

# Lab no 1

## Introduction to Machine Learning and Setting the Environment

### Objective

- To understand the basic concepts of Machine Learning.
- To set up the Python environment using Anaconda.
- To install and use fundamental machine learning libraries like NumPy, Pandas, Matplotlib, and Scikit-learn.

### Introduction

Machine Learning (ML) is a core area of Artificial Intelligence where systems learn from data and improve performance without being explicitly programmed. It is widely applied in fields like image recognition, autonomous vehicles, predictive analytics, and natural language processing.

There are three main types of machine learning:

- **Supervised Learning** – learns from labeled data (e.g., classification, regression).
- **Unsupervised Learning** – finds patterns in unlabeled data (e.g., clustering).
- **Reinforcement Learning** – learns from interactions with an environment.

Before implementing machine learning models, we need to set up the development environment. Python is the most commonly used language for ML due to its simple syntax and vast library support. Anaconda simplifies the setup process by providing all required tools and libraries in one platform.

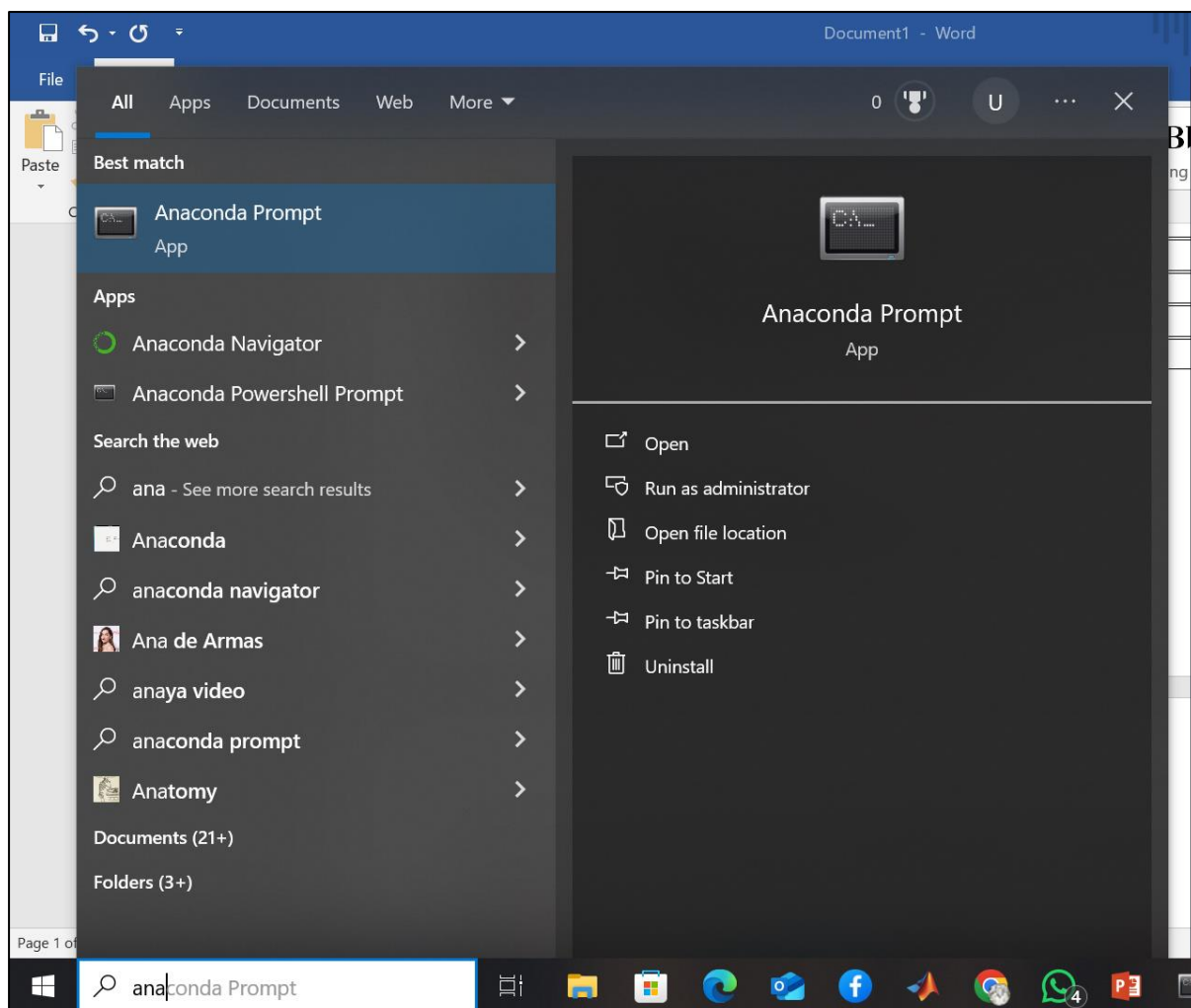
### Tools and Libraries

Tool	Purpose
<b>Anaconda Prompt</b>	Command-line interface for managing Python environments
<b>Jupyter Notebook</b>	Interactive environment for code and documentation
<b>NumPy</b>	Numerical computing library
<b>Pandas</b>	Data analysis and manipulation
<b>Matplotlib</b>	Data visualization
<b>Scikit-learn</b>	ML algorithms and data preprocessing

### Procedure

#### Step 1: Open Anaconda Prompt

- Click **Start** → Search **Anaconda Prompt** → Open it.



