

Python Basic & ML

How to code and use?

DISCLAIMER

The information provided here is for general knowledge and informational purposes only. I am not a qualified expert in this area, and this content should not be construed as professional advice. Always consult with a qualified professional for specific guidance.



01

Editor & Tools

- Jupyter notebook
- Anaconda
- Vscode
- Google colab
- Kaggle notebook



Why Python ???

```
1 import pandas as pd
2
3 try:
4     # Read the CSV file into a DataFrame
5     df = pd.read_csv('input.csv')
6
7     # Filter rows where 'Age' is greater than 30
8     filtered_df = df[df['Age'] > 30]
9
10    # Write the filtered DataFrame to a new CSV file
11    # index=False prevents writing the DataFrame index as a column
12    filtered_df.to_csv('output_filtered.csv', index=False)
13
14    print("CSV processed successfully in Python!")
15
16 except FileNotFoundError:
17     print("Error: 'input.csv' not found. Please create it.")
18 except Exception as e:
19     print(f"An error occurred: {e}")
```

```
1 #include <iostream>
2 #include <fstream>
3 #include <string>
4 #include <vector>
5 #include <sstream> // For std::stringstream
6
7 // A simple struct to hold our data (representing a row in the CSV)
8 struct Person {
9     std::string Name;
10    int Age;
11    std::string City;
12    // Add other fields as needed
13};
14
15 // Helper function to split a string by a delimiter
16 std::vector<std::string> split(const std::string& s, char delimiter) {
17     std::vector<std::string> tokens;
18     std::string token;
19     std::istringstream tokenStream(s);
20     while (std::getline(tokenStream, token, delimiter)) {
21         tokens.push_back(token);
22     }
23     return tokens;
24}
25
26 int main() {
27     // Open the input CSV file
28     std::ifstream inputFile("input.csv");
29     if (!inputFile.is_open()) {
30         std::cerr << "Error: Could not open input.csv" << std::endl;
31         return 1; // Indicate an error
32     }
33
34     // Open the output CSV file
35     std::ofstream outputFile("output_filtered.csv");
36     if (!outputFile.is_open()) {
37         std::cerr << "Error: Could not create output_filtered.csv" << std::endl;
38         inputFile.close(); // Close input file before exiting
39         return 1; // Indicate an error
40     }
41
42     std::string line;
43     std::vector<Person> people; // Vector to store parsed Person objects
44     std::string headerLine; // To store the header row
45 }
```



Python fundamental

From w3Schools

What are needed for this course ?

- Python variables
- Python Lists
- Python Loops
- Python Arrays
- Python Function
- Python condition

Library Numpy

Basic	Random	ufunc
Introduction	Random Intro	ufunc Intro
Getting Started	Data Distribution	Create Function
Creating Arrays	Random Permutation	Simple Arithmetic
Array Indexing	Seaborn Module	Rounding Decimals
Array Slicing	Normal Dist.	Logs
Data Types	Binomial Dist.	Summations
Copy vs View	Poisson Dist.	Products
Array Shape	Uniform Dist.	Differences
Array Reshape	Logistic Dist.	Finding LCM
Array Iterating	Multinomial Dist.	Finding GCD
Array Join	Exponential Dis.	Trigonometric
Array Split	Chi Square Dist.	Hyperbolic
Array Search	Rayleigh Dist.	Set Operations
Array Sort	Pareto Dist.	
Array Filter	Zipf Dist.	

Library Matplotlib

- Matplotlib is a low level graph plotting library in python that serves as a visualization utility.
- Matplotlib was created by John D. Hunter.
- Matplotlib is open source and we can use it freely.
- Matplotlib is mostly written in python, a few segments are written in C, Objective-C and Javascript for Platform compatibility.

Library Scipy

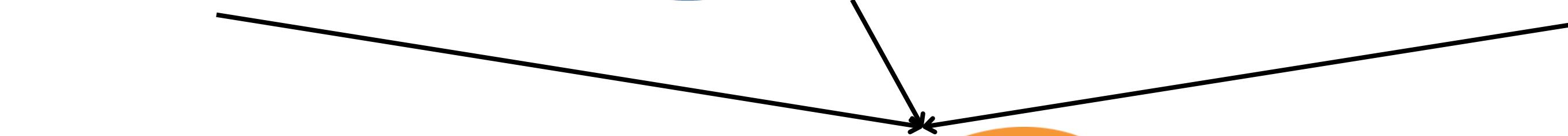
- SciPy is a scientific computation library that uses NumPy underneath.
- SciPy stands for Scientific Python.
- It provides more utility functions for optimization, stats and signal processing.
- Like NumPy, SciPy is open source so we can use it freely.
- SciPy was created by NumPy's creator Travis Olliphant.

