Programming Foundations for Machine Learning

Video Guide

This guide outlines the topics covered in the video, *Programming Foundations for Machine Learning.* Since this is a longer video, you can use this guide to skip to specific sections of interest or revisit key topics as needed. Concepts are grouped by category and include timestamps for easy navigation.

00:00–00:06 — Introduction

Overview of the course, instructor, Jupyter Notebooks, and goals for the session.

Python Basics

00:06–02:00 — Why Python?

Simplicity, readable syntax, advantages over C/C++, and importance for ML workflows.

02:00–06:00 — Python Data Types

Basic types (`int`, `float`, `str`, `bool`, `None`), collections (`list`, `tuple`, `dict`), and type checking.

06:00–09:00 — List Operations

Slicing, indexing, appending, concatenation, and reverse indexing.

Control Flow and Functions

09:00–12:00 — Control Flow

Boolean logic, conditionals, chained comparisons, and the FizzBuzz example.

12:00–14:00 — String Handling

Indexing and slicing strings, `split()`, `join()`, basic text processing.

14:00–17:00 — Functions

Defining and calling functions, default values, argument unpacking, and safe practices.

Data Structures and Comprehensions

17:00–19:00 — Dictionaries

Creating, accessing, and updating dictionaries; safe lookups with `.get()`.

19:00–21:30 — List Comprehensions

Creating lists with `for` and `if` in one line; examples with filtering and 2D structures.

21:30–23:30 — Object-Oriented Programming (OOP)

Creating classes, constructors, methods, and basic usage of objects with type hints.

23:30–26:00 — NumPy and Why We Use Pandas

Generating arrays, limitations of NumPy, and transitioning to labeled tabular data.

26:00–29:30 — Pandas DataFrames

Creating and inspecting DataFrames, column access by name, series, and column types.

Plotting with Matplotlib and Pandas

29:30–31:00 — Basic Plotting with Matplotlib

Line plots, labeling, styling, and multiple lines with legends.

31:00–33:00 — Plotting with Pandas

Using `.plot()` on DataFrames, scatterplots, integration with `matplotlib`.

33:00–34:30 — Improving Visuals

Customizing plots, adding annotations, using Seaborn for style.

34:30–37:00 — Example: Model Evaluation

Creating a mock dataset, computing mean square error, plotting model comparisons.