Configuration Manual

MSc Research Project
MSCDAD A JAN24I

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School of Computing
National College of Ireland

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National College of Ireland

MSc Project Submission Sheet

School of Computing

Student Name: Asish Mathai Mathai

Student ID: X23173645

Programme: MSCDAD A JAN24I **Year:** 2024

Module: MSc Research Project

Lecturer: Vikas Tomar

Submission Due Date: 30/01/2025

Project Title: Enhancing Brain Tumor Detection with Deep Learning Models: A Comparative Analysis

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I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.
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Signature: Asish Mathai Mathai

Date: 28/01/2025

PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST

Attach a completed copy of this sheet to each project (including multiple copies)	□
Attach a Moodle submission receipt of the online project submission, to each project (including multiple copies).	□
You must ensure that you retain a HARD COPY of the project, both for your own reference and in case a project is lost or mislaid. It is not sufficient to keep a copy on computer.	□

Assignments that are submitted to the Programme Coordinator Office must be placed into the assignment box located outside the office.

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Configuration Manual

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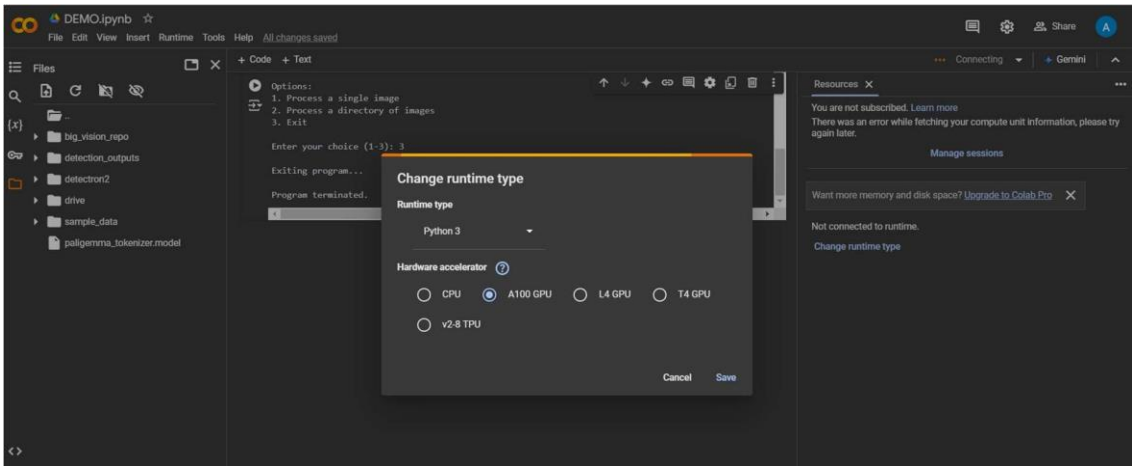
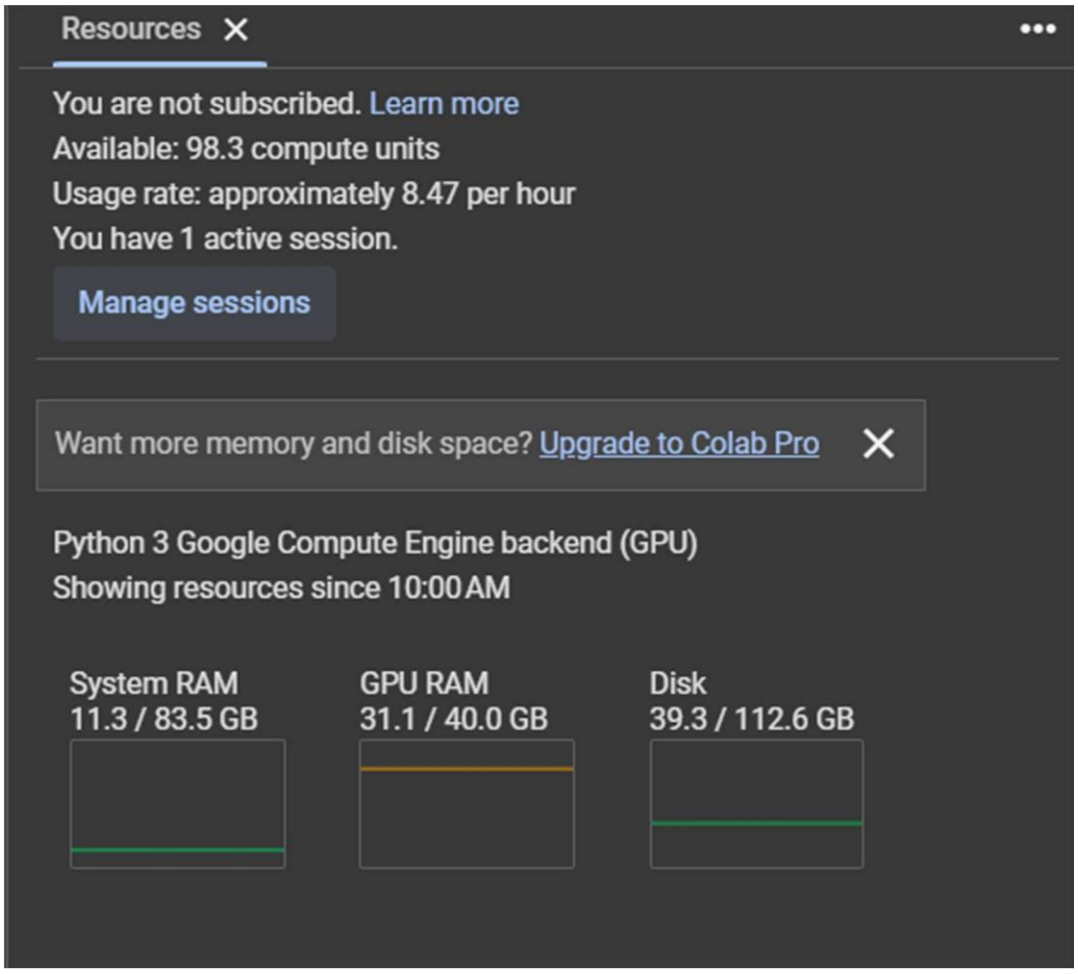
1 Connecting to a Colab Session and Drive setup

