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Python for Machine Learning

hasnatf

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IT practitioner, ex GITS

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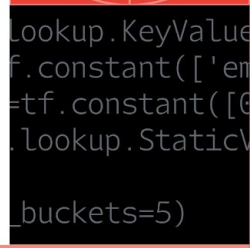
Today's Topic

AI in a Nutshell

- Definition
- Scope of AI
- Machine Learning

Python in ML

- Python
- Library
- Hand-ons



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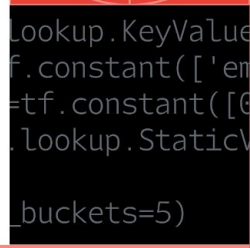
AI in a Nutshell



So.. What is AI? 8 Definitions, 4 Approaches

Thinking humanly

Thinking rationally

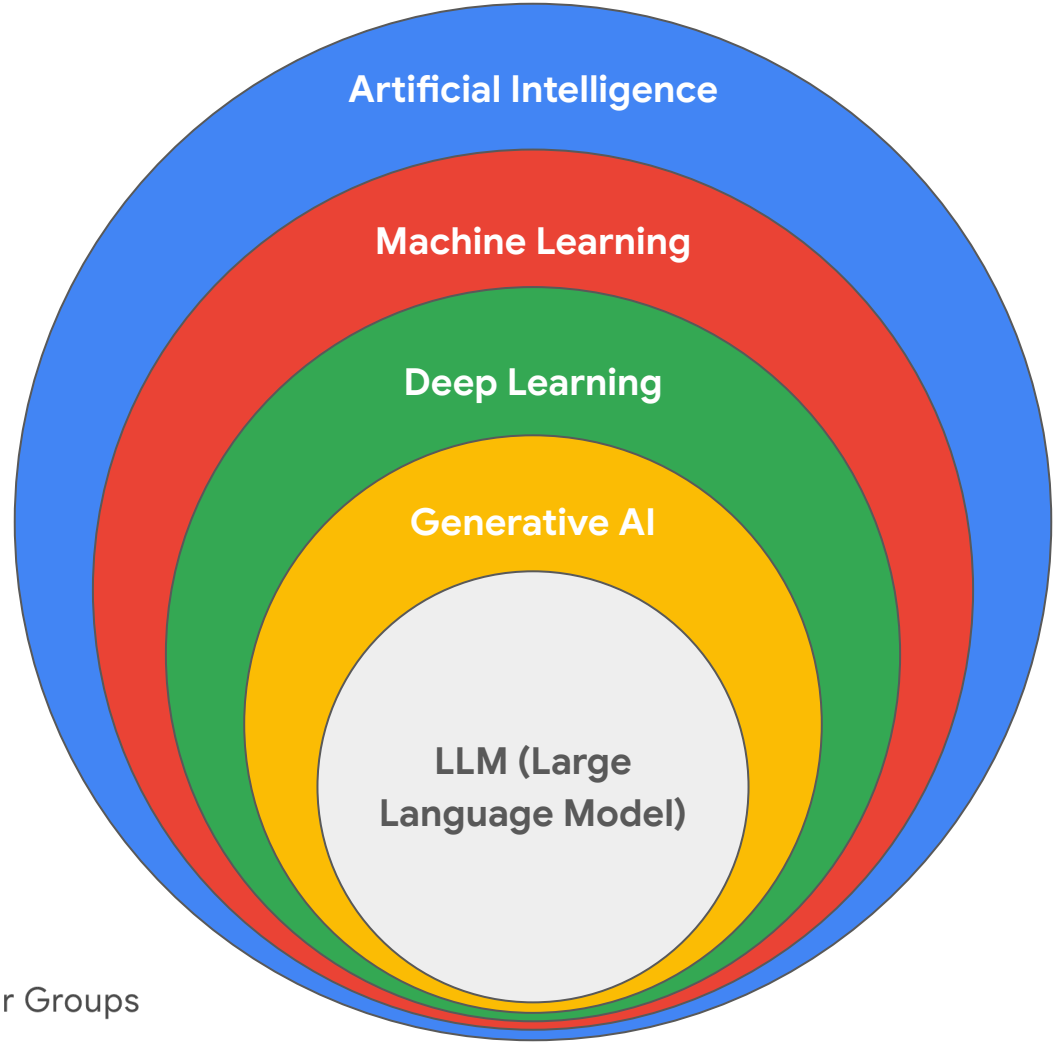
Acting humanly

Acting rationally

Thinking Humanly	Thinking Rationally
"The exciting new effort to make computers think . . . *machines with minds*, in the full and literal sense." (Haugeland, 1985) "[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning . . ." (Bellman, 1978)	"The study of mental faculties through the use of computational models." (Charniak and McDermott, 1985) "The study of the computations that make it possible to perceive, reason, and act." (Winston, 1992)
