National College of Ireland

Configuration Manual

MSc Research Project
Data Analytics

Muhammad Wasit Shahbaz
Student ID: x23257741

School of Computing
National College of Ireland

Supervisor: Jorge Basilio

National College of Ireland

MSc Project Submission Sheet

School of Computing

Student Name:	Muhammad Wasit Shahbaz
Student ID:	X23257741
Programme:	M.Sc. Data Analytics **Year:** 2024
Module:	Research Project
Supervisor:	Jorge Basilio
Submission Due Date:	10th August 2025
Project Title:	Optimizing Airbnb Rental Prices: A Machine Learning Approach Using Listing Attributes, Review Ratings and Amenities
Word Count:	1304 **Page Count:** 12

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.
ALL internet material must be referenced in the bibliography section. Students are required to use the Referencing Standard specified in the report template. To use other author's written or electronic work is illegal (plagiarism) and may result in disciplinary action.

Signature: *W a s i t*

Date: 10th August 2025

Office Use Only	
Signature:	
Date:	
Penalty Applied (if applicable):	

s

Configuration Manual

Muhammad Wasit Shahbaz
X23257741

I. Introduction

This manual contains all the necessary preprocesses needed to run and setup the environment to run this research project "Optimizing Airbnb Rental Prices: A Machine Learning Approach Using Listing Attributes, Review Ratings, and Amenities". It includes detailed instructions about hardware and software requirements, software installation, GPU set and configuration and necessary python libraries installation guidance. Along with that the step-by-step process flows to open and run the project on vs code. After following these pre steps it will make sure that all the requirements are properly satisfied and one can continue to execute the project code file.

II. Hardware Requirements

OS	Windows 10/11 (64-bit)
CPU	Quad-core processor (Intel i5/Ryzen 5 or higher)
RAM	Minimum 8 GB (16 GB recommended for large datasets)
GPU	NVIDIA GPU with CUDA support for faster training (XGBoost, LightGBM, CatBoost with GPU acceleration)
Storage	At least 3 GB free for datasets and model artifacts

For optimal and smooth execution of this project following are the hardware requirements needed as shown in table X. For this project an Nvidia GPU with CUDA support is required to support GPU accelerated model training and evaluation matric calculations. Following step 4 will cover the GPU set and configuration.

III. Software Requirements

The core software and software extensions which are needed are listed in table 1 below.

Table 1: Software Requirement

Programming Language	Python 3.9+
Integrated Development Environment	Visual Studio Code (1.103.0)
Software Extension	Jupyter Extension for VS Code (7.4.4)
Software Extension	Python Extension for VS Code

Step 1: First step is to download and install Python 3.10.0 from the official website as shown in figure 1; the link is given in the heading 7. During installation make sure to add python to

path.

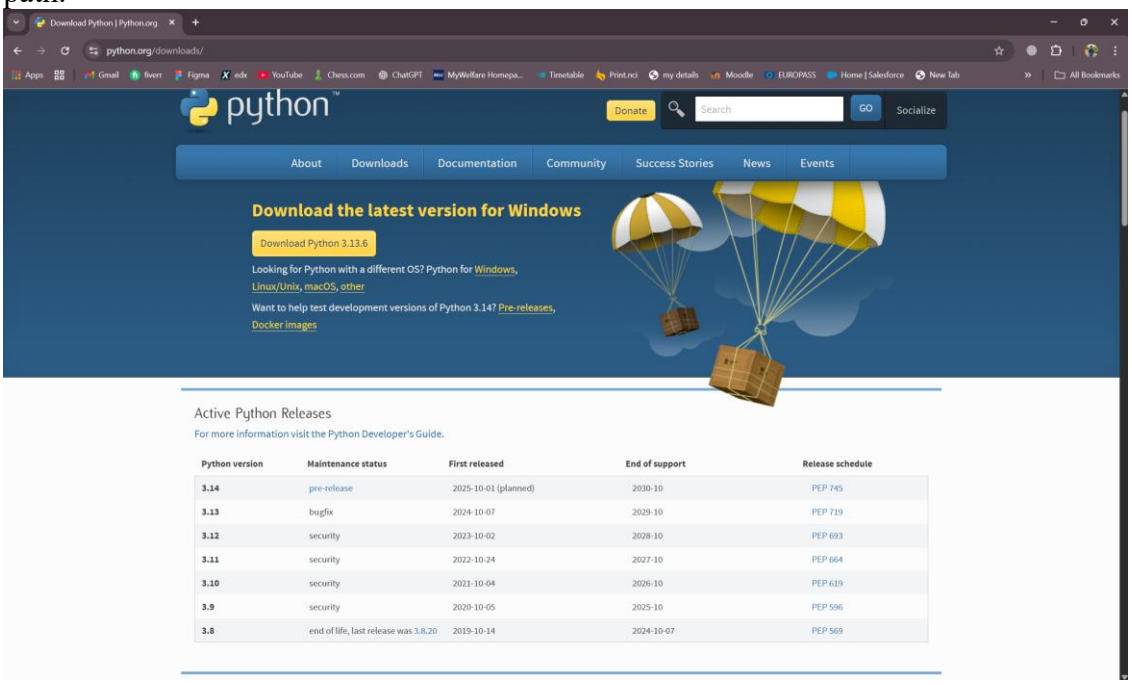

Figure 1: Download Python

Step 2: Now download and install the vs code from the official website as shown in figure 2, the link is also provided in the heading 7.

