National College of Ireland

Configuration Manual

MSc Research Project
Data Analytics

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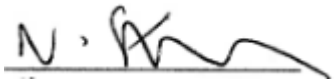
MSc Project Submission Sheet

School of Computing

Student Name:	Nicholas Stancill
Student ID:	X22225668
Programme:	Master of Science in Data Analytics **Year:** 2025
Module:	MSc Research Project
Lecturer:	Dr Vladimir Milosavljevic
Submission Due Date:	15/09/2025
Project Title:	Predicting Competitive Dynamics in Formula 1: Modelling the Impact of FIA Aerodynamic Regulations Using Machine Learning and Simulation

Word Count: 338 **Page Count:** 5

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: 

Date: 14/09/2025

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Configuration Manual

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1 Experimental Environment

This section outlines the development environment used to conduct the experimental work for this project.

- **Platform:** Anaconda Navigator 2.5.0
- **Operating System:** Windows 11 Home (64-bit)
- **Python Version:** 3.11.4
- **Jupyter Notebook Version:** 6.5.4
- **Execution Environment:** Jupyter Notebook launched via Anaconda Navigator
- **Environment Used:** Base (no virtual environments or containers)

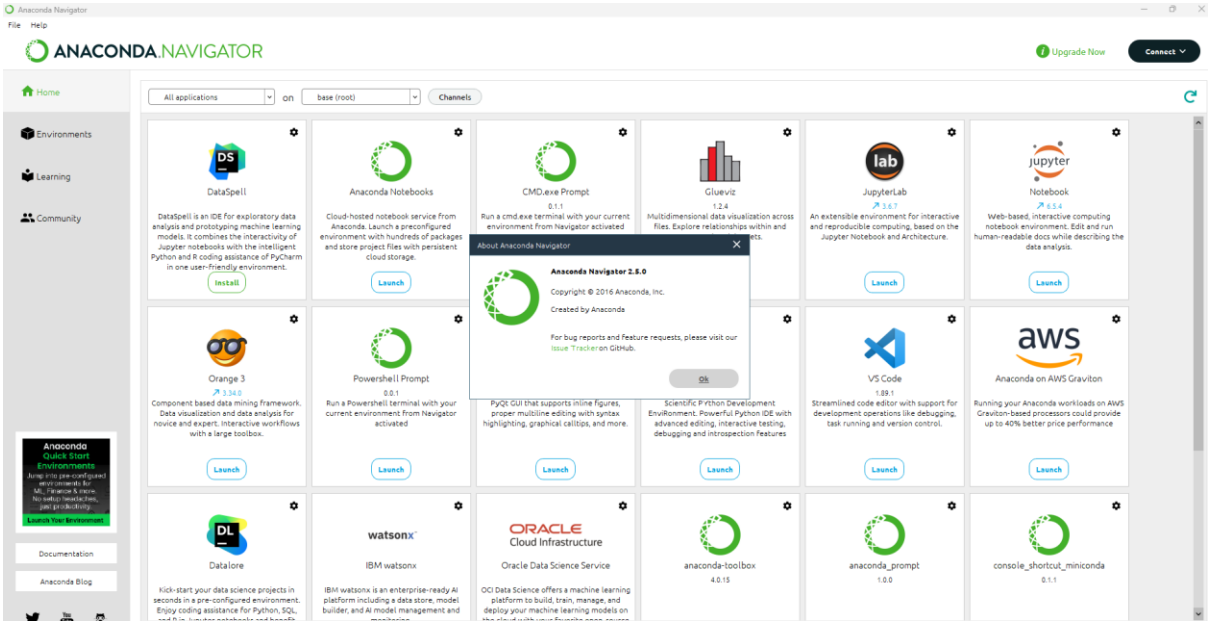

Fig 1 - Anaconda Navigator showing version 2.5.0 and Jupyter Notebook Version 6.5.4

