

ISOM5240

Deep Learning Business Applications  
with Python

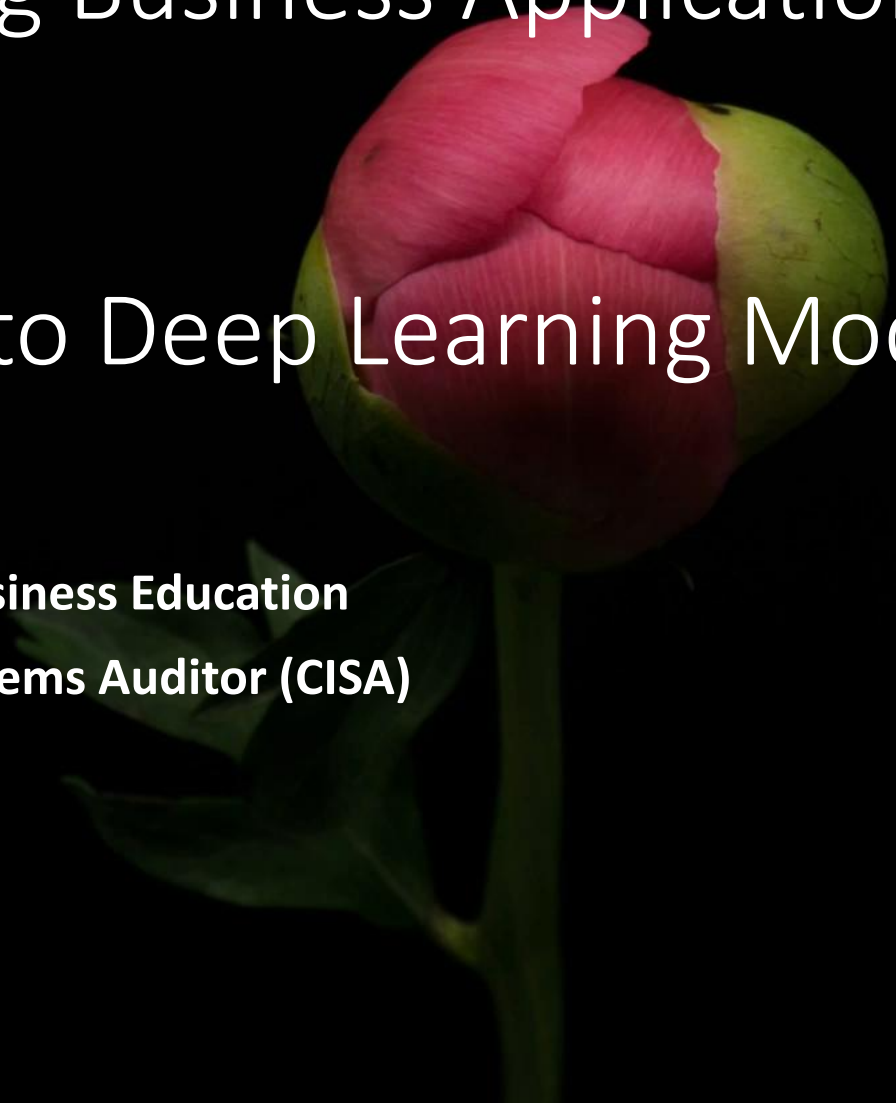
Introduction to Deep Learning Models

**Prof. James Kwok**

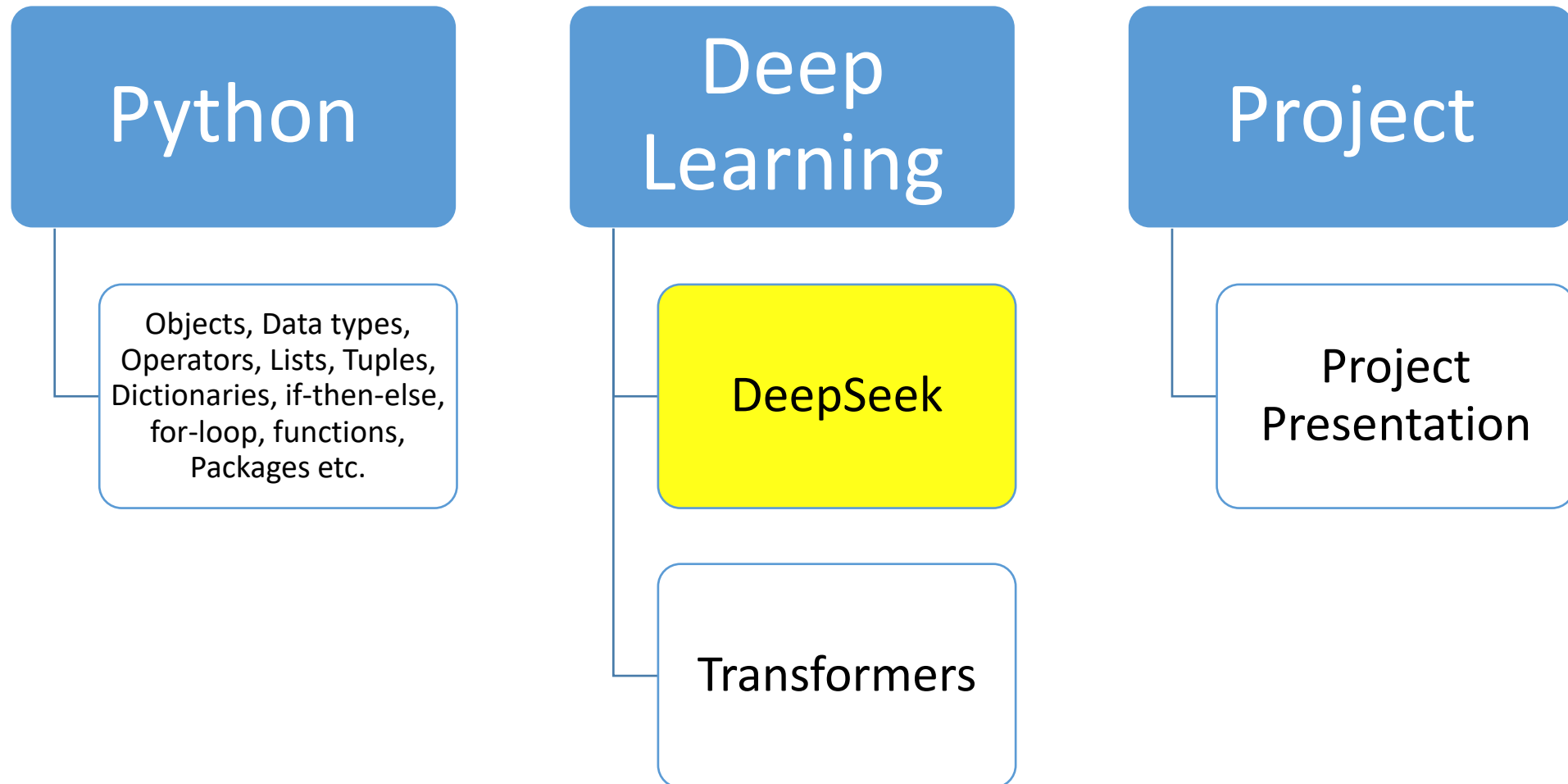
**Associate Professor of Business Education**

**Certified Information Systems Auditor (CISA)**

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# Course Plan – 7 parts in total