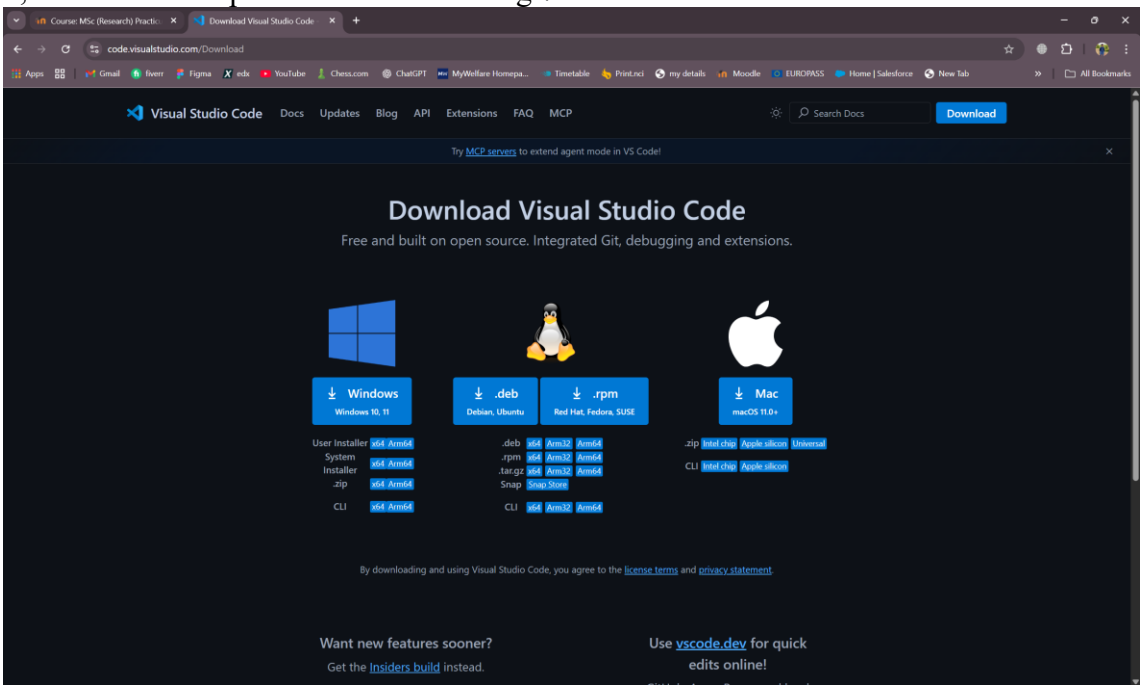

Figure 2: Download Visual Studio Code for Windows

Step 3: After installing the VS code add jupyter extension from marketplace within the VS code on left side bar the by clicking the extension icon as shown in figure 3.

Figure 3: Install Python Extension of VS code

Step 4: After installing the jupyter extension, add python extension from marketplace within the VS code on left side bar then by clicking the extension icon as shown in figure 4.