## Step 2: Create a New Environment

```
conda create --name umar python=3.9
```

■ Anaconda Prompt

```
(base) C:\Users\PMLS>conda create --name umar python=3.9
Retrieving notices: ...working... done
Collecting package metadata (current_repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 23.7.4
  latest version: 25.3.1

Please update conda by running

  $ conda update -n base -c defaults conda

Or to minimize the number of packages updated during conda update use

  conda install conda=25.3.1

## Package Plan ##

environment location: C:\Users\PMLS\anaconda3\envs\umar

added / updated specs:
- python=3.9

The following packages will be downloaded:
```

package	build	
-----	-----	
pip-25.1	pyhc872135_2	1.3 MB
python-3.9.21	h8205438_1	19.6 MB
setuptools-78.1.1	py39haa95532_0	1.7 MB
tzdata-2025b	h04d1e81_0	116 KB
vc-14.42	haa95532_5	11 KB
vs2015_runtime-14.42.34433	hbfb602d_5	1.2 MB
wheel-0.45.1	py39haa95532_0	145 KB
-----	-----	

```

Anaconda Prompt
vc-14.42 | haa95532_5 | 11 KB
vs2015_runtime-14.42.34433 | hbfb602d_5 | 1.2 MB
wheel-0.45.1 | py39haa95532_0 | 145 KB
-----
Total: 24.0 MB

The following NEW packages will be INSTALLED:

ca-certificates pkgs/main/win-64::ca-certificates-2025.2.25-haa95532_0
openssl pkgs/main/win-64::openssl-3.0.16-h3f729d1_0
pip pkgs/main/noarch::pip-25.1-pyhc872135_2
python pkgs/main/win-64::python-3.9.21-h8205438_1
setuptools pkgs/main/win-64::setuptools-78.1.1-py39haa95532_0
sqlite pkgs/main/win-64::sqlite-3.45.3-h2bbff1b_0
tzdata pkgs/main/noarch::tzdata-2025b-h04d1e81_0
vc pkgs/main/win-64::vc-14.42-haa95532_5
vs2015_runtime pkgs/main/win-64::vs2015_runtime-14.42.34433-hbfb602d_5
wheel pkgs/main/win-64::wheel-0.45.1-py39haa95532_0

Proceed ([y]/n)?

Downloading and Extracting Packages

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
# $ conda activate umar
#
# To deactivate an active environment, use
#
# $ conda deactivate

```

### Step 3: Activate the Environment

Write  
conda activate umar

```

(base) C:\Users\PMLS>conda activate umar

(umar) C:\Users\PMLS>

```

### Step 4: Install Required Libraries

Write  
conda install numpy pandas matplotlib scikit-learn jupyter

```
(umar) C:\Users\PMLS>conda install numpy pandas matplotlib
Collecting package metadata (current_repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 23.7.4
  latest version: 25.3.1

Please update conda by running

  $ conda update -n base -c defaults conda

Or to minimize the number of packages updated during conda update use

  conda install conda=25.3.1

## Package Plan ##

environment location: C:\Users\PMLS\anaconda3\envs\umar

added / updated specs:
- matplotlib
- numpy
- pandas

The following packages will be downloaded:
```

package	build	
bottleneck-1.4.2	py39hc99e966_0	129 KB
brotili-python-1.0.9	py39h5da7b33_9	345 KB
contourpy-1.2.1	py39h214f63a_1	202 KB
fonttools-4.55.3	py39h827c3e9_0	2.1 MB
freeglut-3.4.0	hd77b12b_0	133 KB
freetype-2.13.3	h0620614_0	554 KB