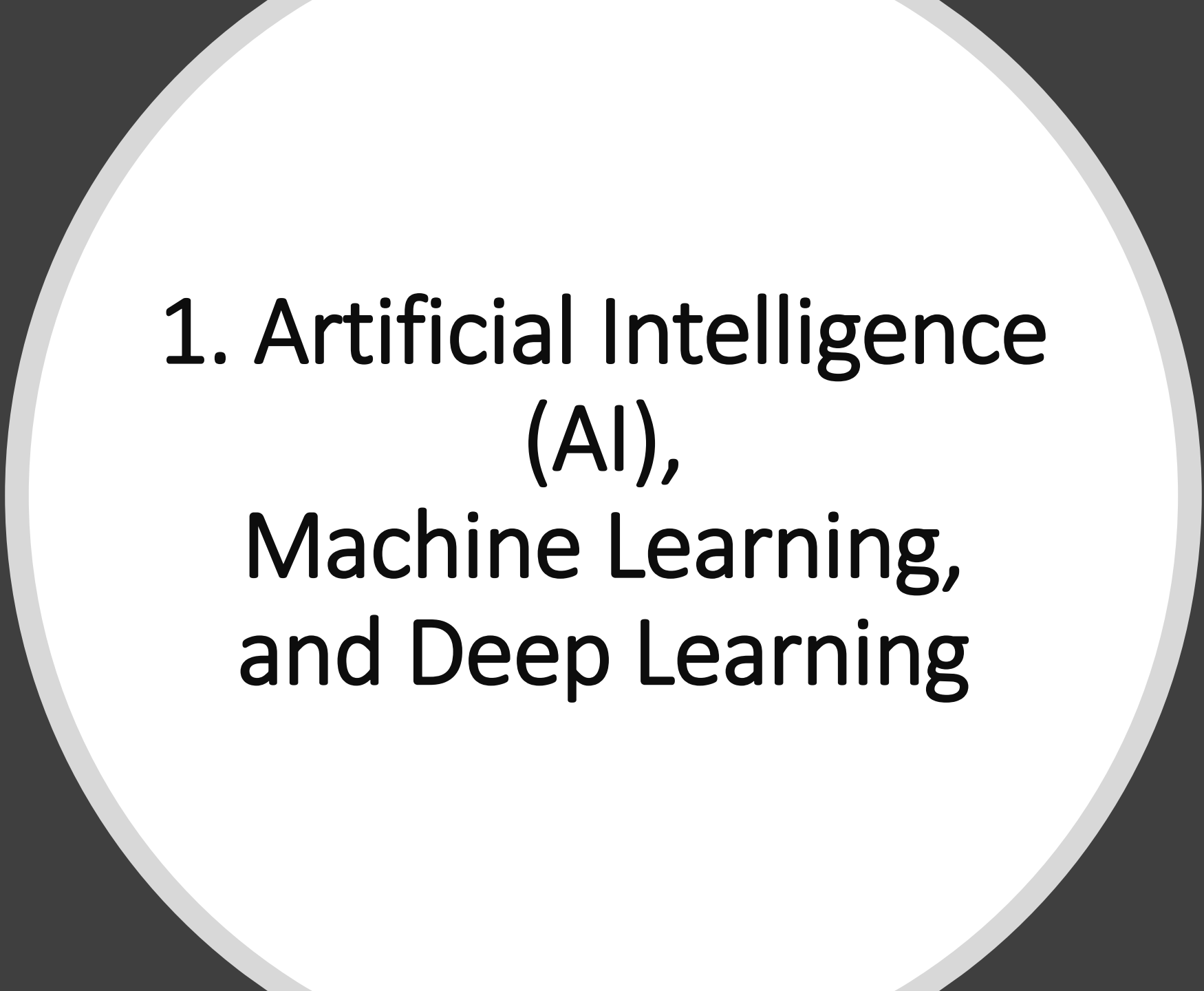




# Outline

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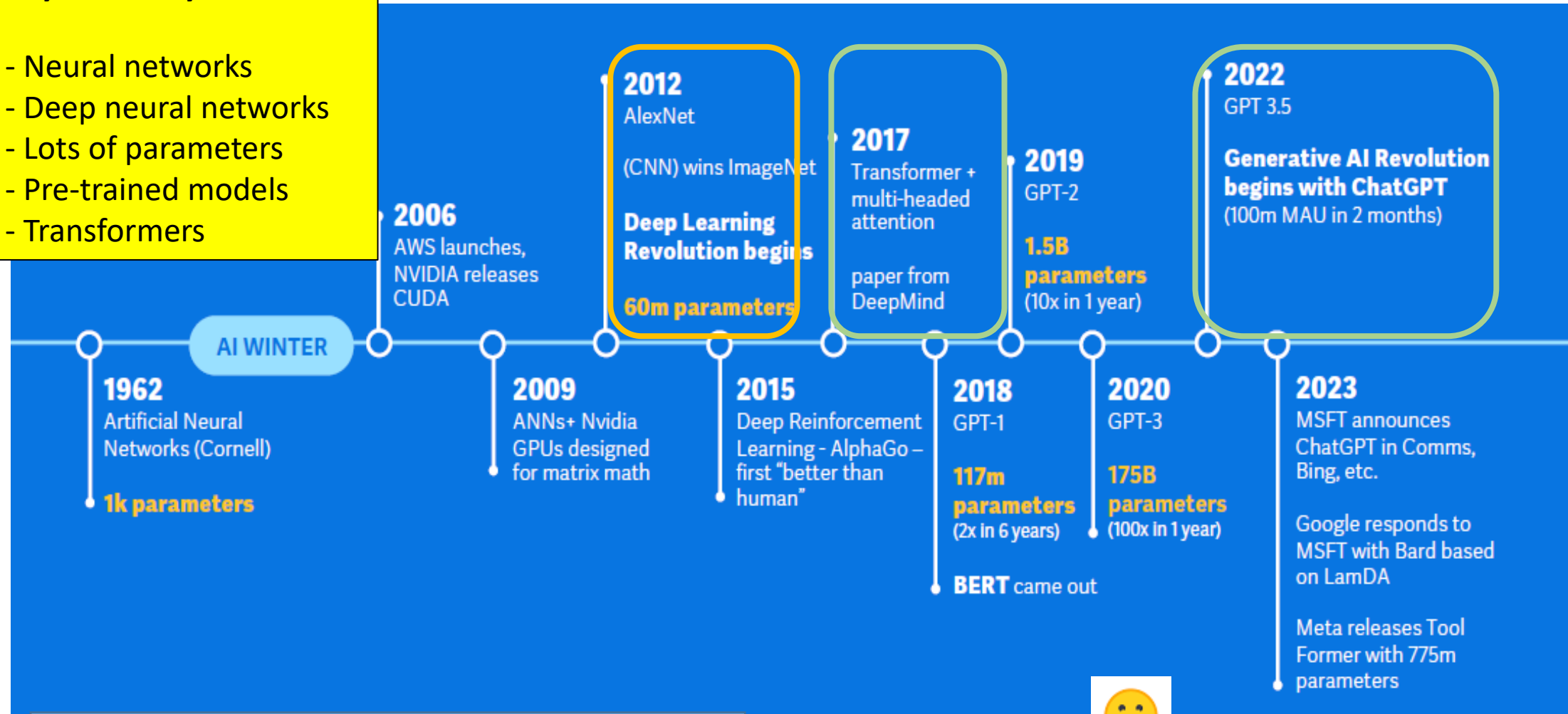
1. Artificial Intelligence (AI), Machine Learning, and Deep Learning
2. Human Brain Vs Deep Learning
3. Different Deep Neural Networks
4. Implementing Deep Learning in Business
5. <<Your First Deep Learning Business Application>>
6. Final Remarks



# 1. Artificial Intelligence (AI), Machine Learning, and Deep Learning

## Key takeaways:

- Neural networks
- Deep neural networks
- Lots of parameters
- Pre-trained models
- Transformers