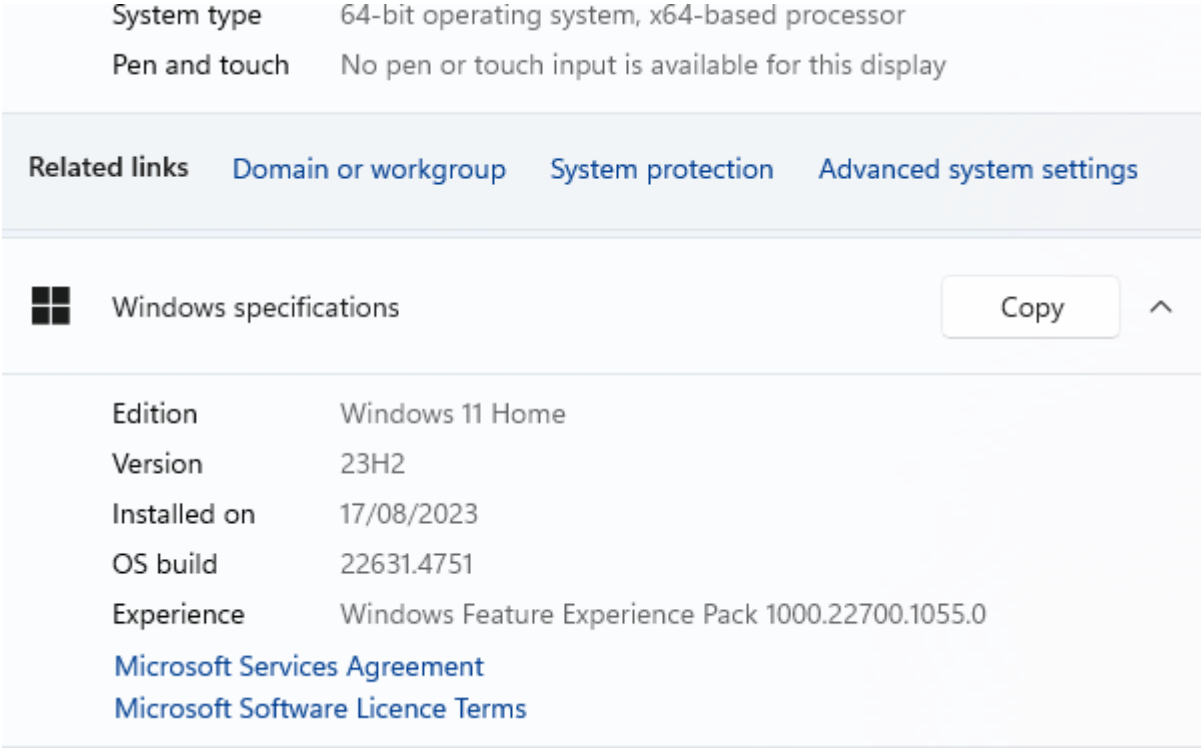

Fig 2 – Operating system

```
In [1]:
1 import sys
2 print(sys.version)

3.11.4 | packaged by Anaconda, Inc. | (main, Jul  5 2023, 13:38:37) [MSC v.1916
64 bit (AMD64)]
```

Fig 3 – Python 3.11.4 output in notebook

The environment was used without any external editors or cloud services. Execution was performed locally.

2 Required Libraries

Library	Version	Purpose
pandas	1.5.3	Data manipulation and processing
numpy	1.24.3	Numerical operations
matplotlib	3.8.3	Static visualisations
seaborn	0.12.2	Statistical data visualisation
plotly	5.18.0	Interactive plots
scikit-learn	1.1.3	Machine learning and data preprocessing
scipy	1.10.0	Scientific/statistical computations
os	Built-in	File and directory operations