Anaconda Prompt - conda install numpy pandas matplotlib

```
pillow                pkgs/main/win-64::pillow-11.1.0-py39hea0d53e_1
pyparsing             pkgs/main/win-64::pyparsing-3.2.0-py39haa95532_0
pyqt                 pkgs/main/win-64::pyqt-6.7.1-py39h5da7b33_1
pyqt6-sip            pkgs/main/win-64::pyqt6-sip-13.9.1-py39h827c3e9_1
python-dateutil       pkgs/main/win-64::python-dateutil-2.9.0post0-py39haa95532_2
python-tzdata         pkgs/main/noarch::python-tzdata-2025.2-pyhd3eb1b0_0
pytz                 pkgs/main/win-64::pytz-2024.1-py39haa95532_0
qtbase               pkgs/main/win-64::qtbase-6.7.3-h0804d20_0
qtdeclarative         pkgs/main/win-64::qtdeclarative-6.7.3-h5da7b33_0
qtsvg                pkgs/main/win-64::qtsvg-6.7.3-hf2fb9eb_0
qttools              pkgs/main/win-64::qttools-6.7.3-h0de5f00_0
qtwebchannel          pkgs/main/win-64::qtwebchannel-6.7.3-h5da7b33_0
qtwebsockets          pkgs/main/win-64::qtwebsockets-6.7.3-h5da7b33_0
sip                  pkgs/main/win-64::sip-6.10.0-py39h5da7b33_0
six                  pkgs/main/win-64::six-1.17.0-py39haa95532_0
tbb                  pkgs/main/win-64::tbb-2021.8.0-h59b6b97_0
tomli                 pkgs/main/win-64::tomli-2.0.1-py39haa95532_0
tornado              pkgs/main/win-64::tornado-6.5-py39h827c3e9_0
unicodedata2          pkgs/main/win-64::unicodedata2-15.1.0-py39h827c3e9_1
xz                   pkgs/main/win-64::xz-5.6.4-h4754444_1
zipp                  pkgs/main/win-64::zipp-3.21.0-py39haa95532_0
zlib                  pkgs/main/win-64::zlib-1.2.13-h8cc25b3_1
zstd                  pkgs/main/win-64::zstd-1.5.6-h8880b57_0
```

Proceed ([y]/n)? y

Downloading and Extracting Packages

Preparing transaction: done  
Verifying transaction: done  
Executing transaction: done

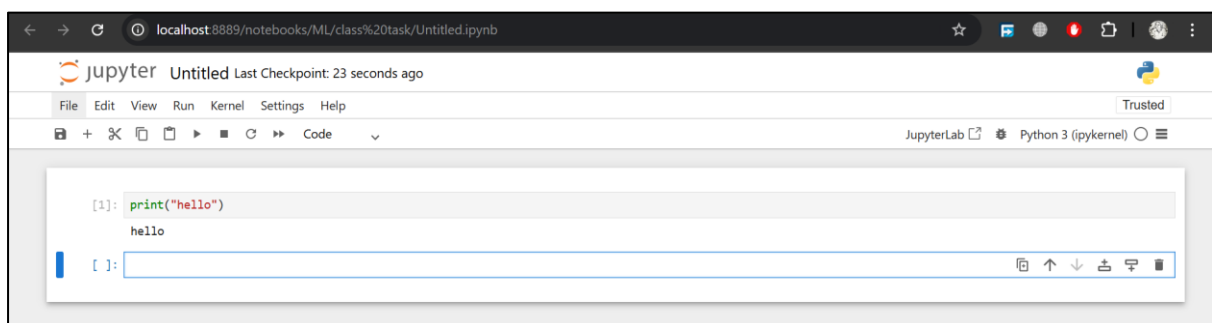
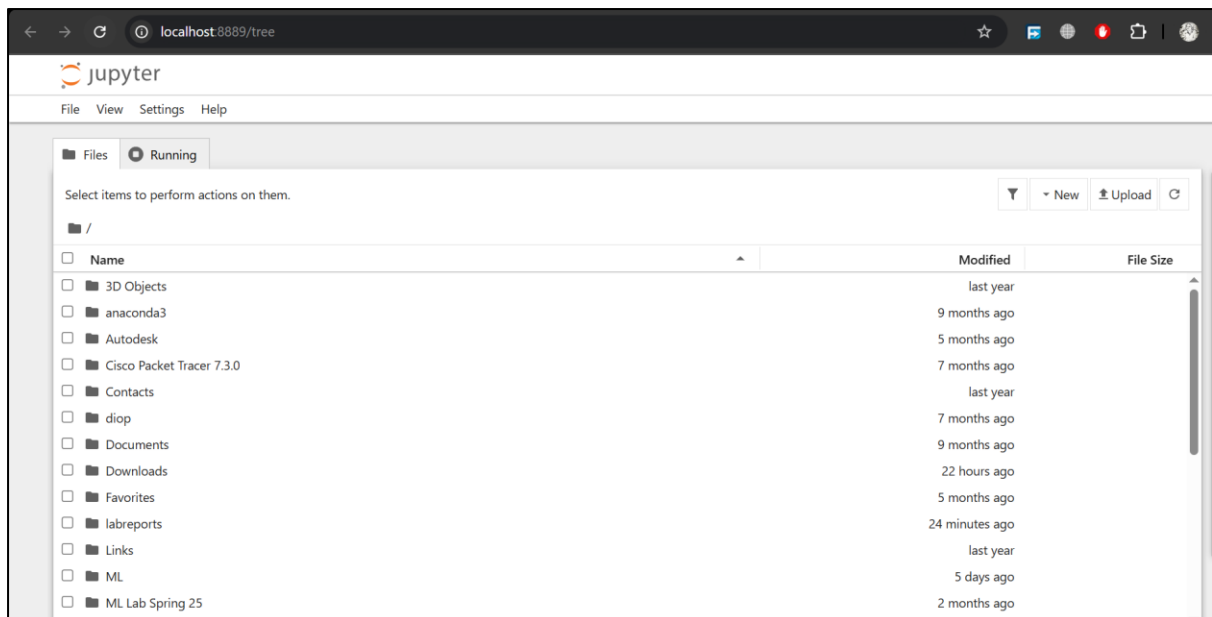
## Step 5: Launch Jupyter Notebook