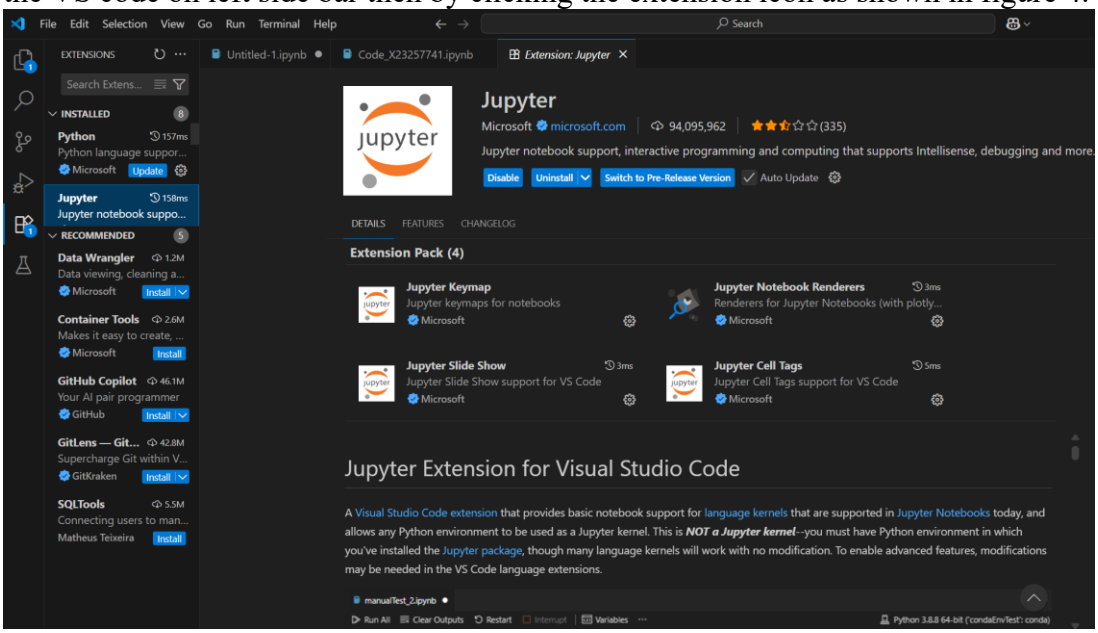

Figure 4:Install Jupyter Extension of VS code

Note: Once both extensions are installed, restart VS Code to ensure all features load correctly.

```
Selected Jupyter core packages...
IPython          : 8.37.0
ipykernel        : 6.29.5
ipywidgets       : not installed
jupyter_client   : 8.6.3
jupyter_core     : 5.8.1
jupyter_server   : 2.16.0
jupyterlab       : 4.4.4
nbclient         : 0.10.2
nbconvert        : 7.16.6
nbformat         : 5.10.4
notebook         : 7.4.4
qtconsole        : not installed
traitlets        : 5.14.3
```

Figure 5: Jupyter Notebook Version

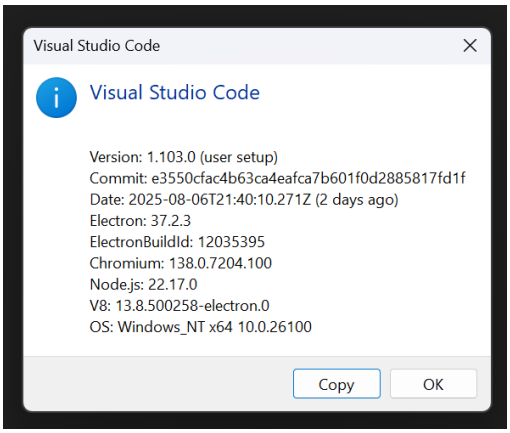

Figure 6: VS code version

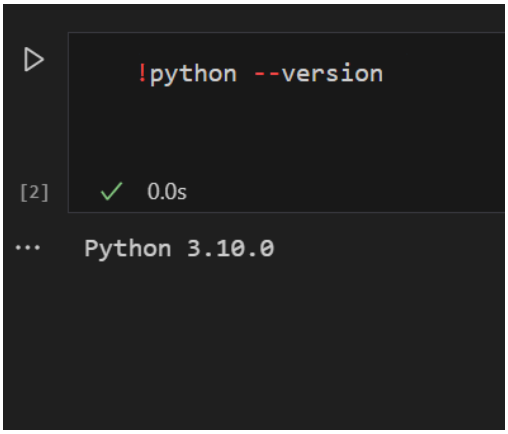

Figure 7: Python Version

IV. GPU Configuration

As earlier explained that some modules of the project are implemented with GPU acceleration. Following are the steps to set up and configure appropriate GPU functioning.

Step 1: First download and install the required Nvidia GPU drivers according to one's GPU model from the original website as shown in figure 8. The link to download the driver is given in the heading 7.