1.1.1 Setting Up Your Google Colab Session: A Quick Guide

1. **Open Google Colab**
   - Visit the Google Colab website to begin.
2. **Sign In to Your Account**
   - Log in with your Google credentials, if required.
3. **Start a New Notebook**
   - Click on the "New Notebook" button to create a blank workspace.
4. **Activate GPU Acceleration**
   - Navigate to the top menu and select **Runtime > Change runtime type**.
   - In the "Hardware accelerator" dropdown menu, choose A100 **GPU**.
   - Confirm the selection by clicking **Save**.

Now your Colab notebook is optimized with GPU acceleration, ready for high-performance computing!





1.2 Drive connection

1. **Import the drive Module and Mount Your Drive**
    - Run the following code in a Colab cell to initiate the connection:
      from google.colab import drive
      drive.mount('/content/drive')
2. **Authenticate Google Drive Access**
    - After running the code, a prompt will appear in the notebook.
    - Click on **"Connect to Google Drive"** when prompted.
3. **Sign In to Your Google Account**
    - Choose the account you wish to connect.
    - Grant Colab the required permissions by following the on-screen instructions.
4. **Verify Drive Access**
    - Once connected, your Google Drive will be mounted at /content/drive.
    - You can now access files stored in your Drive within the Colab environment.