jupyter notebook

```
(umar) C:\Users\PMLS>jupyter notebook
[I 2025-05-25 11:31:06.947 ServerApp] jupyter_lsp | extension was successfully linked.
[I 2025-05-25 11:31:06.953 ServerApp] jupyter_server_terminals | extension was successfully linked.
[I 2025-05-25 11:31:06.963 ServerApp] jupyterlab | extension was successfully linked.
[I 2025-05-25 11:31:06.969 ServerApp] notebook | extension was successfully linked.
[I 2025-05-25 11:31:07.386 ServerApp] notebook_shim | extension was successfully linked.
[I 2025-05-25 11:31:07.416 ServerApp] notebook_shim | extension was successfully loaded.
[I 2025-05-25 11:31:07.418 ServerApp] jupyter_lsp | extension was successfully loaded.
[I 2025-05-25 11:31:07.419 ServerApp] jupyter_server_terminals | extension was successfully loaded.
[I 2025-05-25 11:31:07.422 LabApp] JupyterLab extension loaded from C:\Users\PMLS\anaconda3\envs\umar\lib\site-packages\jupyterlab
[I 2025-05-25 11:31:07.422 LabApp] JupyterLab application directory is C:\Users\PMLS\anaconda3\envs\umar\share\jupyter\lab
[I 2025-05-25 11:31:07.423 LabApp] Extension Manager is 'pypi'.
[I 2025-05-25 11:31:07.658 ServerApp] jupyterlab | extension was successfully loaded.
[I 2025-05-25 11:31:07.665 ServerApp] notebook | extension was successfully loaded.
[I 2025-05-25 11:31:07.667 ServerApp] The port 8888 is already in use, trying another port.
[I 2025-05-25 11:31:07.668 ServerApp] Serving notebooks from local directory: C:\Users\PMLS
[I 2025-05-25 11:31:07.668 ServerApp] Jupyter Server 2.15.0 is running at:
[I 2025-05-25 11:31:07.668 ServerApp] http://localhost:8889/tree?token=bbe9b9710acac0a89b3e97934005c18c0631611c6e5a2f38
[I 2025-05-25 11:31:07.668 ServerApp] http://127.0.0.1:8889/tree?token=bbe9b9710acac0a89b3e97934005c18c0631611c6e5a2f38
[I 2025-05-25 11:31:07.669 ServerApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 2025-05-25 11:31:07.713 ServerApp]

To access the server, open this file in a browser:
file:///C:/Users/PMLS/AppData/Roaming/jupyter/runtime/jpserver-39072-open.html
Or copy and paste one of these URLs:
http://localhost:8889/tree?token=bbe9b9710acac0a89b3e97934005c18c0631611c6e5a2f38
http://127.0.0.1:8889/tree?token=bbe9b9710acac0a89b3e97934005c18c0631611c6e5a2f38
[I 2025-05-25 11:31:07.797 ServerApp] Skipped non-installed server(s): bash-language-server, dockerfile-language-server-nodejs, javascript-
age-server, julia-language-server, pyright, python-language-server, python-lsp-server, r-languageserver, sql-language-server, texlab, types
nlanguage-server, vscode-css-languageserver-bin, vscode-html-languageserver-bin, vscode-json-languageserver-bin, yaml-language-server
```

- This will open Jupyter in your default browser.
- Click **New** → **Python 3** to open a new notebook.



## Results

- Successfully created a conda environment and installed the necessary libraries.
- Launched and worked in Jupyter Notebook via Anaconda Prompt.

## Conclusion

This lab successfully introduced Machine Learning and demonstrated how to set up a working ML environment using Anaconda Prompt. By using conda environments and Jupyter notebooks, we created a reliable and organized workflow for ML projects.