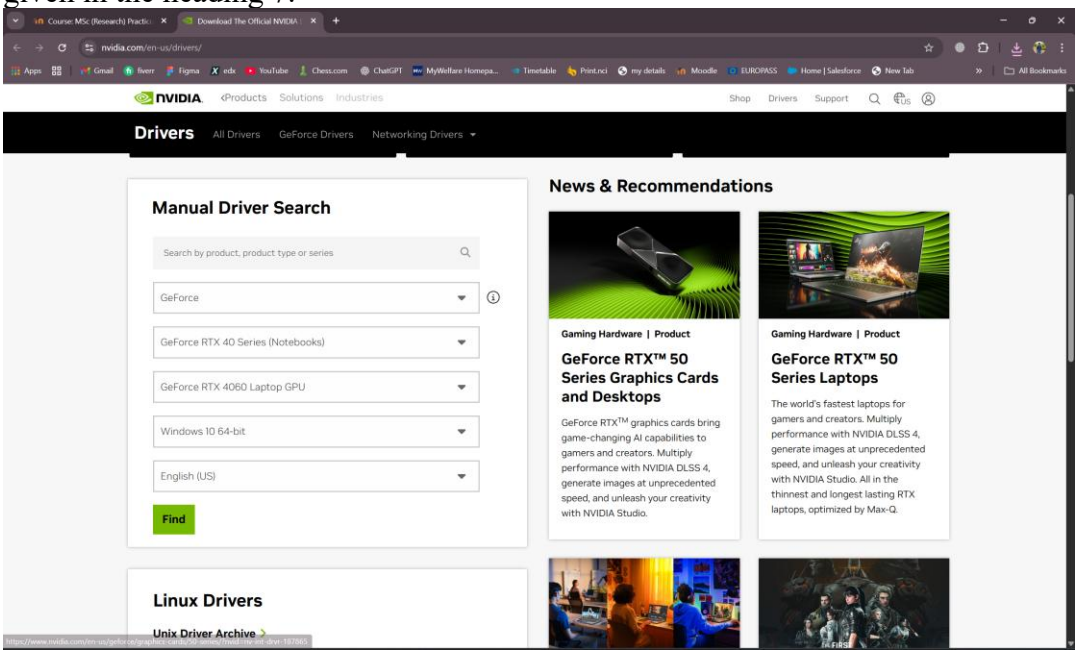

Figure 8: Download GPU Nvidia Driver

Step 2: After installing the drivers, now download and install the CUDA toolkit to support the GPU. Make sure to download and install competitive CUDA toolkit as shown in figure 9. One can search for their GPU compatible toolkit version from the original website. The links for the websites are provided in the heading 7.

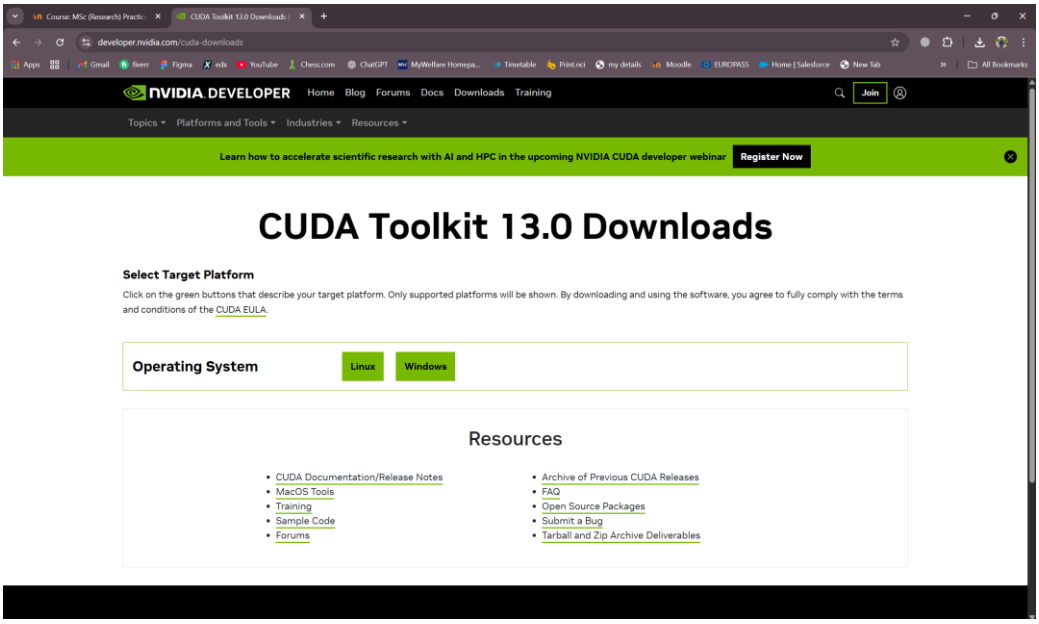

Figure 9: Download CUDA Toolkit

Step 3: After completing these requirements open VS code and downloading the required and compatible cupy version by using pip install command as shown in table 2.
Step 4: After completing these steps finally re-start the vs code and run command as shown in figure 10, 11 and 12 to verify the configurations, these figures also show the expected output.

Table 2: Cupy versions according to the CUDA

CUDA Version	Install Command
CUDA 12.x	pip install cupy-cuda12x
CUDA 11.x	pip install cupy-cuda11x
CUDA 10.x	pip install cupy-cuda100