2 Uploading Files to Google Drive

2.1 Accessing Google Drive

1. Open your web browser
2. Navigate to drive.google.com
3. Sign in with your Google account credentials

2.2 Creating Directory Structure

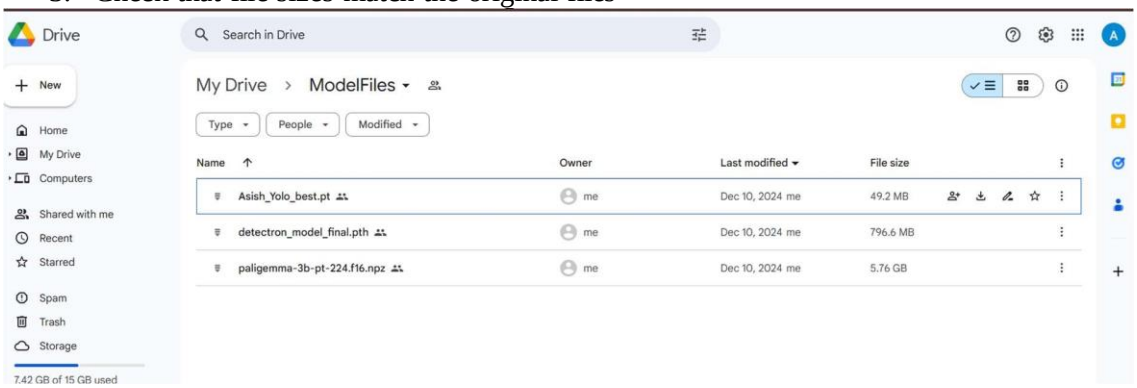
1. Click the "+ New" button in the top-left corner
2. Select "Folder" from the dropdown menu
3. Name the folder "model_files"
4. Double-click to open the new folder

2.3 Uploading Model Files

1. Inside the "model_files" folder, click the "+ New" button
2. Select "File upload" or simply drag and drop the following files:
    - aishs_yolo.pt
    - detectron_model_final.pth
    - paligemma-3b-pt-224.f16.npz

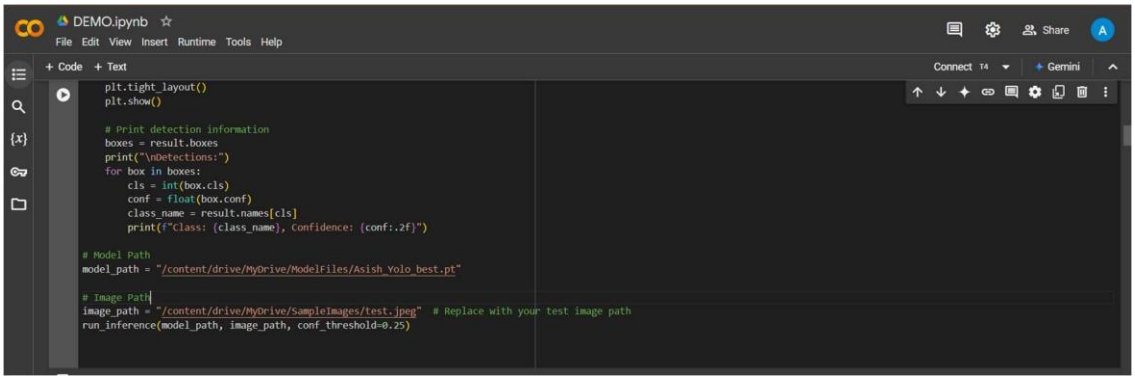
2.4 Verifying Upload

1. Wait for the upload completion notification
2. Confirm all three files are visible in the "model_files" directory
3. Check that file sizes match the original files



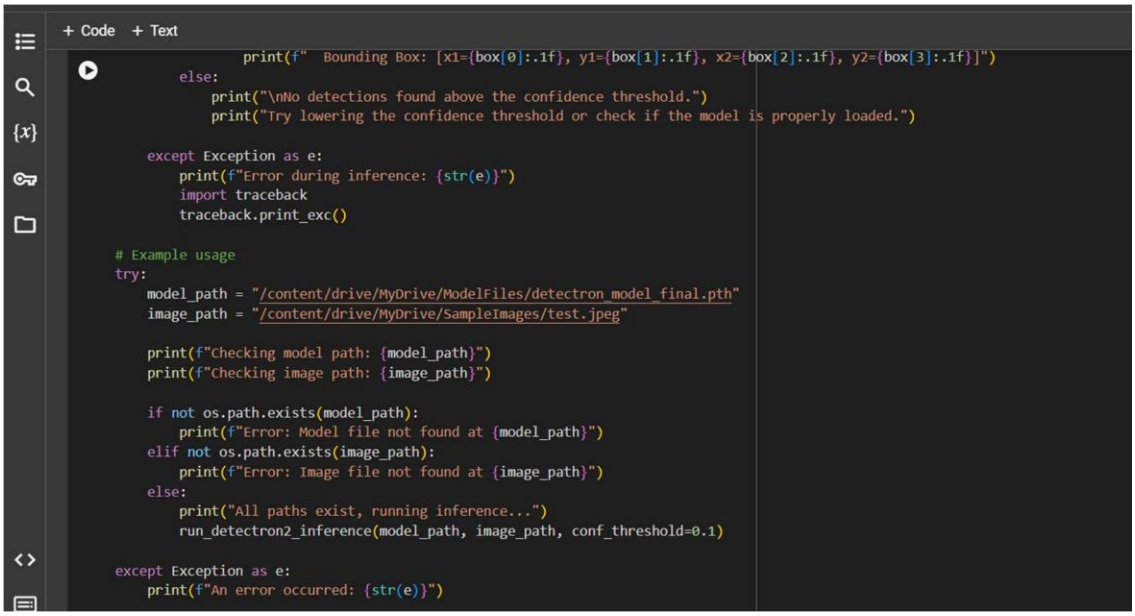
3 Update the Model path in the Demo.ipynb File