All libraries were available in the Anaconda base environment, with a few installed using either pip or conda.

```
In [2]:
import importlib, pandas as pd, numpy as np, matplotlib, seaborn, plotly, scipy, sklearn
print("pandas", pd.__version__)
print("numpy", np.__version__)
print("matplotlib", matplotlib.__version__)
print("seaborn", seaborn.__version__)
print("plotly", plotly.__version__)
print("scipy", scipy.__version__)
print("scikit-learn", sklearn.__version__)

pandas 1.5.3
numpy 1.24.3
matplotlib 3.8.3
seaborn 0.12.2
plotly 5.18.0
scipy 1.10.0
scikit-learn 1.1.3
```

Fig 4 – Installed Python libraries and versions

3 Dataset and Execution

The dataset used for the project was:

- **Title:** Formula 1 World Championship (1950 - 2020)
- **Author:** Rohan Rao
- **Source:** https://www.kaggle.com/datasets/rohanrao/formula-1-world-championship-1950-2020

Usage Notes:

- The dataset folder has been renamed to F1 DATA and placed inside the project directory F1 Thesis.
- The notebook file used for this project is named F1 Analysis.ipynb and resides in the same folder.
- The notebook was executed sequentially from top to bottom using the "Run All" option in Jupyter Notebook.
- Outputs generated include plots, tables, and machine learning results, all displayed inline within the notebook.
- The dataset files (e.g. races.csv, drivers.csv, etc.) were referenced using relative paths such as: base_path = "F1 DATA"

Reproducibility Notes:

- It is important to use the exact versions of the libraries listed to avoid incompatibilities.
- Ensure that all files are in the same working directory.
- Confirm the Python kernel is set to 3.11 (base) before execution.