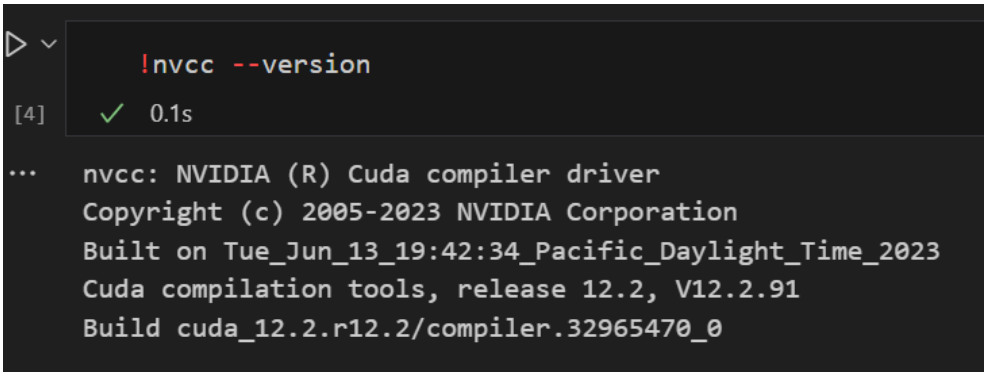

Figure 10: CUDA Toolkit Version

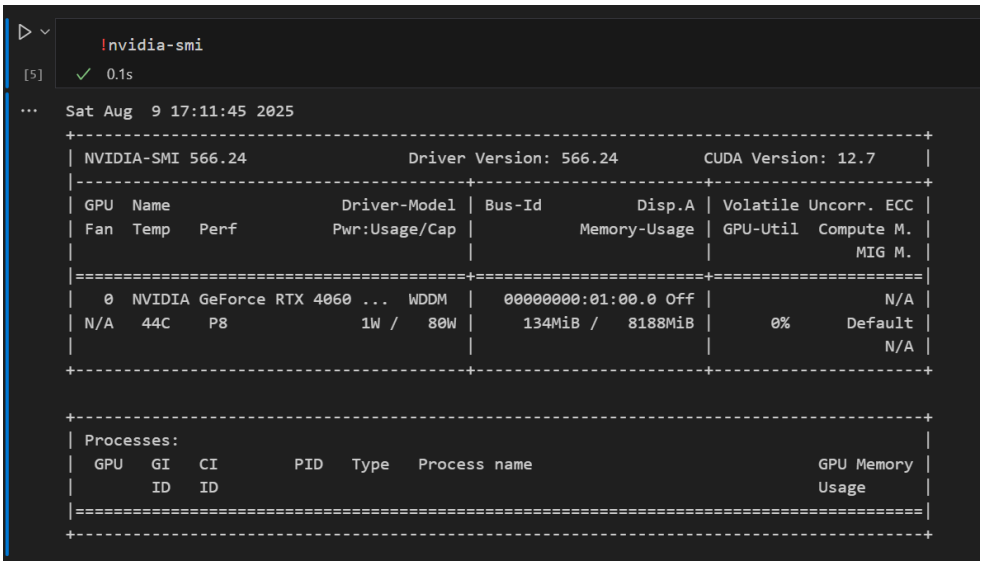

Figure 11: NVIDIA Driver & Runtime

Figure 12: Cupy Version

V. Libraries Requirements

The project requires several Python libraries for data manipulation, visualization, and machine learning. These should be installed in the same Python environment used to run the project. The list below includes each library and its installation command:

Table 3: Installation Commands for Libraries

Library	**Install Command**
numpy	pip install numpy
pandas	pip install pandas
matplotlib	pip install matplotlib
seaborn	pip install seaborn
cupy	pip install cupy (Requires CUDA for GPU)
scikit-learn	pip install scikit-learn
xgboost	pip install xgboost
lightgbm	pip install lightgbm
catboost	pip install catboost
scipy	pip install scipy
statsmodels	pip install statsmodels
joblib	pip install joblib
shap	pip install shap

VI. Execution

After installing all the required software, libraries and configuring all the GPU and environment settings the project is ready to run. Following are the steps to run and execute the project source code.

Step 1: Download the zip folder and extract the folder named Research.

Step 2: After extracting the folder, launch the vs code as shown in figure 13.