3.1 For YOLO



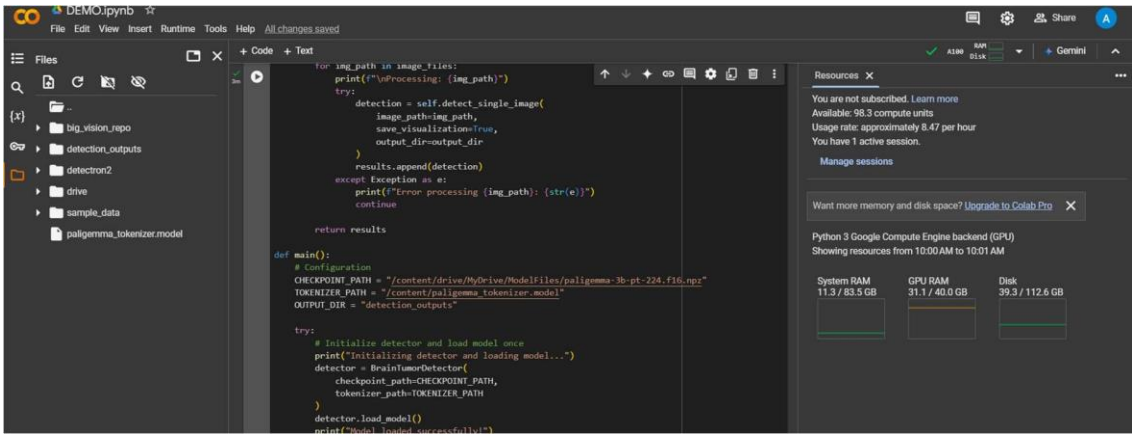
- Chagne the updated model path and image for the inference purpose

3.2 For the Detectron2



- Same upate the path of the model file and test image path

3.3 For the PaliGemma



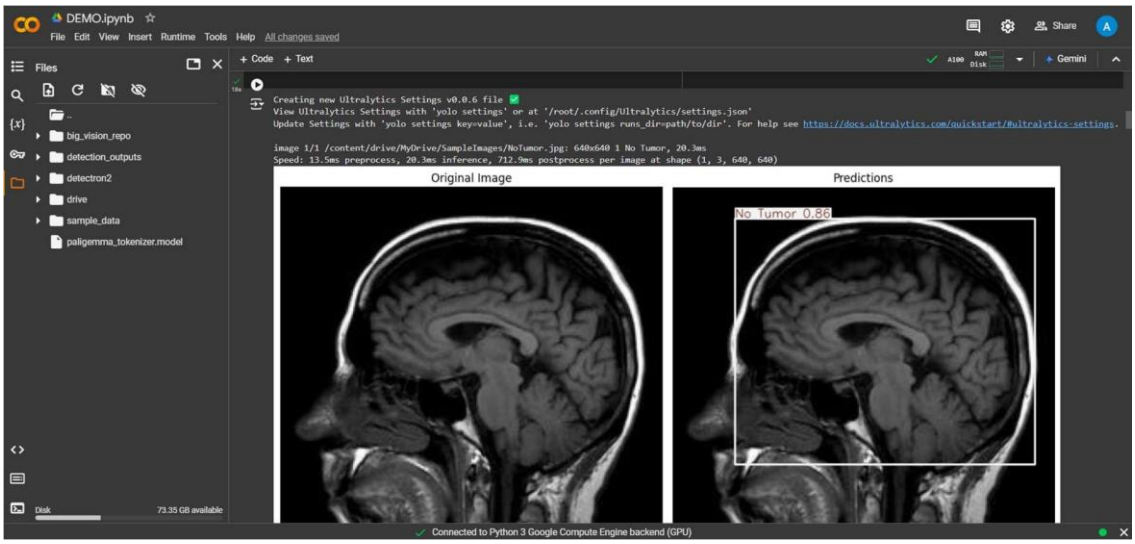
- Change the model path and tokenizer path and change the output directory if needed.