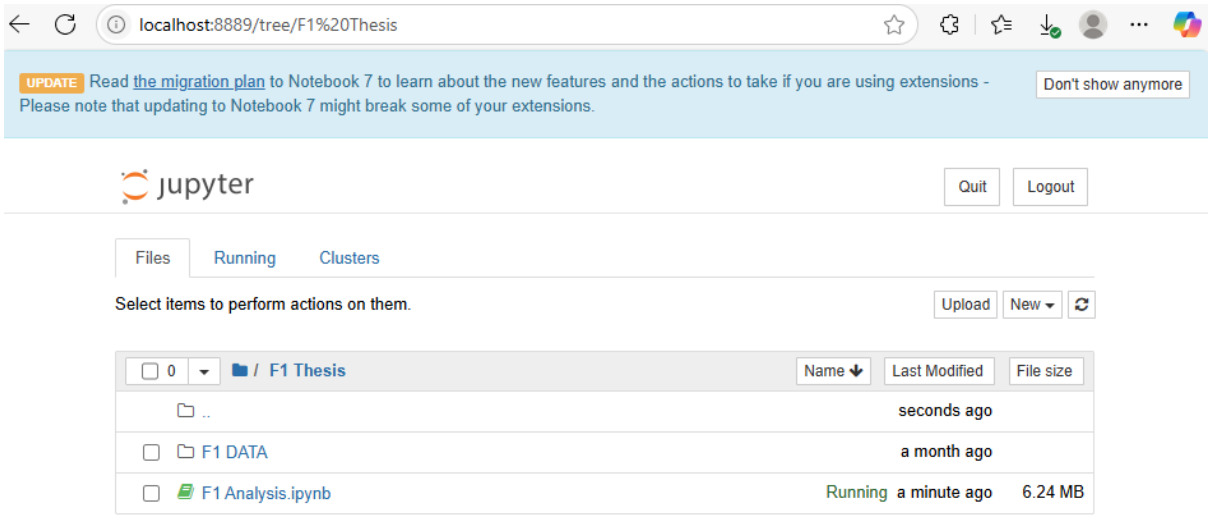

Figure 5 – Project folder structure inside Jupyter

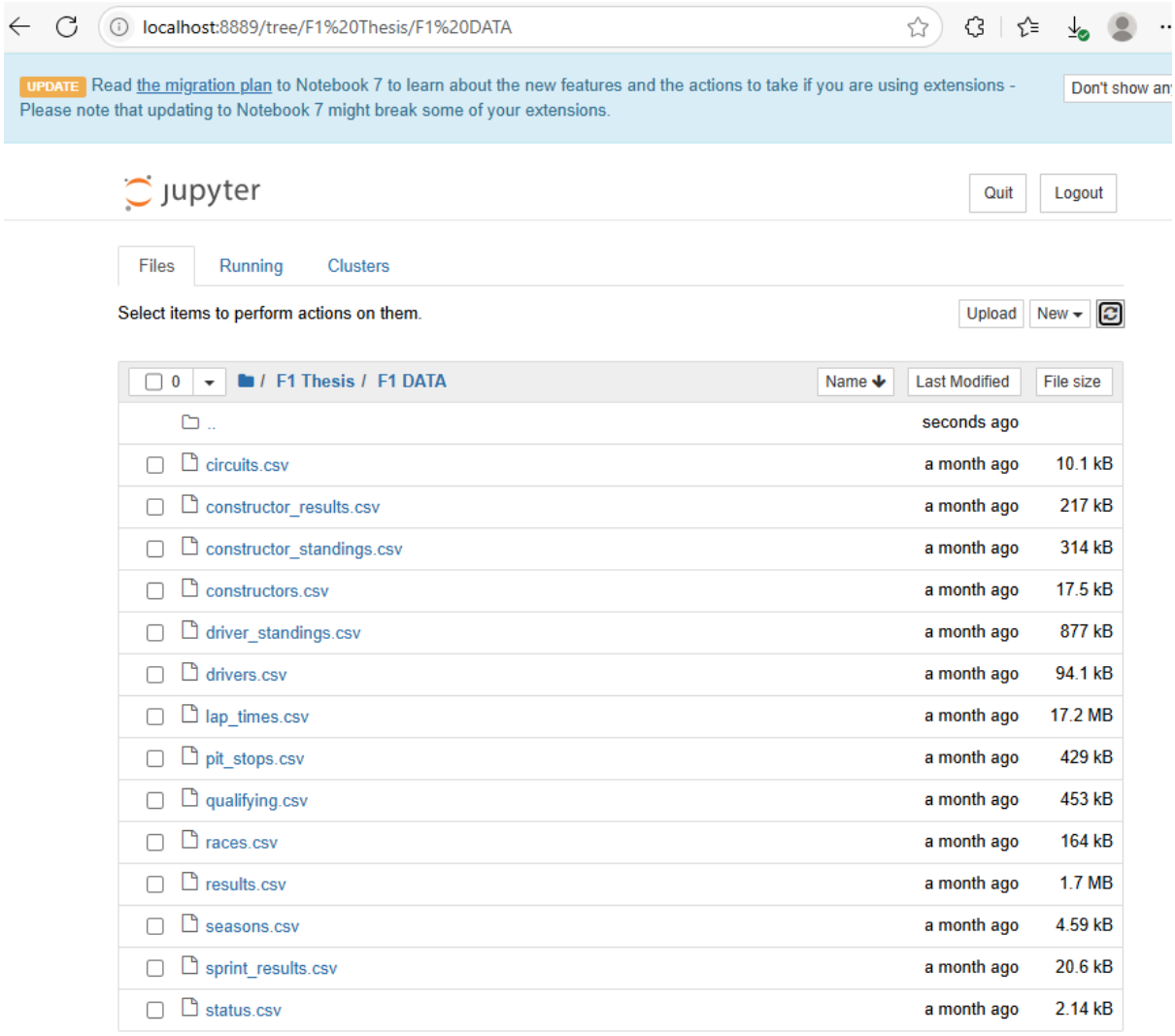

Figure 6 – Dataset folder contents (CSV files)

