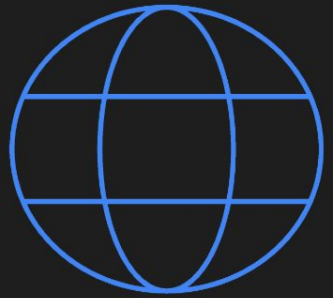
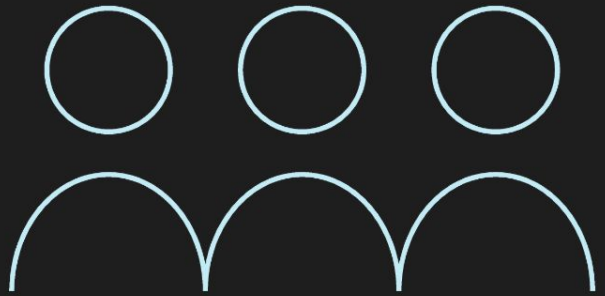

Week 3 - AI Mentorship Program

# Introduction to Deep Learning

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# Recap

# Outline

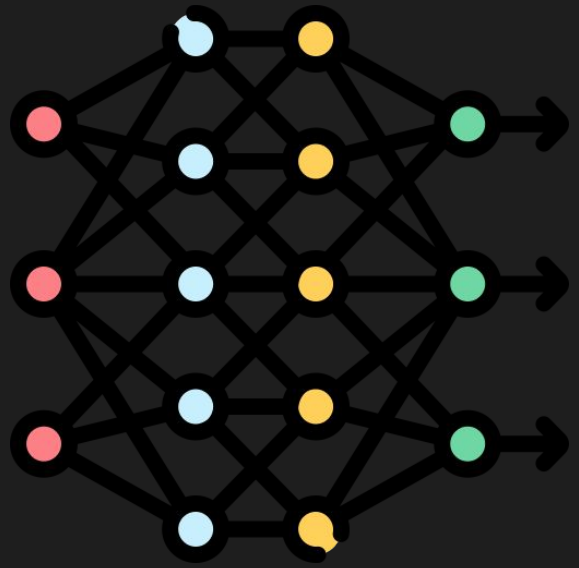
1. Deep Learning
2. Computer Vision
3. NLP

# Apa itu DL ?

Sub-bidang machine learning yang algoritmanya terinspirasi dari struktur otak manusia

**“More data, more layers, more processing!”**

Struktur tersebut dinamakan Artificial Neural Networks atau disingkat ANN (tiga atau lebih lapisan)



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# Algorithm pada DL

- Convolutional Neural Network (CNN)
- Recurrent Neural Network (RNN)
- Long Short Term Memory Network (LTSM)
- Self Organizing Maps (SOM)

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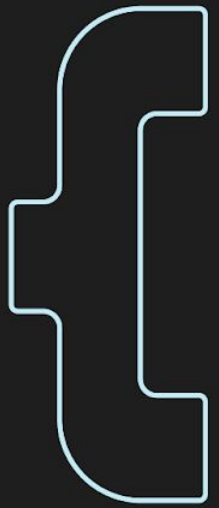
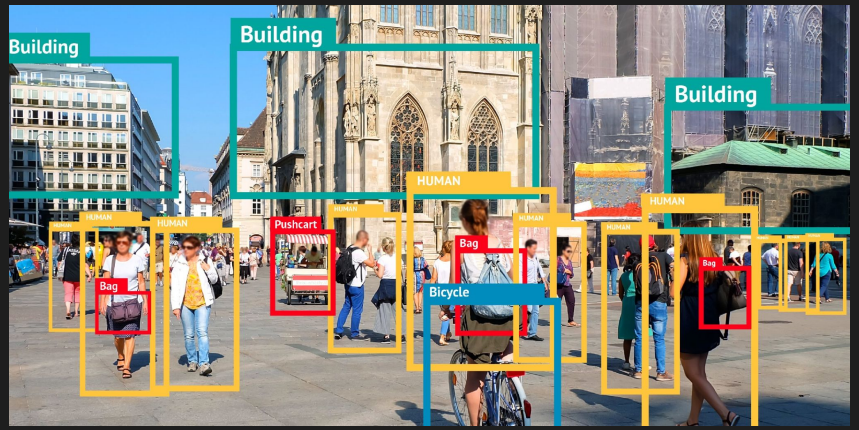


# Apa itu CV?

Computer Vision (CV) adalah bagian dari AI yang  yang dapat memproses, menganalisis, dan memahami data visual (gambar atau video) dengan cara yang sama seperti yang dilakukan manusia.