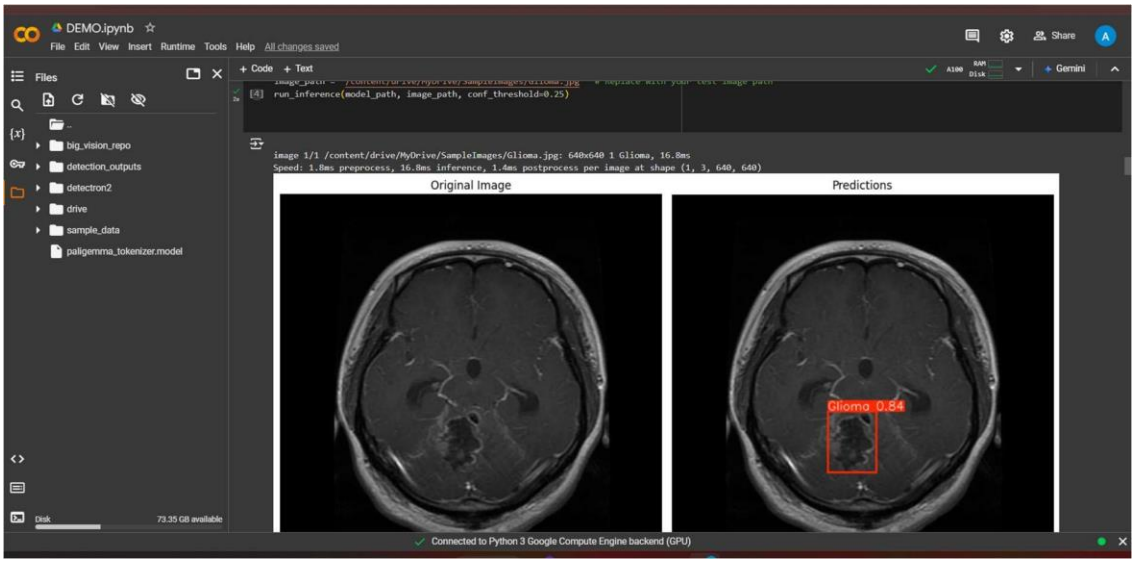
4 Running the Inference on the Trained Models

1. **Section 1: YOLO**
    - Open Google Colab
    - Install ultralytics library
    - Change the following paths in your code:
        - Update model_path
        - Update image_path (Use paths from above section)
    - Run the detection code
2. **Section 2: Detectron2**
    - Open Google Colab
    - Install all dependencies
    - Update these paths (as per above section):
        - Change model path
        - Change test image path
    - Run the code
3. **Section 3: Paligemma**
    - Open Google Colab
    - Install dependencies
    - Update paths if needed:
        - Model path
        - Tokenizer path (Note: If using default, no need to change as it will download to same path)
    - Run the code
    - You will see 3 options:
        - Check on single image
        - Check on entire directory
        - Exit
    - Choose option and provide required paths
    - Press Enter
    - After completion:
        - For directories: "Process another directory? (y/n):"
        - For images: "Process another image? (y/n):"
    - Input response:
        - Enter 'y': Returns to options menu to provide new image/directory path
        - Enter 'n': Exits the program