Library Sklearn



SciPy

matplotlib



02

Machine Learning tool



Keras

Keras

A superpower for ML developers

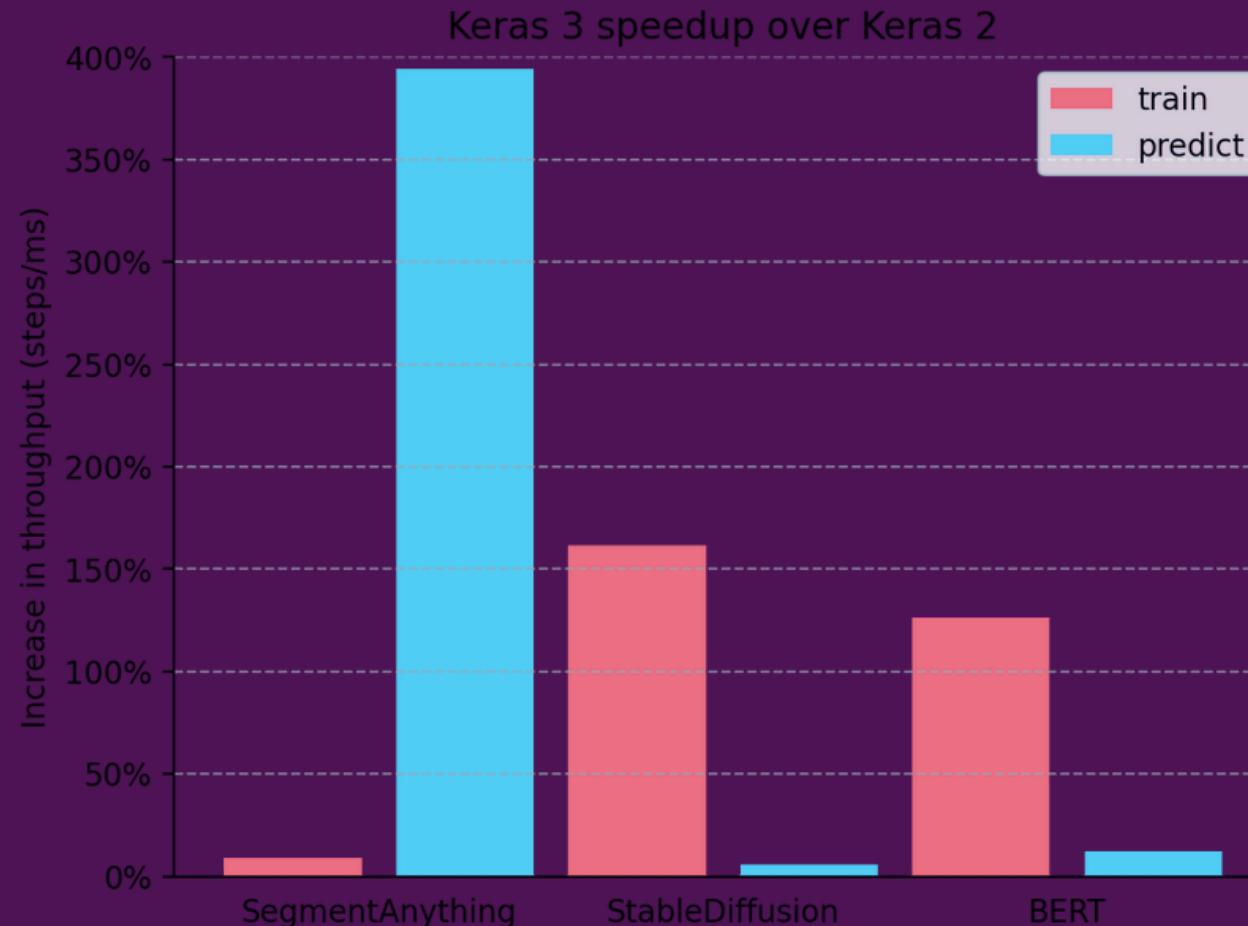
Why use Keras

Keras is a deep learning API designed for human beings, not machines. Keras focuses on debugging speed, code elegance & conciseness, maintainability, and deployability. When you choose Keras, your codebase is smaller, more readable, easier to iterate on.

03

Benchmarks

All benchmarks are done with a single NVIDIA A100 GPU with 40GB of GPU memory on a Google Cloud Compute Engine of machine type a2-highgpu-1g with 12 vCPUs and 85GB host memory.



Batchsize	Keras 2(TensorFlow)	Keras 3(TensorFlow)	Keras 3(JAX)	Keras 3(PyTorch) (eager)	Keras 3(best)
SegmentAnything(fit)	1	386.93	355.25	361.69	1,388.87
SegmentAnything(predict)	4	1,859.27	438.50	376.34	1,720.96
Stable Diffusion(fit)	8	1,023.21	392.24	391.21	823.44
Stable Diffusion(predict)	13	649.71	616.04	627.27	1,337.17
BERT(fit)	32	486.00	214.49	222.37	808.68
BERT(predict)	256	470.12	466.01	418.72	1,865.98
Gemma(fit)	8	NA	232.52	273.67	525.15
Gemma(generate)	32	NA	1,134.91	1,128.21	7,952.67*
Gemma(generate)	1	NA	758.57	703.46	7,649.40*
Mistral(fit)	8	NA	185.92	213.22	452.12
Mistral(generate)	32	NA	966.06	957.25	10,932.59*
Mistral(generate)	1	NA	743.28	679.30	11,054.67*



Example of Keras

Cat & Dog

- image to test Cat: 10728, 9988
- image to test Dog: 3120, 9988

Mnist (Modified National Institute of Standards and Technology database)

- Example for predicting number 0-9

Summary

- Python basic
 - Numpy
 - Matplotlib
 - Scipy
 - Sklearn
- Machine learning
 - Keras
 - Dog cat classification
 - Mnist classification

Assignment

- Write a program to detect PRIME Number
 - input: number
 - output: true / false
- Successfully run: [Pneumonia Classification](#)
 - Tips:
 - Reduce epochs for faster traning
 - Use another runtime GPU/TPU



"I asked my AI to write clean, efficient code. It responded by deleting all my files and replacing them with a single 'Hello, World!' program."

-Internet

THANK
YOU