Core Teknik : Image recognition, object detection, and segmentation.

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# Contoh Computer Vision

- Motion capture
- Self driving Vehicles
- Medical imaging
- Optical character recognition (OCR)
- Biometrics

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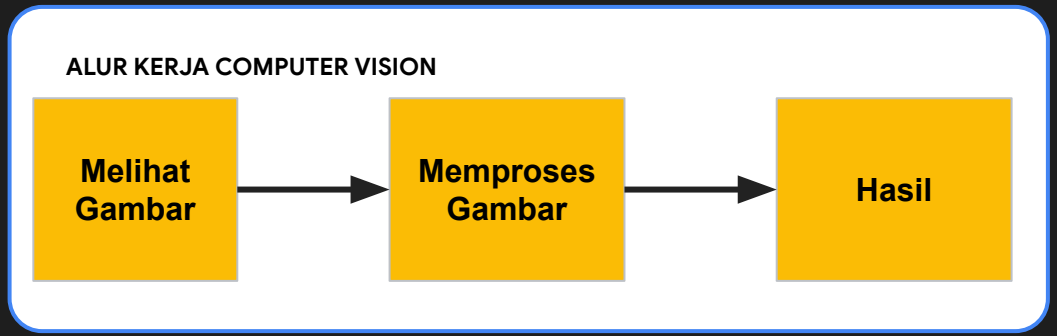

# Algorithm CNN

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Convolutional Neural Network (CNN) adalah jenis jaringan saraf tiruan yang dirancang khusus untuk pemrosesan data berbentuk grid seperti gambar. CNN terdiri dari beberapa lapisan utama:

- Convolutional Layer: Menerapkan filter (kernel) untuk mendeteksi fitur dari input .
- Pooling Layer: Mengurangi dimensi data dan mempertahankan informasi utama.
- Fully Connected Layer (FC Layer): Lapisan terakhir yang mengubah fitur yang diekstrak menjadi output yang dapat digunakan untuk klasifikasi atau regresi.
- Activation Function: Biasanya menggunakan ReLU (Rectified Linear Unit) untuk menambah non-linearitas.

📌 Aplikasi: Klasifikasi gambar, deteksi objek, segmentasi gambar.

# Algorithm CNN

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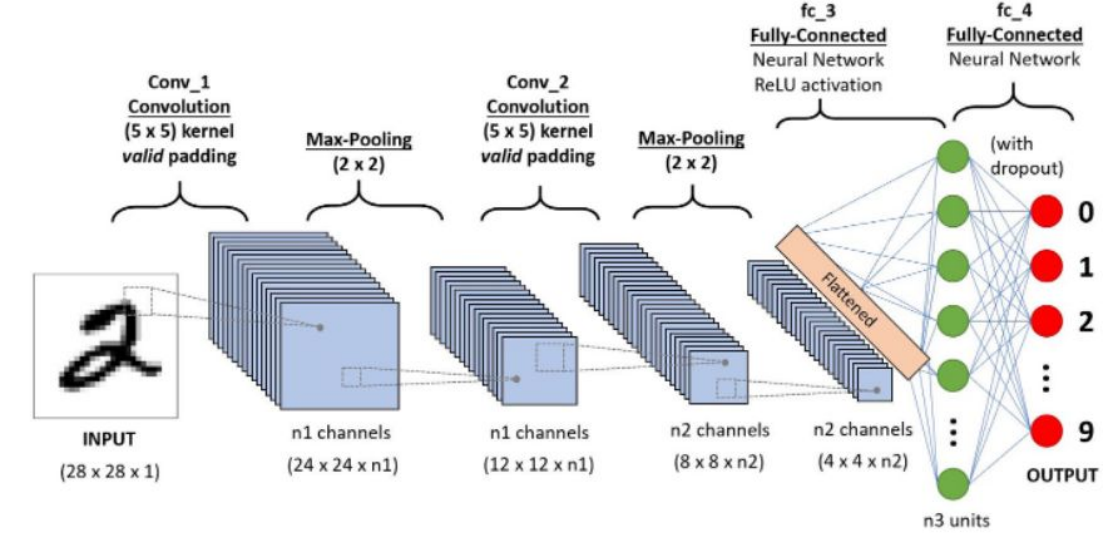