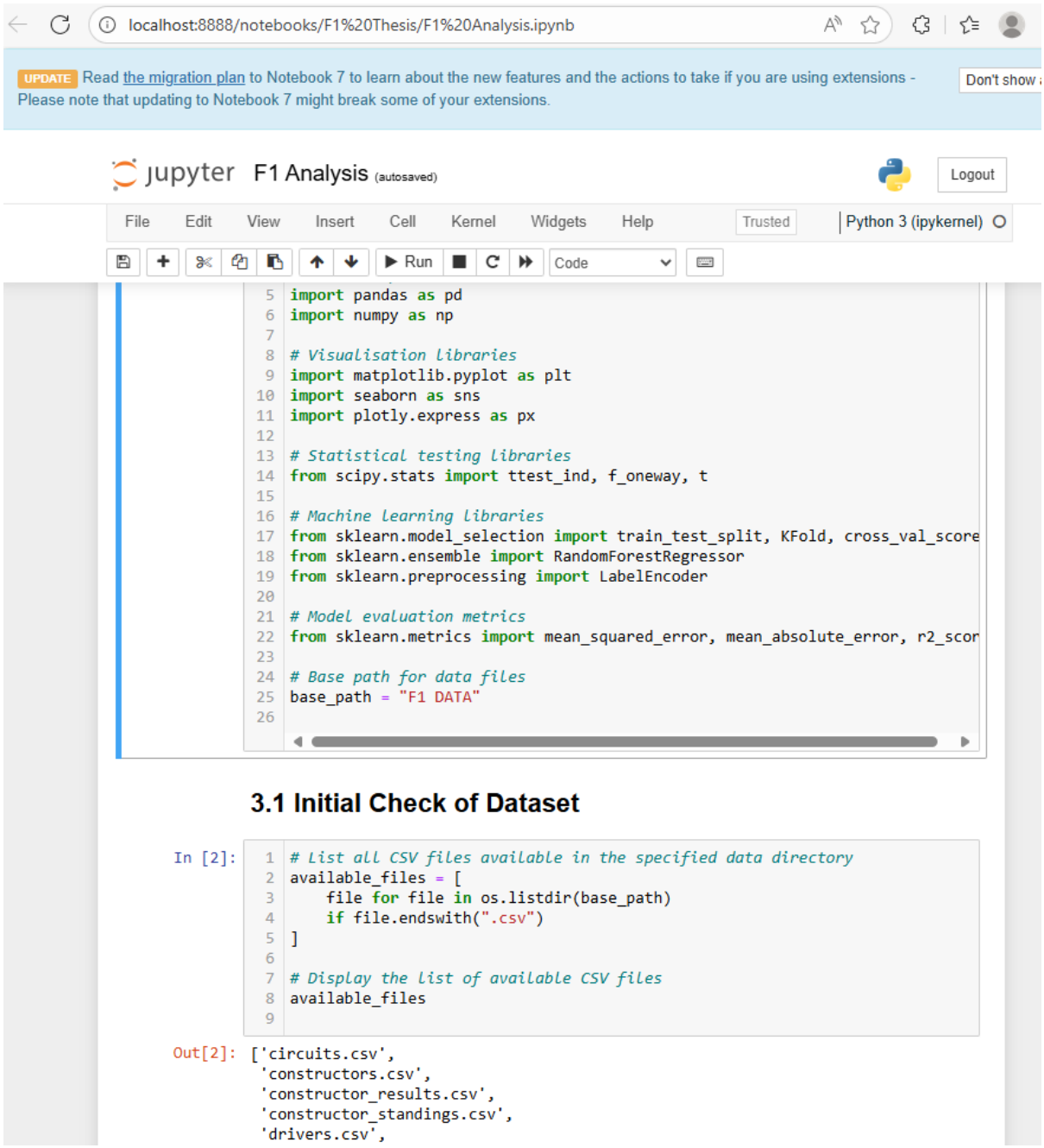

Fig 7 – Jupyter Notebook showing imported libraries, dataset path definition, and file discovery from the F1 DATA folder

References

Kaggle (2024) *Formula 1 World Championship (1950–2024)* [Dataset]. Available at: https://www.kaggle.com/datasets/rohanrao/formula-1-world-championship-1950-2020