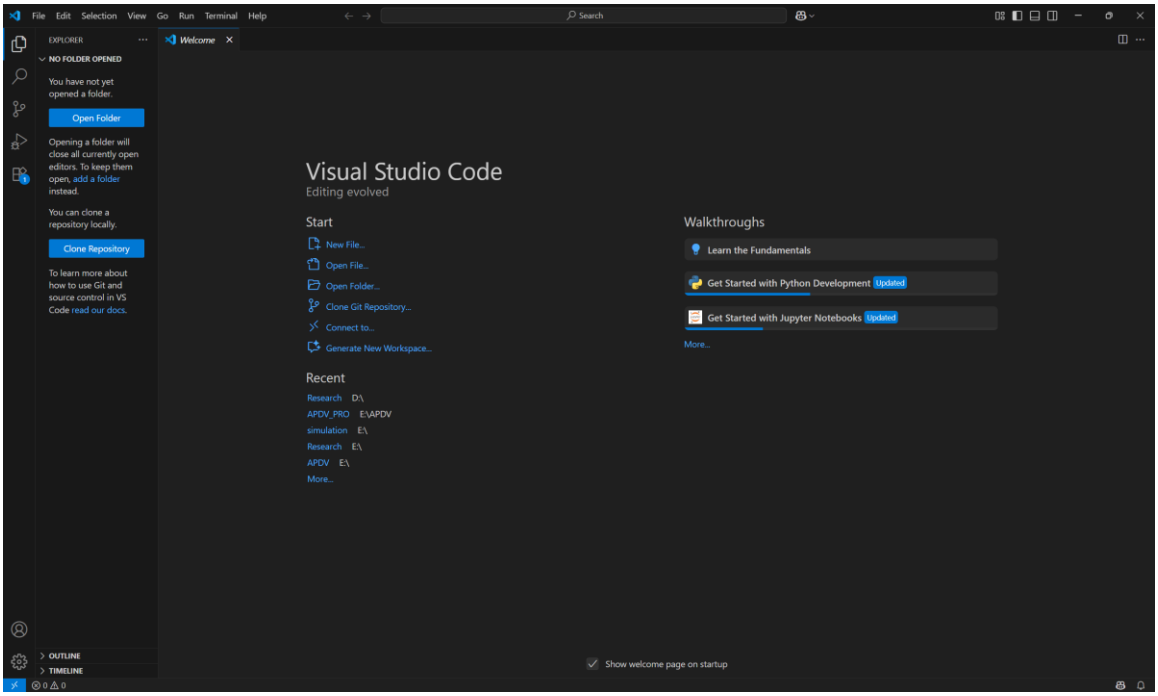

Figure 13: Launch of VS code

Step 3: Now from the top menu bar click the file button and then choose open folder option as shown in figure 14.

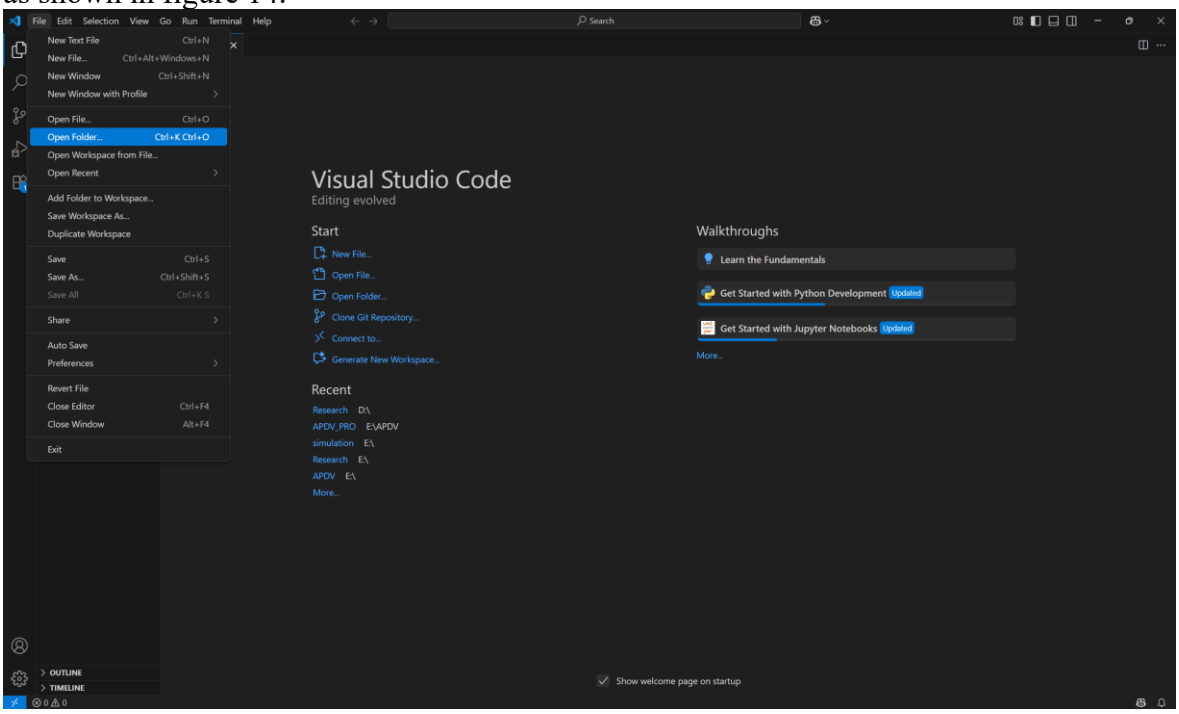

Figure 14: How to Open Folder

Step 4: Select the extracted research folder from the directory where it is extracted as shown in figure 15.

