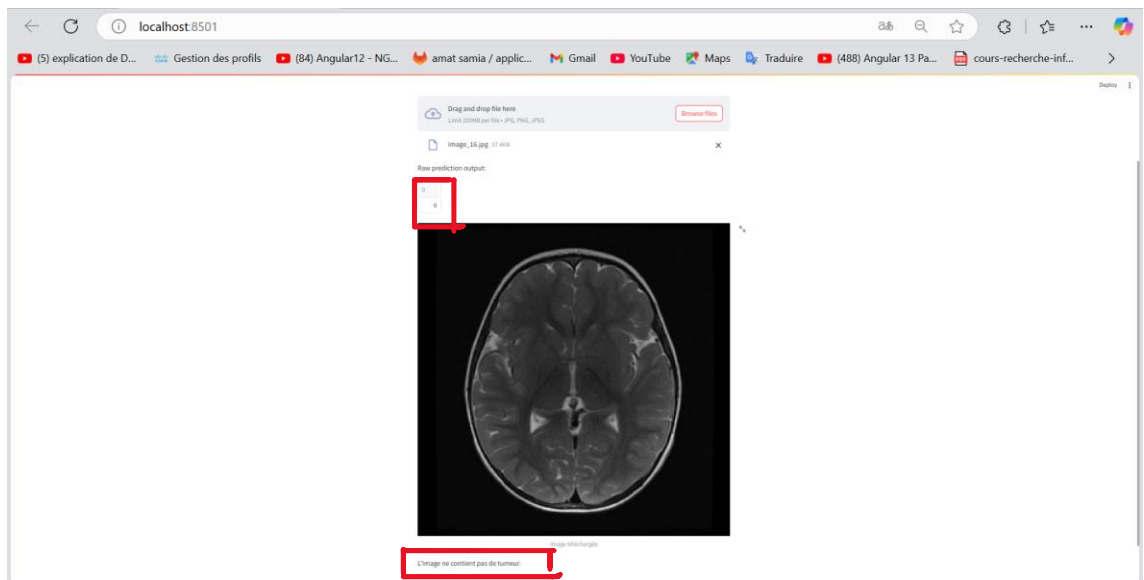


3. The results are displayed with a probability of belonging to each class.

**first test with an image that contains a tumor**



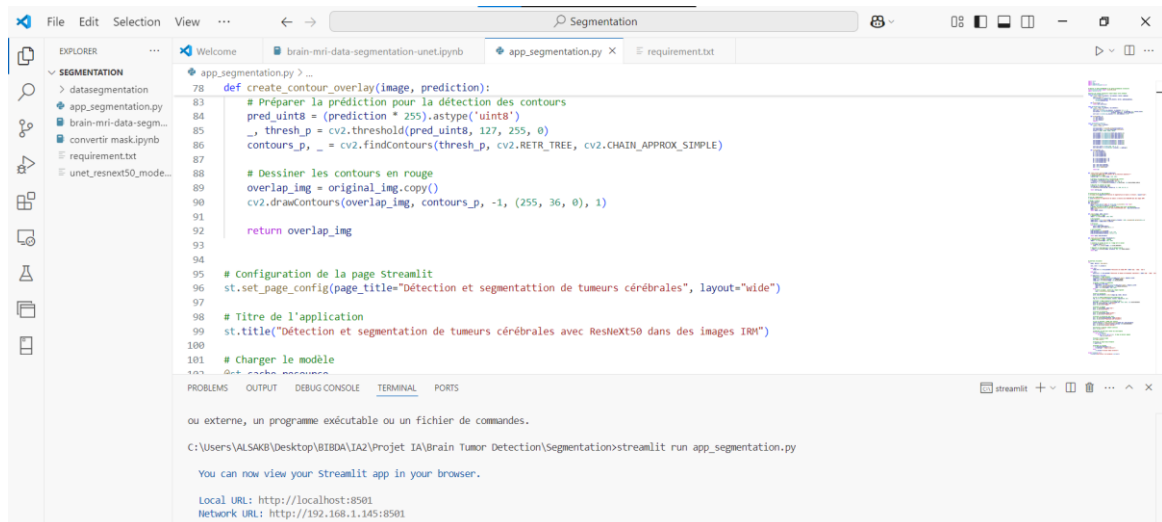
**Second test with an image that does not contain a tumor**