# Algorithm CNN

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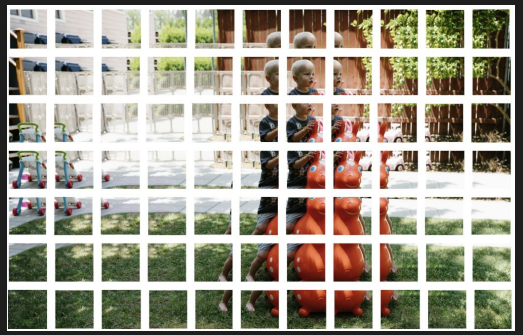

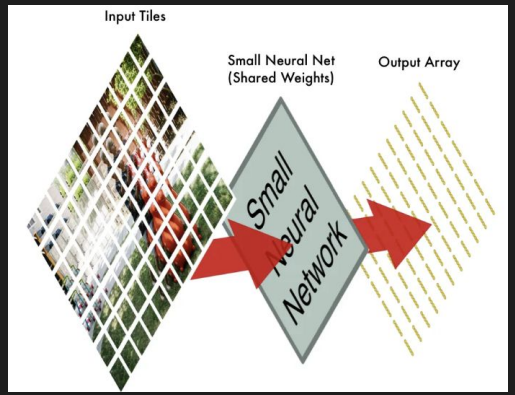

# Algorithm CNN - Filter

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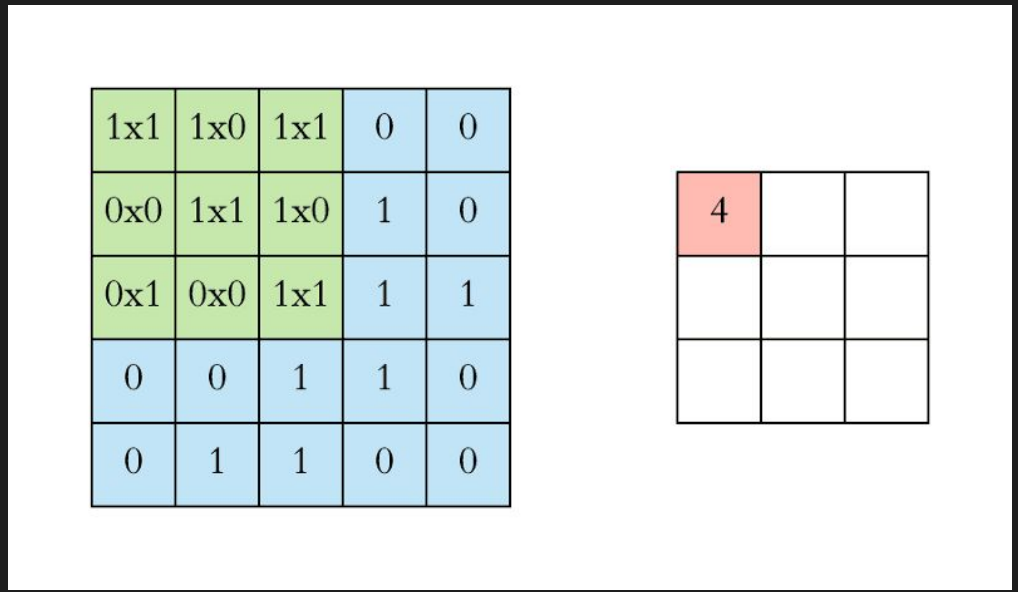