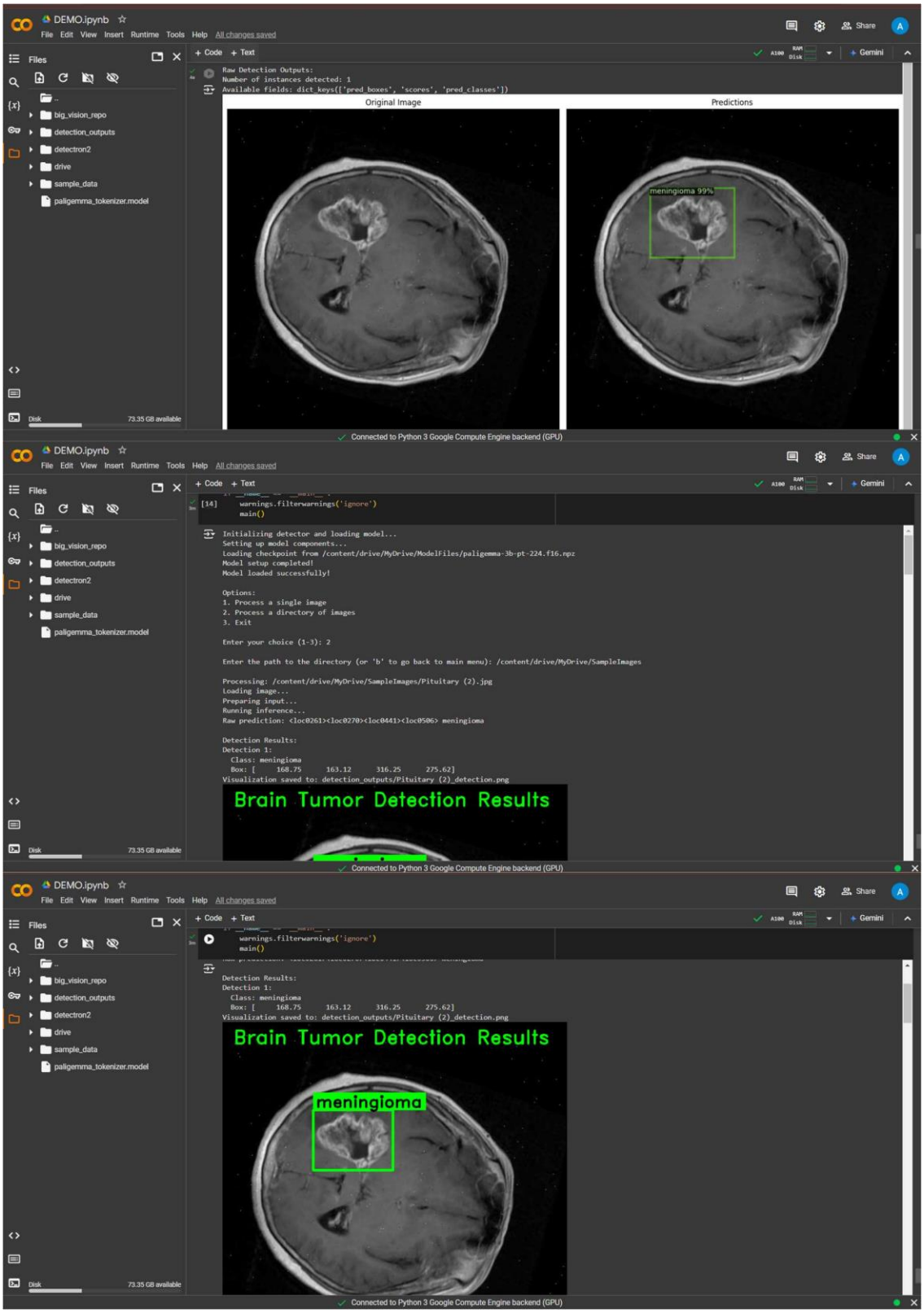
Note: Make sure to have GPU runtime selected in your Colab notebooks for better performance.

5 Results :


DEMO.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Share
Files
+ Code + Text
Gemini
big_vision_repo
detection_outputs
detectron2
drive
sample_data
paligemma_tokenizer.model
Creating new Ultralytics Settings v0.0.6 file
View Ultralytics Settings with 'yolo settings' or at '/root/.config/Ultralytics/settings.json'
Update Settings with 'yolo settings key=value', i.e. 'yolo settings runs_dir=path/to/dir'. For help see https://docs.ultralytics.com/quickstart/#ultralytics-settings.
image 1/1 /content/drive/MyDrive/SampleImages/NoTumor.jpg: 640x640 1 No Tumor, 20.3ms
Speed: 13.5ms preprocess, 20.3ms inference, 712.9ms postprocess per image at shape (1, 3, 640, 640)
Original Image
Predictions
No Tumor 0.86
Disk
73.35 GB available
Connected to Python 3 Google Compute Engine backend (GPU)