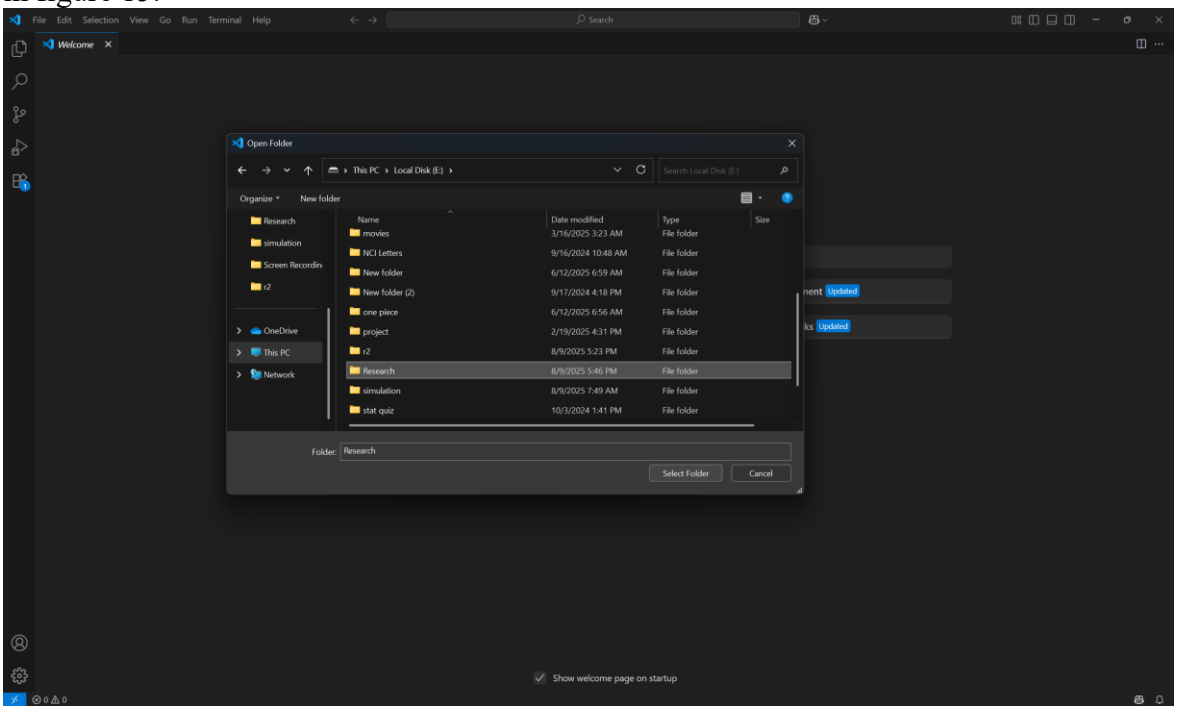

Figure 15: Select Downloaded Research folder

Step 5: After opening the research folder in VS code double click the code file code X23257741.ipyb from the left side explore panel to open it as shown in figure 16.

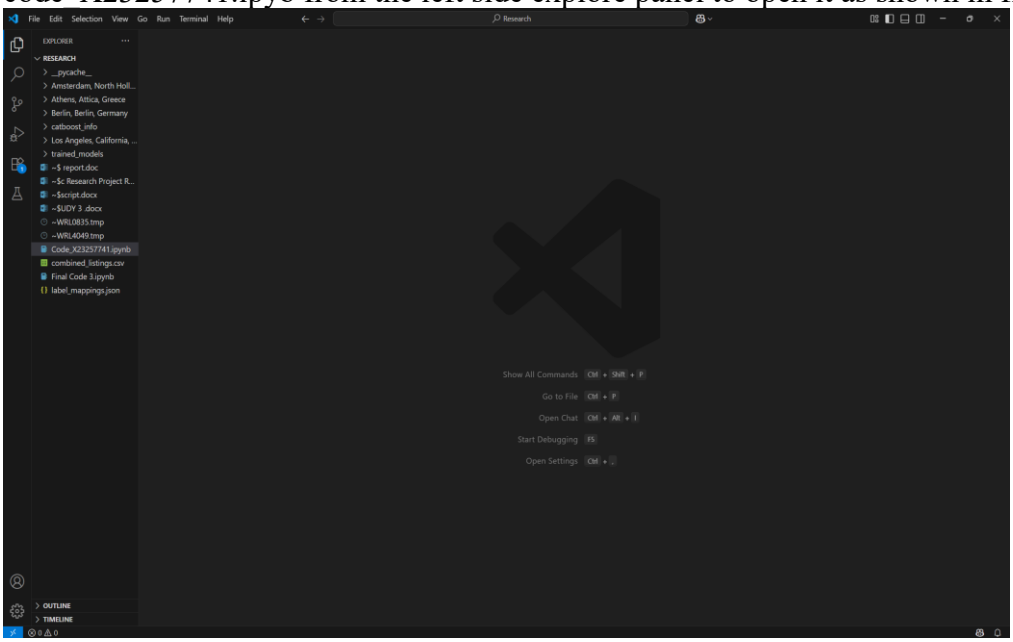

Figure 16: Research Folder is Opened

Step 6: Before executing the file check the right Python environment is active or not from the top right corner of the VS code as shown in figure 18, if not then click select kernel option to select the python environment as shown in figure 17.