Acting Humanly	**Acting Rationally**
"The art of creating machines that perform functions that require intelligence when performed by people." (Kurzweil, 1990) "The study of how to make computers do things at which, at the moment, people are better." (Rich and Knight, 1991)	"Computational Intelligence is the study of the design of intelligent agents." (Poole *et al.*, 1998) "AI . . . is concerned with intelligent behavior in artifacts." (Nilsson, 1998)

Figure 1.1 Some definitions of artificial intelligence, organized into four categories.

Scope of AI


Artificial Intelligence
Machine Learning
Deep Learning
Generative AI
LLM (Large Language Model)

What is Machine learning

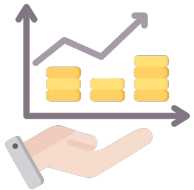
Here is a slightly more general definition:

> *[Machine Learning is the] field of study that gives computers the ability to learn without being explicitly programmed.*
>
> —Arthur Samuel, 1959

And a more engineering-oriented one:

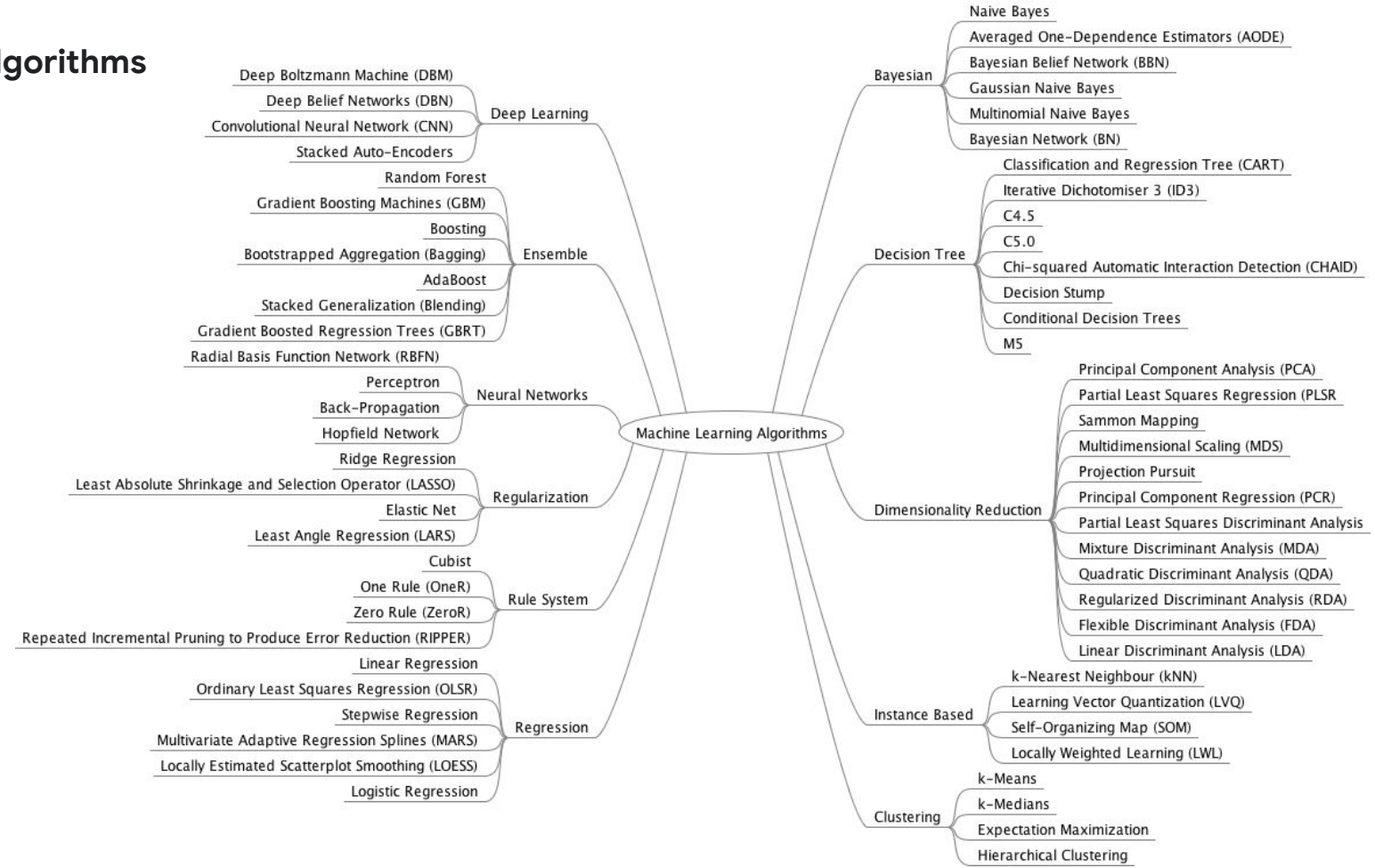
> *A computer program is said to learn from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E.*
>
> —Tom Mitchell, 1997