1000 classes, 60 millions parameters and 650,000 neurons, 5 CNN layers

**Supervised Learning**

Transformer

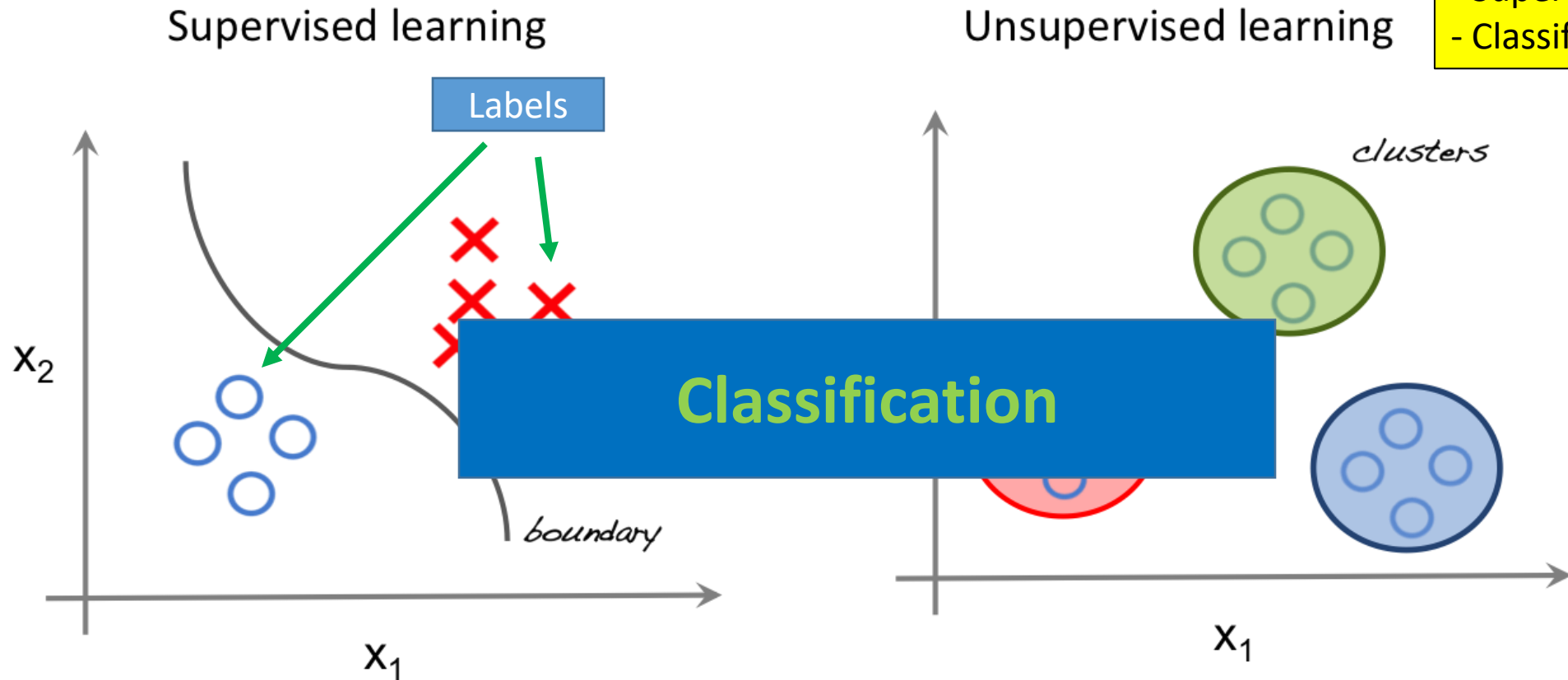
  
Hugging Face  
Transformers

ChatGPT

DeepSeek

# Supervised Learning Vs Unsupervised Learning

ChatGPT uses supervised learning



Key takeaways:

- Supervised learning
- Classification

## Key takeaways:

- Lots of data

# Artificial Intelligence


## Machine Learning

### Deep Learning

**DL** is a specialized form of ML that involves neural networks with multiple layers. These deep neural networks aim to simulate the way the human brain works, allowing for more complex tasks.

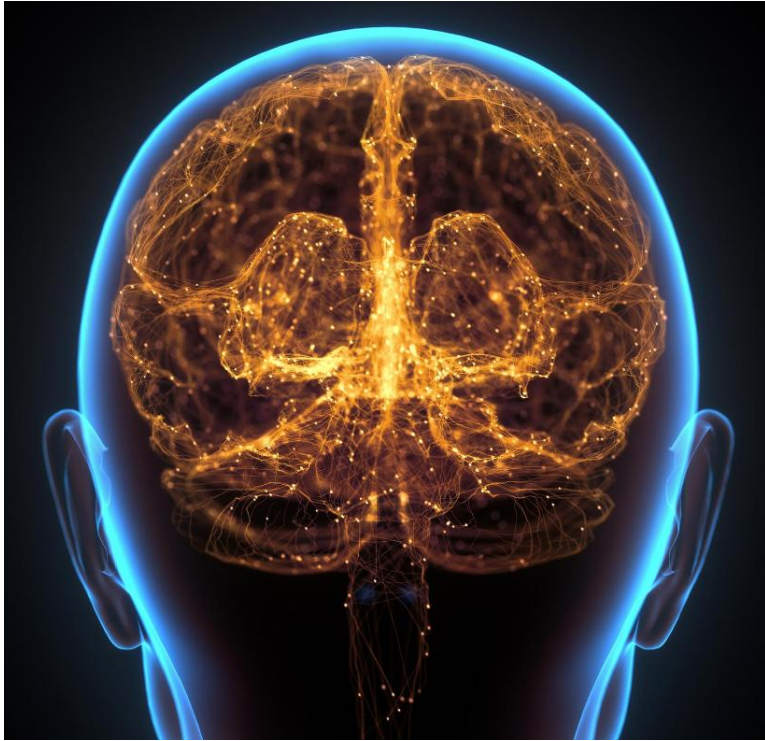
**ML** is a type of AI that enables computers to **learn from data** without being explicitly programmed. It focuses on algorithms that improve their performance over time.