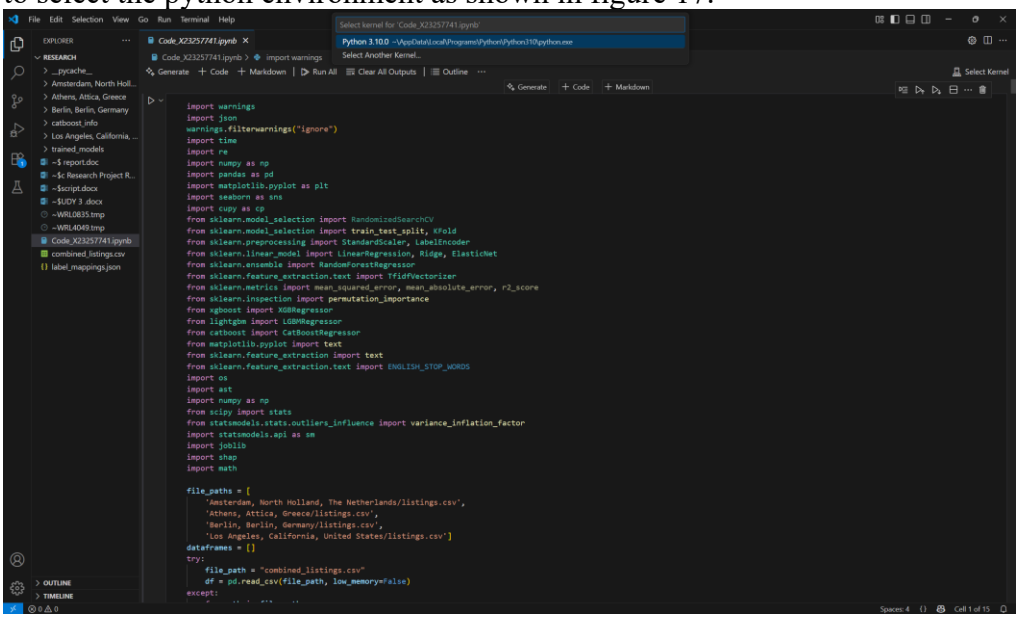

Figure 17: Select Appropriate Python Environment

Step 7: Press Run All button to execute every cell of the project at once one after another as shown in figure 18.

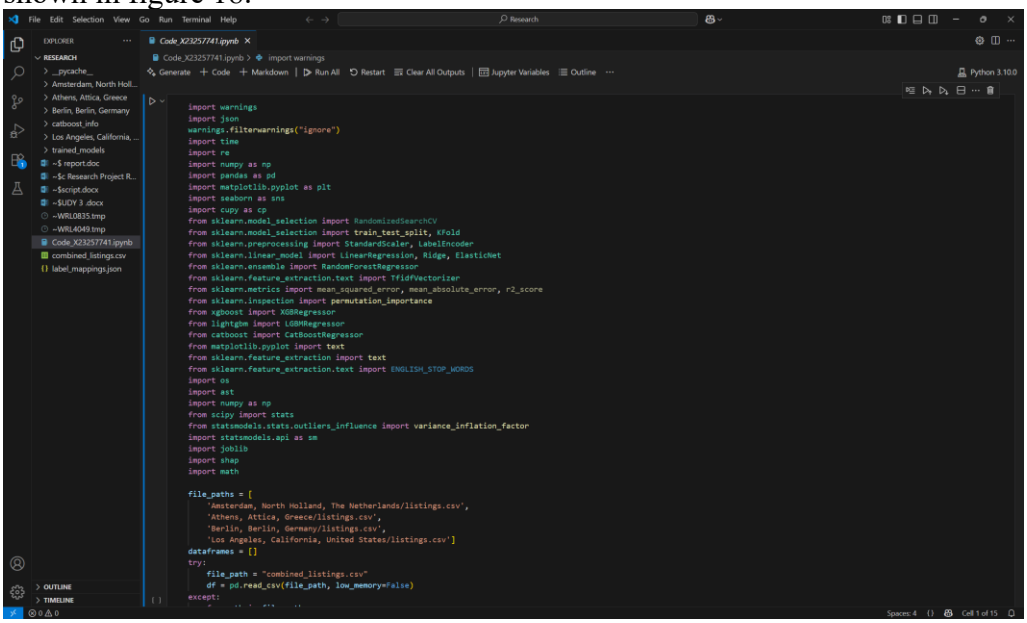

Figure 18: Appropriate Python Environment Selected

VII. Links

Python: https://www.python.org/downloads/
VS Code: https://code.visualstudio.com/download
GPU Driver: https://www.nvidia.com/en-us/drivers/
CUDA Toolkit: https://developer.nvidia.com/cuda-downloads