Spam Filter

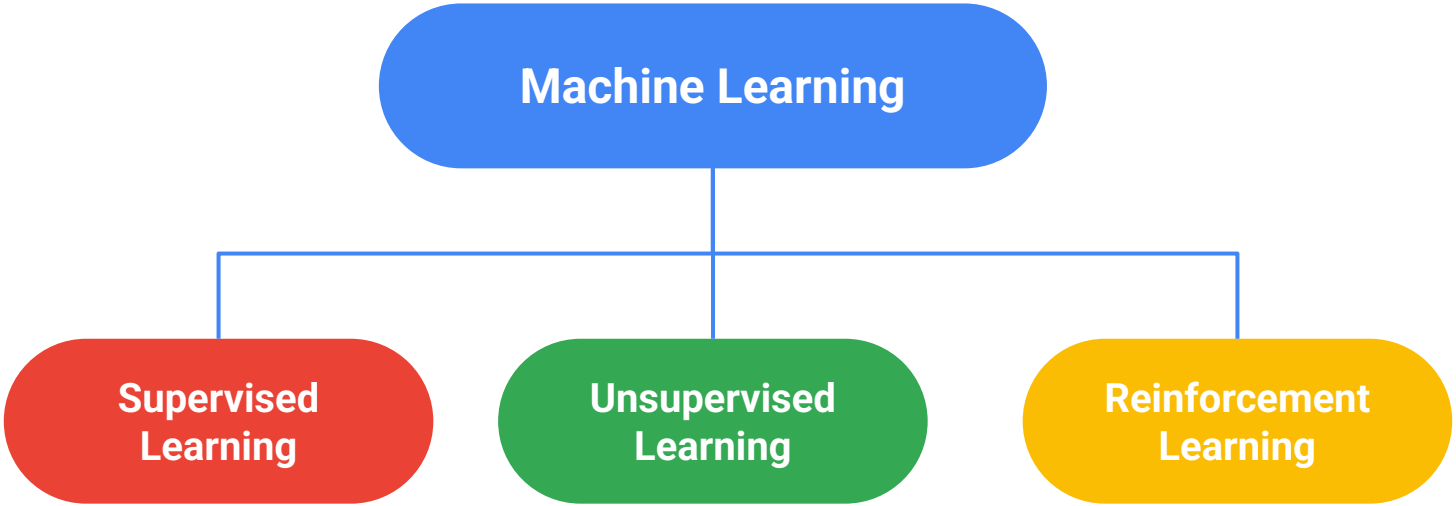


Forecast Comp Revenue

ML Algorithms



ML Type of Supervision



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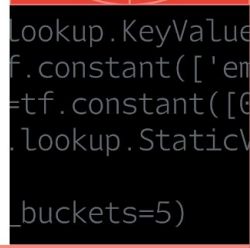
Machine Learning Objective

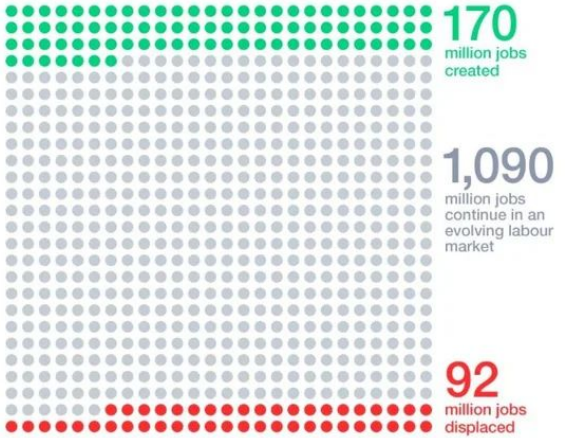
- Improve Revenue
  - Visibility in app search results
- Reduce Operational Cost
  - Email Extraction for Plane Ticket Rescheduling