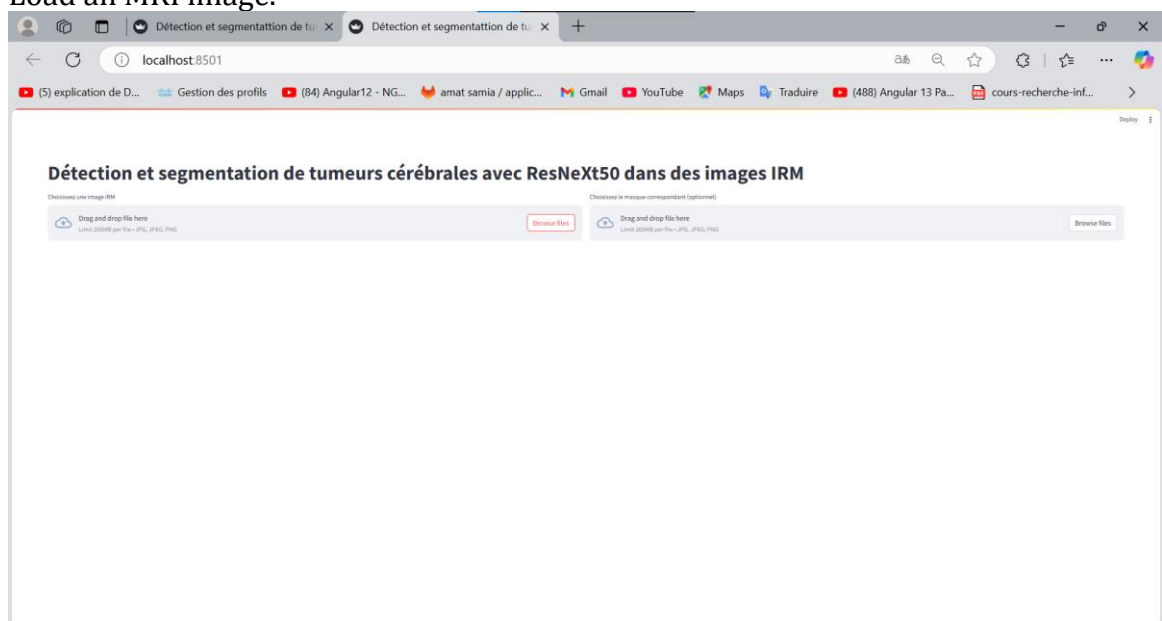
## 2.2. Segmentation Interface (U-Net ResNeXt50)