# Algorithm CNN - Filter

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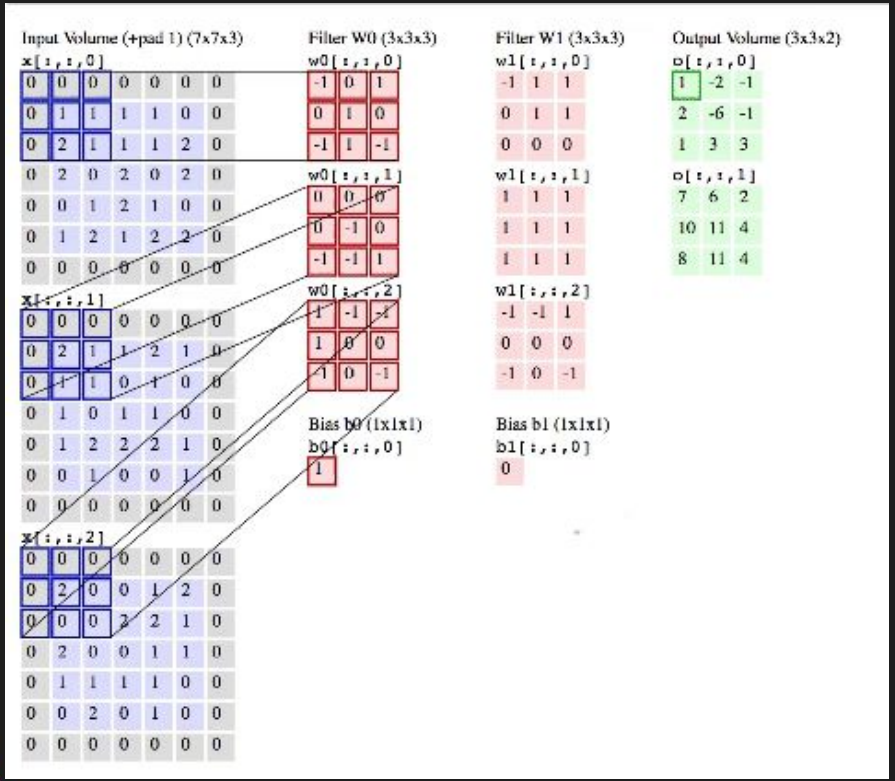


Note:
1. Stride adalah parameter yang menentukan berapa jumlah pergeseran filter.
2. Padding atau zero padding adalah parameter menentukan jumlah pixel (berisi nilai 0) yang akan ditambahkan di setiap sisi dari input.

# Algorithm CNN - Pooling

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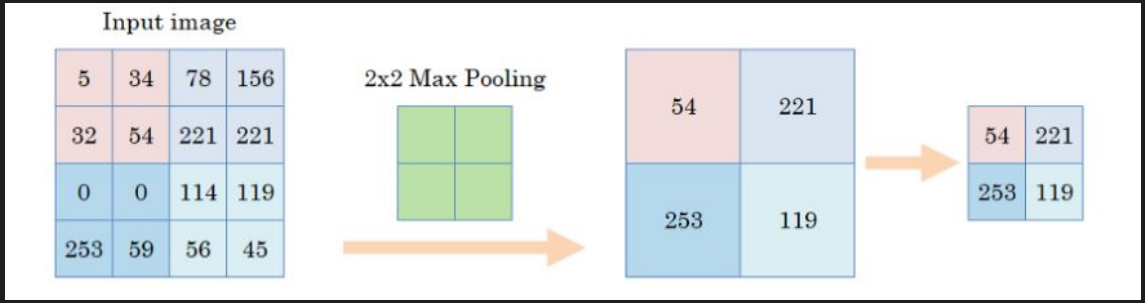