Future of Jobs Report 2025

Total job growth and loss

WORLD ECONOMIC FORUM



Source: World Economic Forum. (2025). *Future of Jobs Report 2025.*

Future of Jobs Report 2025

Top 10 fastest growing skills by 2030

1. AI and big data
2. Networks and cybersecurity
3. Technological literacy
4. Creative thinking
5. Resilience, flexibility and agility
6. Curiosity and lifelong learning
7. Leadership and social influence
8. Talent management
9. Analytical thinking
10. Environmental stewardship

Top fastest growing jobs

1. Big data specialists
2. FinTech engineers
3. AI and machine learning specialists
4. Software and applications developers
5. Security management specialists
6. Data warehousing specialists
7. Autonomous and electric vehicle specialists
8. UI and UX designers
9. Light truck or delivery services drivers
10. Internet of things specialists
11. Data analysts and scientists
12. Environmental engineers
13. Information security analysts
14. DevOps engineers
15. Renewable energy engineers

https://reports.weforum.org/docs/WEF_Future_of_Jobs_Report_2025.pdf

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AI is not a competitor. It is expensive. AI still requires humans as subject matter experts.

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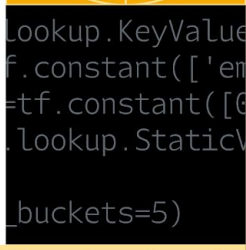
tapi jangan terlalu advanced yaa, yang beginner friendly aja kalau mau nambahin kontennyua
11:41 AM

Python for ML



Python?

Python is a popular programming language. It was created by Guido van Rossum, and released in 1991.

Python's streamlined syntax allows experts to spend more time working out solutions to complex ML issues rather than focusing on the language's complexity.

https://www.w3schools.com/python/python_intro.asp

https://www.turing.com/kb/why-python-is-widely-used-for-machine-learning

Library

Python libraries are collections of pre-written code and functions that extend the capabilities of the Python programming language.

Used to analyze data

Visualization utility

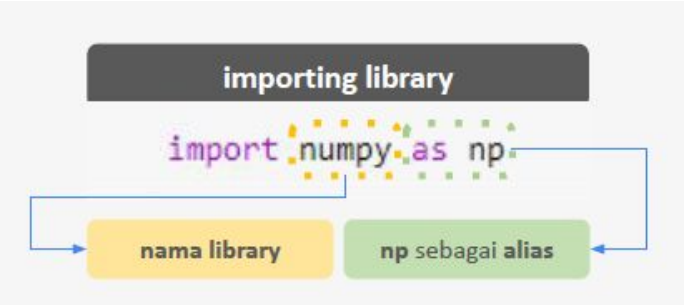
Machine learning

Used for working with arrays

Visualization utility

Deep learning

Library - Numpy



Used to process numerical data stored in arrays, such as: finding the mean, median, performing matrix calculations, and so on.

Library - Pandas

It's a library built on top of other libraries like NumPy and Matplotlib, designed to assist in data analysis.

Pandas is versatile for data processing tasks, including: data cleaning, basic visualization, mathematical operations, creating dataframes, and encoding.

Library - Pandas

pendefinisian Series

```
series = pd.Series(data=[1, 2, 3, 4, 5, 6], name='angka')

print(series)
```

```
0    1
1    2
2    3
3    4
4    5
5    6
Name: angka, dtype: int64
```

pendefinisian DataFrame

```
df = pd.DataFrame(data={'angka': [4, 5, 6, 1, float('nan'), 3],
                        'huruf': ['D', 'E', 'F', 'A', 'B', 'C']})

print(df)
```

```
   angka huruf
0    4.0     D
1    5.0     E
2    6.0     F
3    1.0     A
4    NaN     B
5    3.0     C
```

Library - Pandas

1 menampilkan kolom

```
print(df.columns)
```

```
Index(['angka', 'huruf'], dtype='object')
```