1. Launch the application with:

**streamlit run app\_segmentation.py**

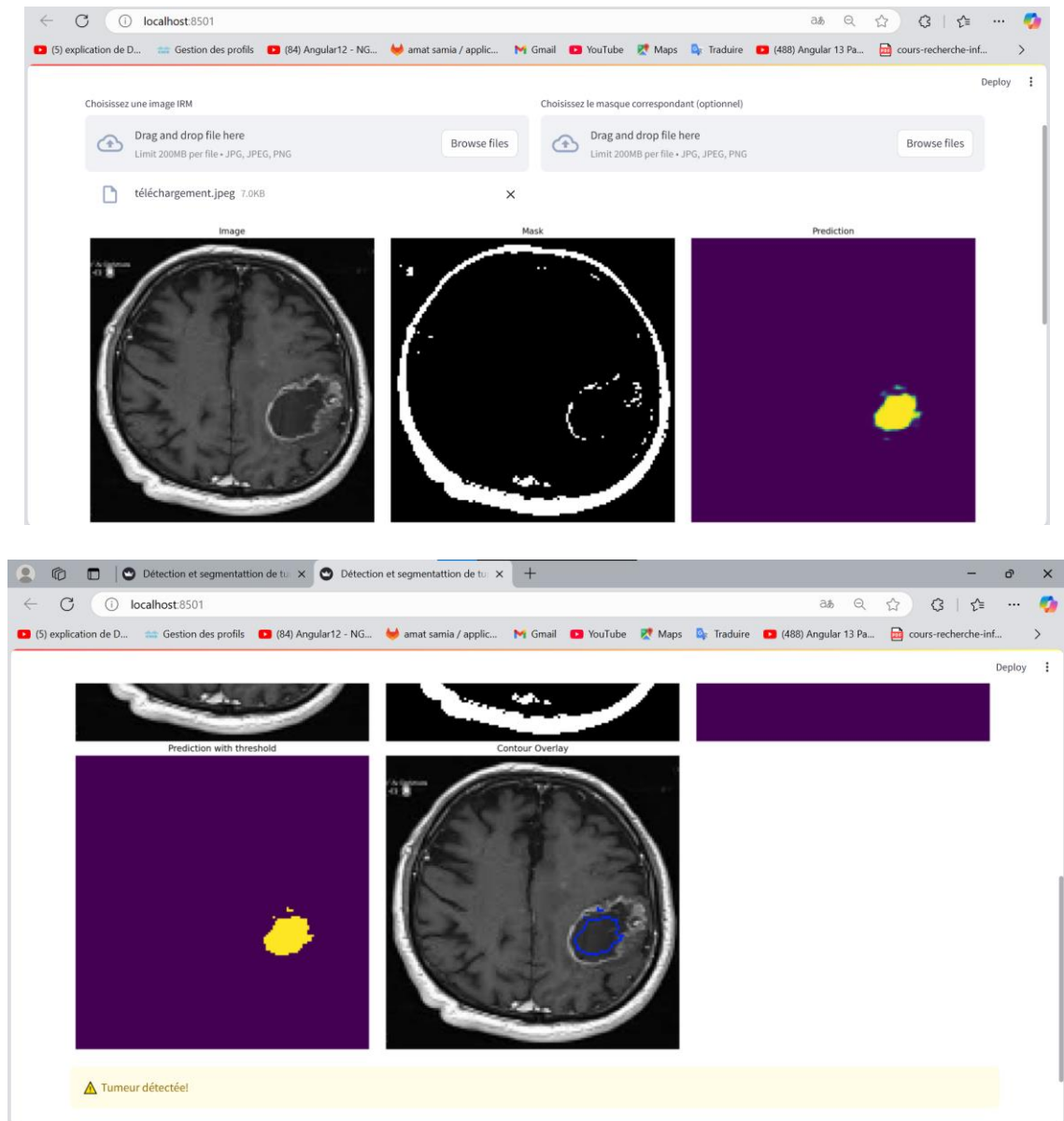


2. Load an MRI image.

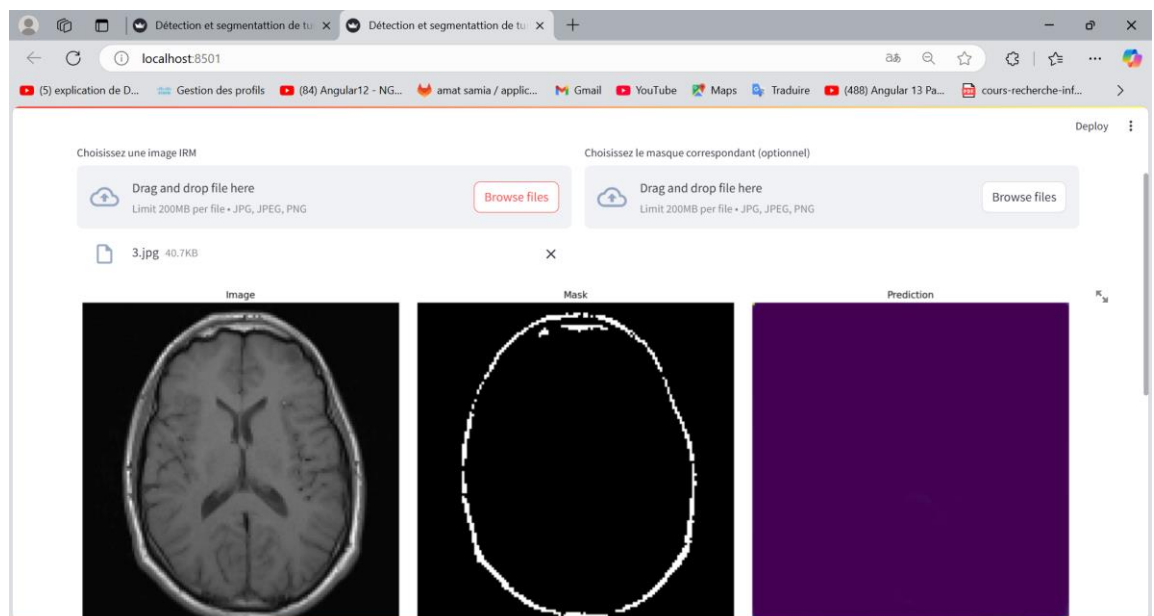


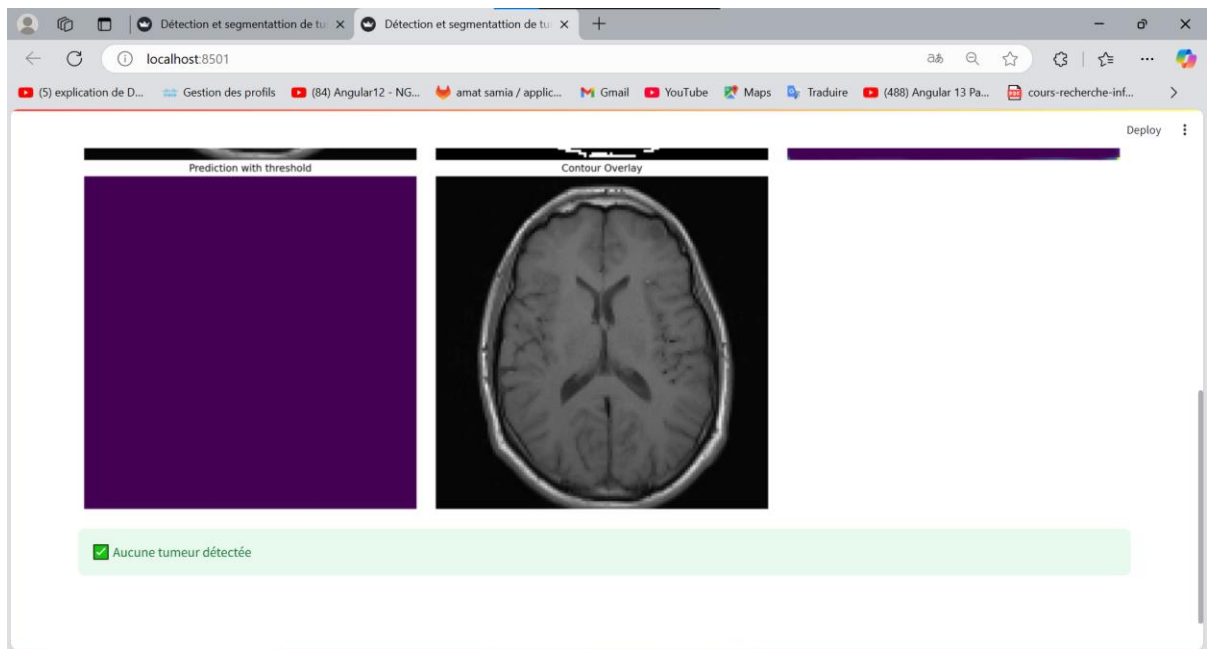
### 3. Displaying results.

#### First test with an image that contains a tumor



#### Second test with an image that does not contain a tumor





### 3. Interpreting Results

- **Classification/Detection:** An image may belong to multiple classes with confidence scores.
- **Segmentation:** An overlay of the segmentation is displayed on the original image.

### Conclusion

This guide allows you to take control of the applications for detection and segmentation of brain lesions in MRI images. For any modifications or improvements, refer to the source files and the documentation provided with the project.