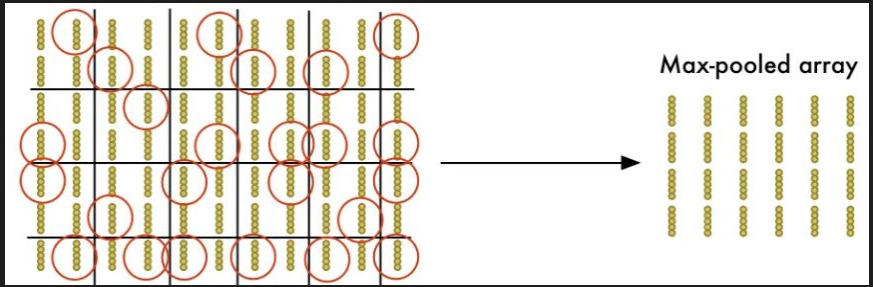

# Algorithm CNN - Ilustrasi konvolusi

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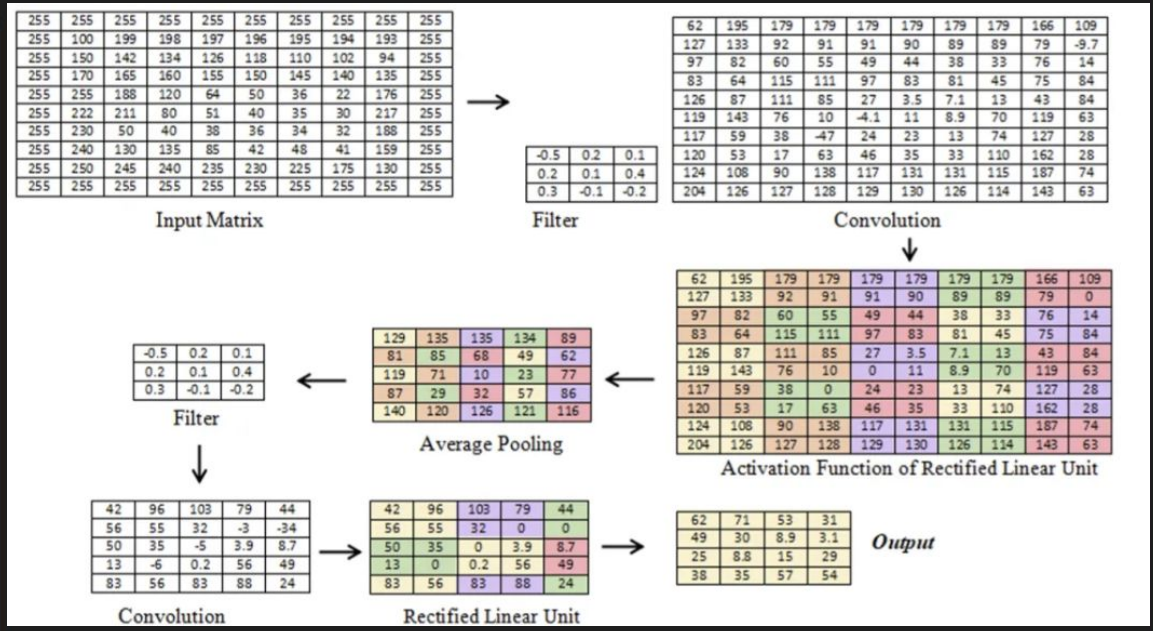

# Aplikasi CNN dalam Computer Vision

- Klasifikasi Gambar (ResNet, VGG)
- Deteksi Objek (YOLO, Faster R-CNN)
- Segmentasi Gambar (U-Net, Mask R-CNN)
- Pengenalan Wajah (Facial Recognition)

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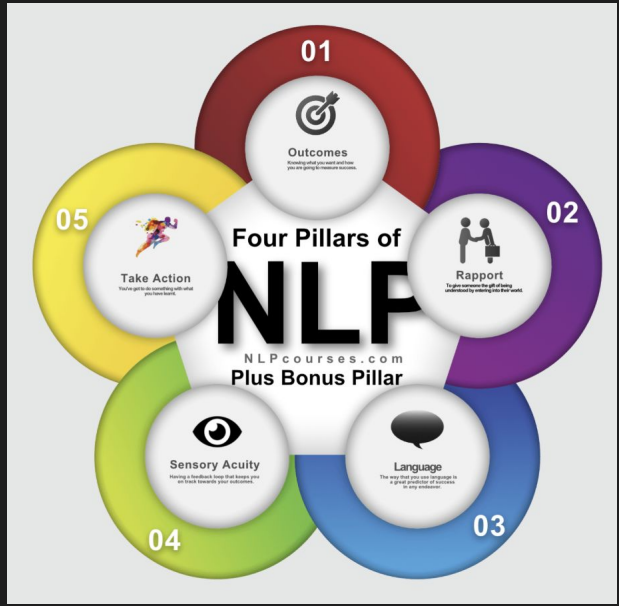
# Apa itu NLP?

Computer Vision (CV) adalah bagian dari AI yang  yang dapat memproses, menganalisis, dan memahami data visual (gambar atau video) dengan cara yang sama seperti yang dilakukan manusia.