DEMO.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Share
Files
+ Code + Text
Gemini
big_vision_repo
detection_outputs
detectron2
drive
sample_data
paligemma_tokenizer.model
[4] run_inference(model_path, image_path, conf_threshold=0.25)
image 1/1 /content/drive/MyDrive/SampleImages/Glioma.jpg: 640x640 1 Glioma, 16.8ms
Speed: 1.8ms preprocess, 16.8ms inference, 1.4ms postprocess per image at shape (1, 3, 640, 640)
Original Image
Predictions
Glioma 0.84
Disk
73.35 GB available
Connected to Python 3 Google Compute Engine backend (GPU)

DEMO.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Share
Files
+ Code + Text
Gemini
big_vision_repo
detection_outputs
detectron2
drive
sample_data
paligemma_tokenizer.model
Confidence threshold: 0.1
Raw Detection Outputs:
Number of instances detected: 1
Available fields: dict_keys(['pred_boxes', 'scores', 'pred_classes'])
Original Image
Predictions
meningioma 99%
Disk
73.35 GB available


DEMO.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Share
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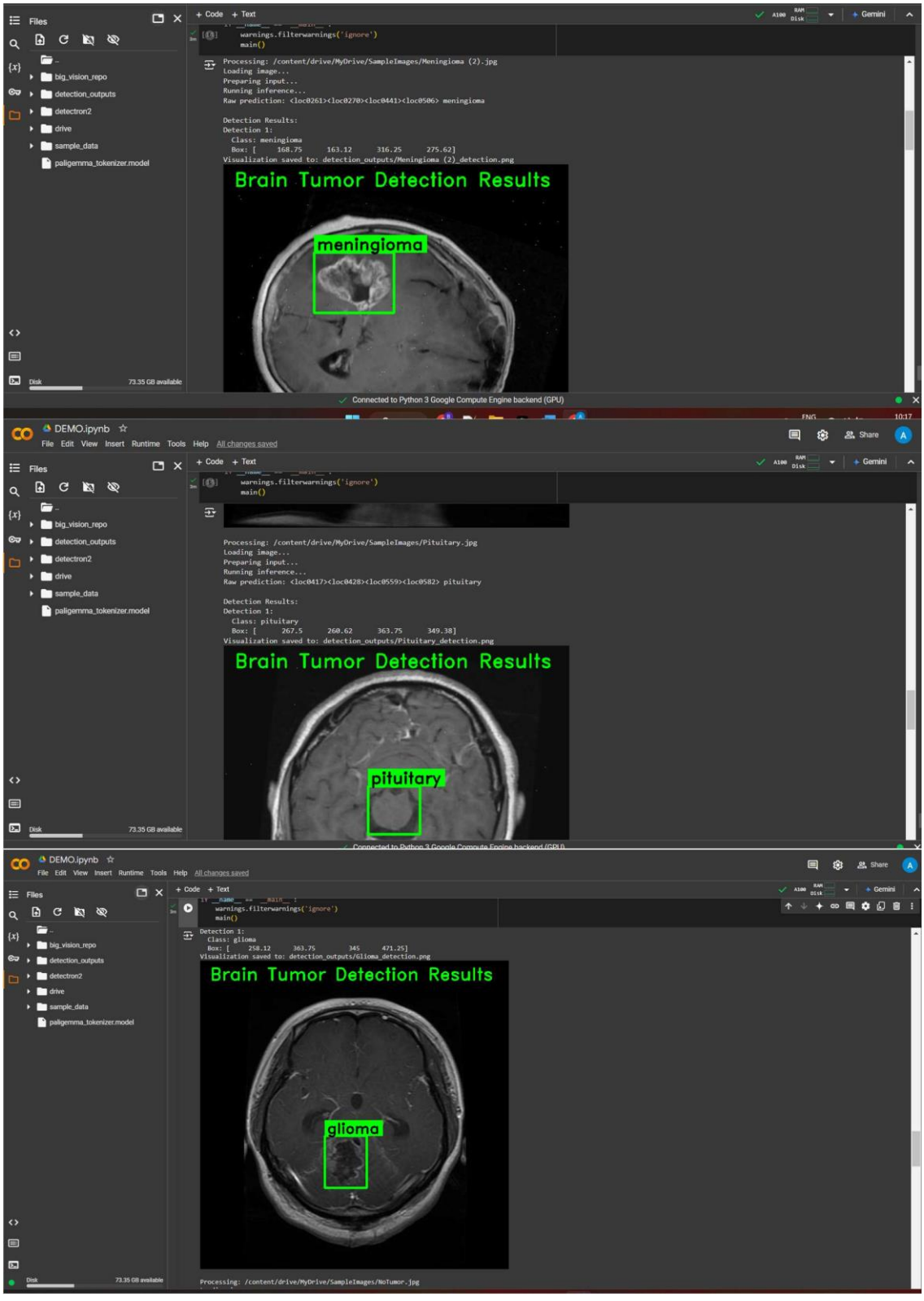
+ Code + Text
Gemini
big_vision_repo
detection_outputs
detectron2
drive
sample_data
paligemma_tokenizer.model
Disk 73.35 GB available
Raw Detection Outputs:
Number of instances detected: 1
Available fields: dict_keys(['pred_boxes', 'scores', 'pred_classes'])
Original Image
Predictions
meningioma 99%
Connected to Python 3 Google Compute Engine backend (GPU)
[14] warnings.filterwarnings('ignore')
main()
Initializing detector and loading model...
Setting up model components...
Loading checkpoint from /content/drive/MyDrive/ModelFiles/paligemma-3b-pt-224.f16.npz
Model setup completed!
Model loaded successfully!
Options:
1. Process a single image
2. Process a directory of images
3. Exit
Enter your choice (1-3): 2
Enter the path to the directory (or 'b' to go back to main menu): /content/drive/MyDrive/SampleImages
Processing: /content/drive/MyDrive/SampleImages/Pituitary (2).jpg
Loading image...
Preparing input...
Running inference...
Raw prediction: <loc0261><loc0270><loc0441><loc0506> meningioma
Detection Results:
Detection 1:
Class: meningioma
Box: [168.75 163.12 316.25 275.62]
Visualization saved to: detection_outputs/Pituitary (2)_detection.png
Brain Tumor Detection Results
meningioma