2 menampilkan 5 data teratas

```
print(df.head(5))
```

```
   angka huruf
0    4.0     D
1    5.0     E
2    6.0     F
3    1.0     A
4    NaN     B
```

3 menampilkan 3 data terbawah

```
print(df.tail(3))
```

```
   angka huruf
3    1.0     A
4    NaN     B
5    3.0     C
```

4 menampilkan informasi dari data

```
print(df.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6 entries, 0 to 5
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   angka   5 non-null      float64
 1   huruf   6 non-null      object 
dtypes: float64(1), object(1)
memory usage: 224.0+ bytes
```

5 menampilkan null value

```
print(df.isna())
```

```
   angka  huruf
0  False  False
1  False  False
2  False  False
3  False  False
4   True  False
5  False  False
```

6 menampilkan total null value

```
print(df.isna().sum())
```

```
angka    1
huruf    0
dtype: int64
```

Library - Pandas

7 memeriksa data duplikat

```
print(df.duplicated())
```

```
0    False
1    False
2    False
3    False
4    False
5    False
dtype: bool
```

8 memeriksa jumlah data duplikat

```
print(df.duplicated().sum())
```

```
0
```

9 mengurutkan data by kolom tertentu

```
print(df.sort_values(by='angka'))
```

```
   angka huruf
3    1.0     A
5    3.0     C
0    4.0     D
1    5.0     E
2    6.0     F
4    NaN     B
```

10 menghapus nilai by indeks

```
df.drop(index=1, inplace=True)

print(df)
```

```
   angka huruf
0    4.0     D
2    6.0     F
3    1.0     A
4    NaN     B
5    3.0     C
```

11 mengatur ulang indeks

```
df.reset_index(drop=False, inplace=True)

print(df)
```

```
   index  angka huruf
0      0    4.0     D
1      2    6.0     F
2      3    1.0     A
3      4    NaN     B
4      5    3.0     C
```

12 mengatur ulang indeks

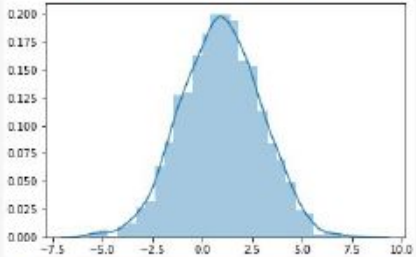
```
df.reset_index(drop=True, inplace=True)

print(df)
```

```
   angka huruf
0    4.0     D
1    6.0     F
2    1.0     A
3    NaN     B
4    3.0     C
```

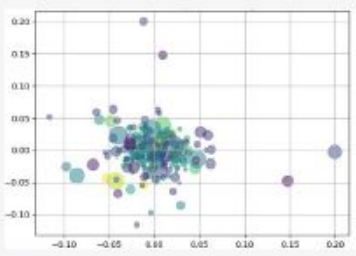
Library - Matplotlib & Seaborn

Both can be used to visualize data in many different ways, including:

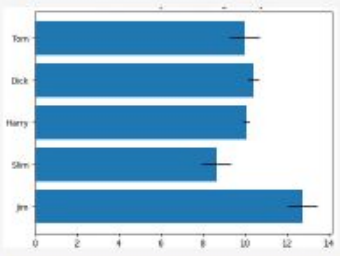


distribution plot

pie plot



scatter plot



bar-h plot

Seaborn is essentially built on top of Matplotlib, allowing for their combined use.

Library - Matplotlib & Seaborn

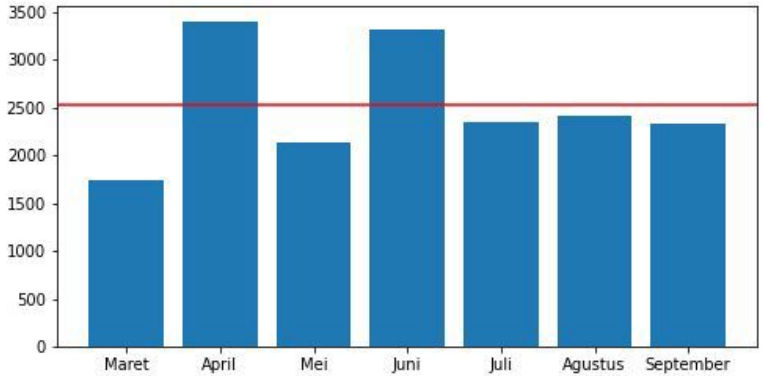
So, what is the purpose of data visualization? Is it always required?

