Lab Report: Introduction to Python and Machine Learning Tools

University of Engineering and Technology Peshawar – Jalozai Campus

Course: Machine Learning

Lab Number: 01

Title: Introduction to Python, Installation, Best Practices, and Essential Libraries

Objective

The purpose of this lab is to introduce students to the Python programming language, provide installation guidelines, and present foundational tools and best practices essential for machine learning, deep learning, and time series forecasting. It also includes curated resources and datasets to support students in their journey of mastering Python and machine learning.

Materials and Tools Required

Integrated Development Environment (IDE):
- Anaconda Distribution: https://www.anaconda.com/download
- Python Official Website: https://www.python.org/downloads/

Version Control:
- GitHub Account: https://github.com

Online Coding Platforms:
- Google Colab: https://colab.google/

Virtual Environment Setup:
- YouTube Guide: https://www.youtube.com/watch?v=23aQdrS58e0&t=10s

Best Practices and Development Aids

Debugging and Community Support:
- Stack Overflow: https://stackoverflow.com

Python Tutorials and Learning Resources:

- Real Python: https://realpython.com
- Real Python YouTube Channel: https://www.youtube.com/@realpython

Jupyter Notebook Introduction:
- Video Tutorial: https://www.youtube.com/watch?v=HW29067qVWk&t=27s

Learning Resources

Python Programming
YouTube Course:
https://www.youtube.com/watch?v=UjeNA_JtXME&list=PLlRFEj9H3Oj7Bp8-DfGpfAfDBiblRfl5p
GitHub Repository: https://github.com/SyedHasnat/OOP-in-Python-UET/tree/main

Machine Learning
Coursera Specialization: https://www.coursera.org/specializations/machine-learning-introduction
Lecture Notes: https://irosyadi.netlify.app/course/machine-learning-andrewng/
YouTube Playlist: https://www.youtube.com/@statquest/playlists
Machine Learning Mastery Website: https://machinelearningmastery.com

Deep Learning
Coursera Specialization: https://www.coursera.org/specializations/deep-learning

Time Series Forecasting
UET Jalozai SharePoint Resources: https://pern-my.sharepoint.com/:f:/g/personal/18ktele0560_uetpeshawar_edu_pk/Eu7JuJEoKltKrGgzC1m2cqwBGaGEKx7OiW4xz8rMcL4oag?e=iIFBTb

Libraries
NumPy: https://youtu.be/ZB7BZMhfPgk?si=vJarh2aiQwBj7qTQ
Pandas: https://www.youtube.com/watch?v=ZyhVh-qRZPA&list=PL-osiE80TeTsWmV9i9c58mdDCSskIFdDS

Datasets

Time Series Datasets

PJM Hourly Energy Consumption Data:
https://www.kaggle.com/datasets/robikscube/hourly-energy-consumption
ISO-NE Load Forecasting: https://github.com/yalickj/load-forecasting-resnet
Citylearn Challenge Dataset: https://gitlab.aicrowd.com/aicrowd/challenges/citylearn-challenge/citylearn-2023-forecasting-track-starter-kit/-/tree/master/data/schemas/warm_up

Image Datasets

Figshare Brain Tumor Dataset: https://www.kaggle.com/datasets/ashkhagan/figshare-brain-tumor-dataset
PlantVillage Dataset: 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 provides foundational resources for setting up a productive Python development environment and introduces students to key tools and practices in machine learning. Through guided resources and community platforms, students are equipped to independently explore Python and advance their understanding of data science and AI.