Files
big_vision_repo
detection_outputs
detectron2
drive
sample_data
paligemma_tokenizer.model
Disk 73.35 GB available
+ Code + Text
warnings.filterwarnings('ignore')
main()
Processing: /content/drive/MyDrive/SampleImages/Meningioma (2).jpg
Loading image...
Preparing input...
Running inference...
Raw prediction: <loc0261><loc0270><loc0441><loc0506> meningioma
Detection Results:
Detection 1:
Class: meningioma
Box: [168.75 163.12 316.25 275.62]
Visualization saved to: detection_outputs/Meningioma (2)_detection.png
Brain Tumor Detection Results
meningioma
Connected to Python 3 Google Compute Engine backend (GPU)
DEMO.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Share
Gemini
Processing: /content/drive/MyDrive/SampleImages/Pituitary.jpg
Loading image...
Preparing input...
Running inference...
Raw prediction: <loc0417><loc0428><loc0559><loc0582> pituitary
Detection Results:
Detection 1:
Class: pituitary
Box: [267.5 260.62 363.75 349.38]
Visualization saved to: detection_outputs/Pituitary_detection.png
Brain Tumor Detection Results
pituitary
Detection 1:
Class: glioma
Box: [258.12 363.75 345 471.25]
Visualization saved to: detection_outputs/Glioma_detection.png
Brain Tumor Detection Results
glioma
Processing: /content/drive/MyDrive/SampleImages/NoTumor.jpg

References

Google Colab. (n.d.). https://colab.research.google.com/

https://ai.google.dev/gemma/docs/paligemma/fine-tuning-paligemma

Zhao, Y., Lv, W., Xu, S., Wei, J., Wang, G., Dang, Q., Liu, Y. and Chen, J., 2024. Detrs beat yolos on real-time object detection. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (pp. 16965-16974).

Yaseen, M., 2024. What is YOLOv9: An In-Depth Exploration of the Internal Features of the Next-Generation Object Detector. *arXiv preprint arXiv:2409.07813*.