Core Teknik : Image recognition, object detection, and segmentation.

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# Arsitektur NLP

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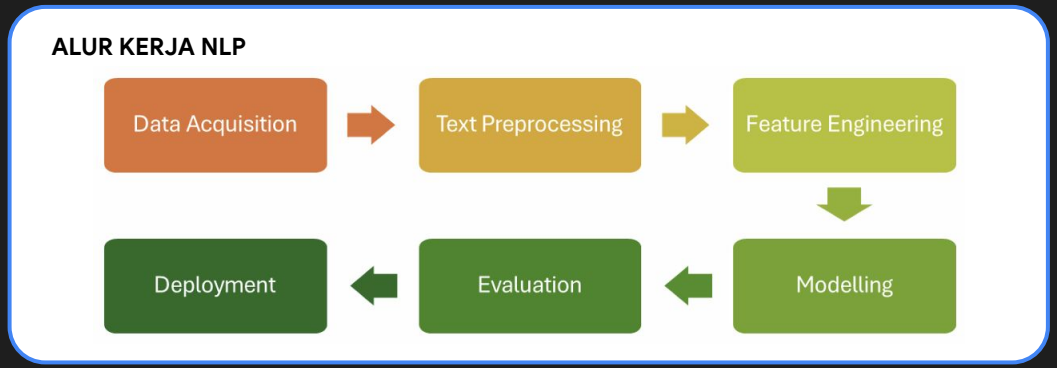
Recurrent Neural Networks (RNN) dan turunannya seperti LSTM dan Transformer lebih cocok untuk data sekuensial seperti teks.

**Self-Attention dan Transformer** → Model seperti BERT dan GPT memungkinkan pemahaman bahasa dengan lebih baik dibandingkan RNN tradisional.



# Feature Representation pada NLP

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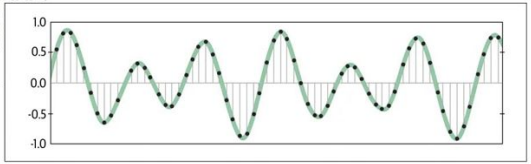
What We See

What Computers See

01




02

```
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1974, 2624, 3793, 4968, 5939, 6057, 6581, 7302, 7640, 7223, 6119, 5461,
4820, 4353, 3611, 2740, 2004, 1349, 1178, 1085, 901, 301, -262, -499,
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350, 103, -113, 64, 176, 93, -249, -461, -606, -909, -1159, -1307, -1544]
```

03 a sentence: "I love my cat"

I → [1 0 0 0],
love → [0 1 0 0],
my → [0 0 1 0],
cat → [0 0 0 1]

sentence = [ [1,0,0,0],[0,1,0,0],[0,0,1,0],[0,0,0,1] ]

# Aplikasi NLP

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- Machine Translation (Google Translate dengan Transformer)
- Text Generation (GPT-4, ChatGPT)
- Sentiment Analysis (Analisis ulasan produk)
- Named Entity Recognition (NER) (Ekstraksi informasi dari teks)

# Next Steps :

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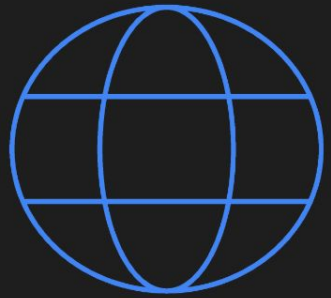
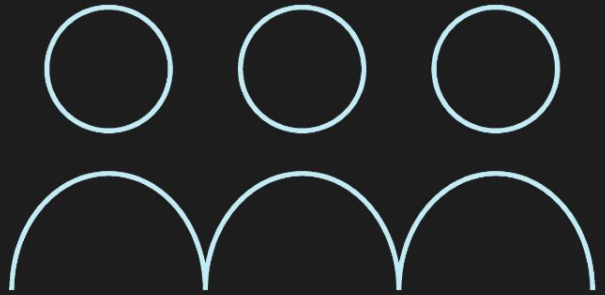
1. Carilah ide untuk mini project dapat dikumpulkan melalui link yang sudah di share di discord.
2. Pengumpulan paling lambat **Jumat, 7 feb 2024**

# Thank You

See You Next Week!

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