**Lab NO : 1**

**Introduction to Python, Installation, and Best Practices**

**Objective:**

The main objective of this lab is to introduce Python programming and its applications in machine learning, deep learning, and time-series forecasting. This lab aims to guide students through the installation of Python or Anaconda, creation of virtual environments, the use of online resources, and the selection of standard courses and datasets relevant to machine learning.

**Tools and Resources Used:**

| **Tool/Platform** | **Purpose** |
| --- | --- |
| **Python / Anaconda** | Installation and coding environment |
| **GitHub** | Version control and code sharing |
| **Jupyter Notebook** | Interactive coding and visualization |
| **Google Colab** | Online coding without local installation |
| **YouTube / Coursera / GitHub** | Learning and reference material |
| **Stack Overflow / Real Python** | Debugging and learning support |
| **Datasets (Kaggle, GitHub, AICrowd)** | For real-time machine learning experiments |

**Lab Tasks and Activities Performed:**

**1. Python Installation:**

* Downloaded Python from [python.org](https://www.python.org/downloads/) and/or Anaconda from [anaconda.com](https://www.anaconda.com/download).
* Verified successful installation by running basic Python commands in the terminal and Jupyter Notebook.

**2. GitHub Account Creation:**

* Created an account at [GitHub](https://github.com/).
* Understood its importance in version control, project collaboration, and accessing shared codebases.

**3. Learning Resources Explored:**

* **Stack Overflow:** Used for understanding error messages and solutions.
* **Real Python:** Explored tutorials at [realpython.com](https://realpython.com/) and their [YouTube channel](https://www.youtube.com/@realpython).

**4. Jupyter Notebook Usage:**

* Watched [YouTube tutorial](https://www.youtube.com/watch?v=HW29067qVWk&t=27s).
* Practiced running and documenting Python code inside cells.

**5. Virtual Environment Setup:**

* Followed the tutorial: [YouTube Link](https://www.youtube.com/watch?v=23aQdrS58e0&t=10s).
* Created a virtual environment using venv to isolate dependencies.

**6. Online Coding with Google Colab:**

* Accessed [Google Colab](https://colab.google/) and tested small Python snippets online.

**7. Python Courses & OOP Repository:**

* Followed beginner-friendly video course: [YouTube Playlist](https://www.youtube.com/watch?v=UjeNA_JtXME&list=PLlRFEj9H3Oj7Bp8-DfGpfAfDBiblRfl5p).
* Accessed code examples from: [GitHub Repo](https://github.com/SyedHasnat/OOP-in-Python-UET).

**Machine Learning & Deep Learning Resources:**

**ML Specialization:**

* Coursera Link: [ML Specialization by Andrew Ng](https://www.coursera.org/specializations/machine-learning-introduction)
* Lecture Notes: [irosyadi.netlify](https://irosyadi.netlify.app/course/machine-learning-andrewng/)
* YouTube Channel: [StatQuest](https://www.youtube.com/@statquest/playlists)

**Deep Learning Specialization:**

* Coursera Link: [Deep Learning Specialization](https://www.coursera.org/specializations/deep-learning)

**Time-Series Forecasting:**

* Accessed reference folder from: [OneDrive Link](https://pern-my.sharepoint.com/:f:/g/personal/18ktele0560_uetpeshawar_edu_pk/Eu7JuJEoKltKrGgzC1m2cqwBGaGEKx7OiW4xz8rMcL4oag?e=iIFBTb)

**Important Python Libraries:**

* **NumPy Tutorial:** [YouTube Link](https://youtu.be/ZB7BZMhfPgk?si=vJarh2aiQwBj7qTQ)
* **Pandas Playlist:** [YouTube Playlist](https://www.youtube.com/watch?v=ZyhVh-qRZPA&list=PL-osiE80TeTsWmV9i9c58mdDCSskIFdDS)

**Datasets for Practice:**

**Time Series Datasets:**

1. PJM Hourly Energy Consumption: [Kaggle Link](https://www.kaggle.com/datasets/robikscube/hourly-energy-consumption)
2. ISO-NE: [GitHub Link](https://github.com/yalickj/load-forecasting-resnet)
3. Citylearn 2023 Forecasting: [AICrowd GitLab](https://gitlab.aicrowd.com/aicrowd/challenges/citylearn-challenge/citylearn-2023-forecasting-track-starter-kit/-/tree/master/data/schemas/warm_up)

**Image Datasets:**

1. Brain Tumor Dataset: [Kaggle Link](https://www.kaggle.com/datasets/ashkhagan/figshare-brain-tumor-dataset)
2. PlantVillage: [Kaggle Link](https://www.kaggle.com/datasets/emmarex/plantdisease)

**Recommended Books:**

1. **Python Tricks : The Book** by Dan Bader
2. **How to Think Like a Computer Scientist** by Allen Downey
3. **Deep Learning for Time-Series Forecasting** by Jason Brownlee
4. **Deep Learning** by Ian Goodfellow
5. **Deep Learning with Python** by François Chollet

**Conclusion:**

This lab introduced us to essential tools, platforms, and resources for starting our journey in Python programming and machine learning. We practiced installing the environment, using Jupyter and Colab, and explored valuable online content and datasets. This foundation will help in developing machine learning and deep learning projects efficiently.