While data visualization isn't strictly necessary, it's often essential for making data understandable. It allows anyone to grasp the information without having to sift through countless rows and columns.

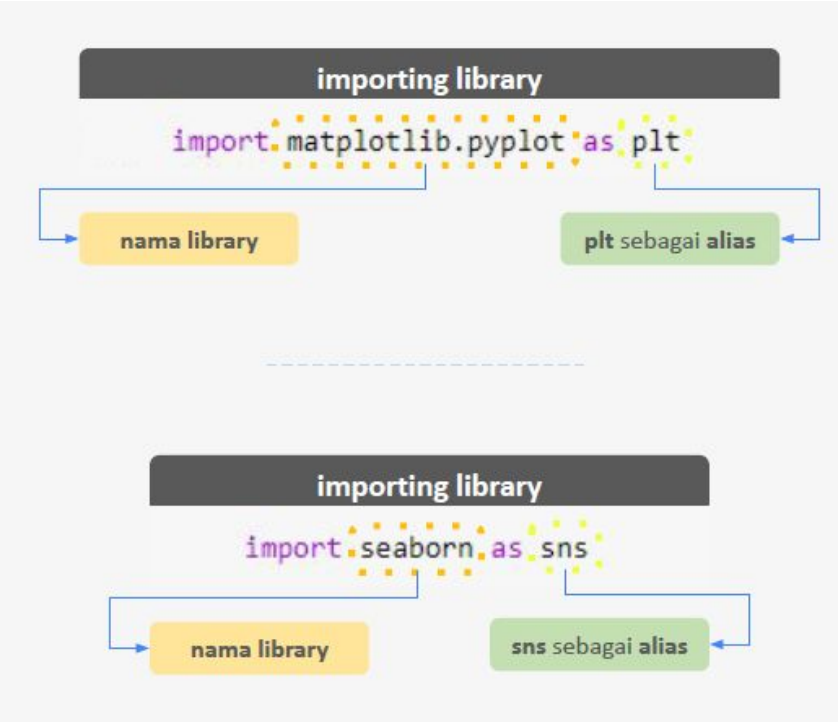
Library - Matplotlib & Seaborn

Bulan	Kasus Positif Harian
Maret	1741
April	3397
Mei	2134
Juni	3314
Juli	2349
Agustus	2404
September	2331

OR



Library - Matplotlib & Seaborn



Library - Scikit-learn

This module is designed to help with data processing and training data for machine learning or data science applications.

Scikit-learn is an open source machine learning library that supports supervised and unsupervised learning. It also provides various tools for model fitting, data preprocessing, model selection, model evaluation, and many other utilities.

Hands-on

Google Colab

Task:

Explore & visualize **your own data** using Google Colab

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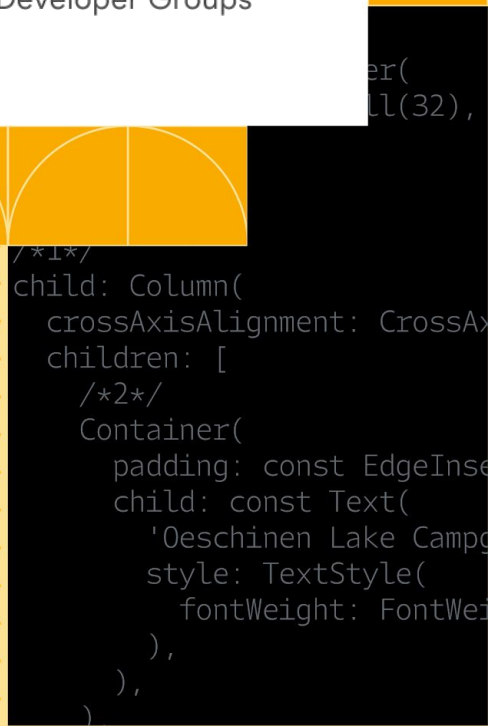

The end of this session,
Any question guys?

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LinkedIn: https://www.linkedin.com/in/hasnatf/

Instagram: @hasnat5_

```
child: Column(
  crossAxisAlignment: CrossAx
  children: [
    /*2*/
    Container(
      padding: const EdgeInse
      child: const Text(
        'Oeschinen Lake Campg
        style: TextStyle(
          fontWeight: FontWei
        ),
      ),
    )
```

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