**AI** refers to machines or computer systems that can perform tasks that typically require human intelligence.



## 2. Human Brain vs. Deep Learning

# Deep Learning





### Overall:

**Boss** – e.g., Learning

**Learning:** thinking, remembering, and feeling

**Weight:** 3 pounds

**Power:** 25 watts

**Structure:** cerebrum (2 halves)

**Control:** Solve problems, speaking, drawing, imagination

**Memory:** Short-term and Long-term

### Neurons:

- over 100 billion
- Messages flow backwards and forwards

### Learning:

- Messages travel from one neuron to another
- Brain starts to create connections or **pathways** between neurons
- Trial and error
- Creating pathways is how we learn and remember things

Source: <https://www.youtube.com/watch?v=cgLYkV689s4>

## Human Brain:

**Boss** – e.g., Learning

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## Deep Learning:

**Boss** – e.g., Learning

**Learning:** thinking, remembering, and feeling

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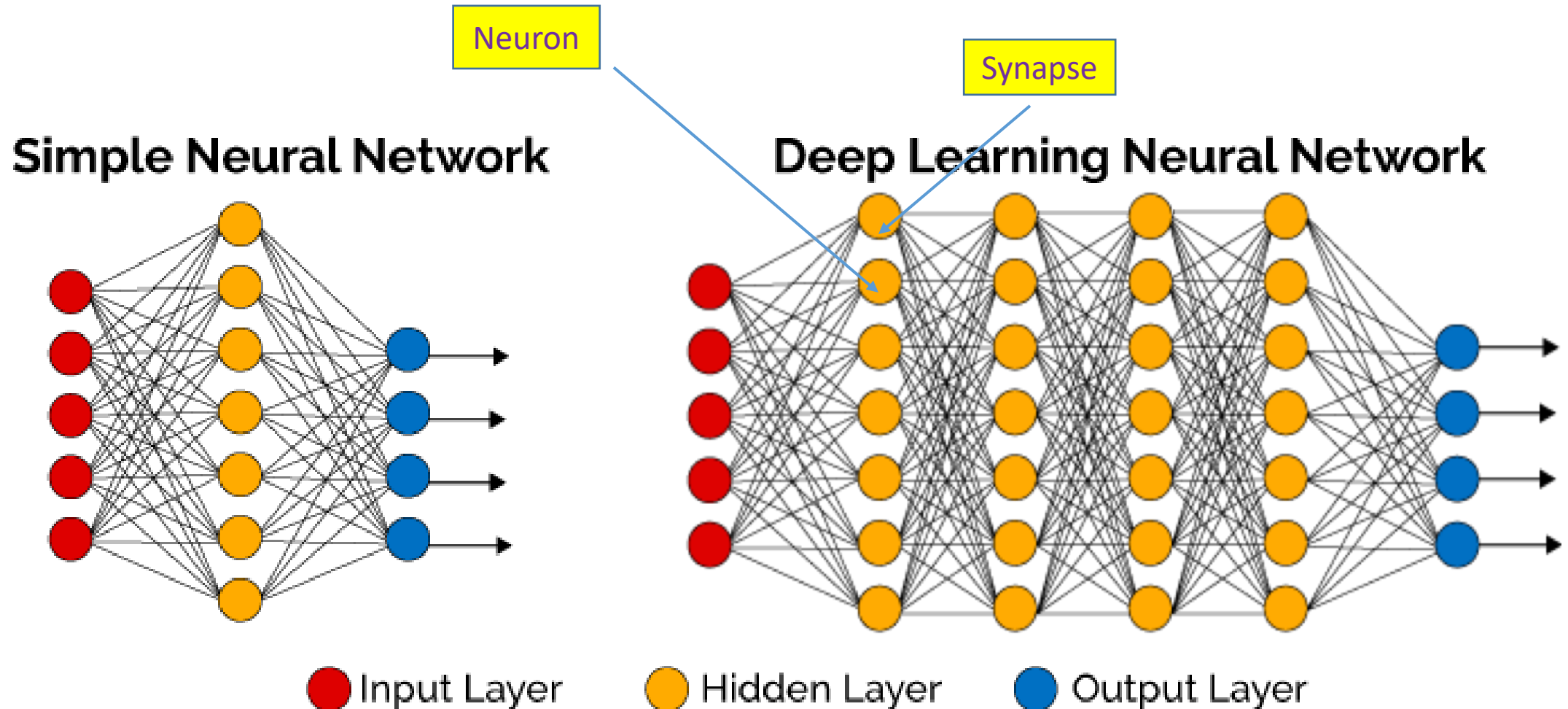
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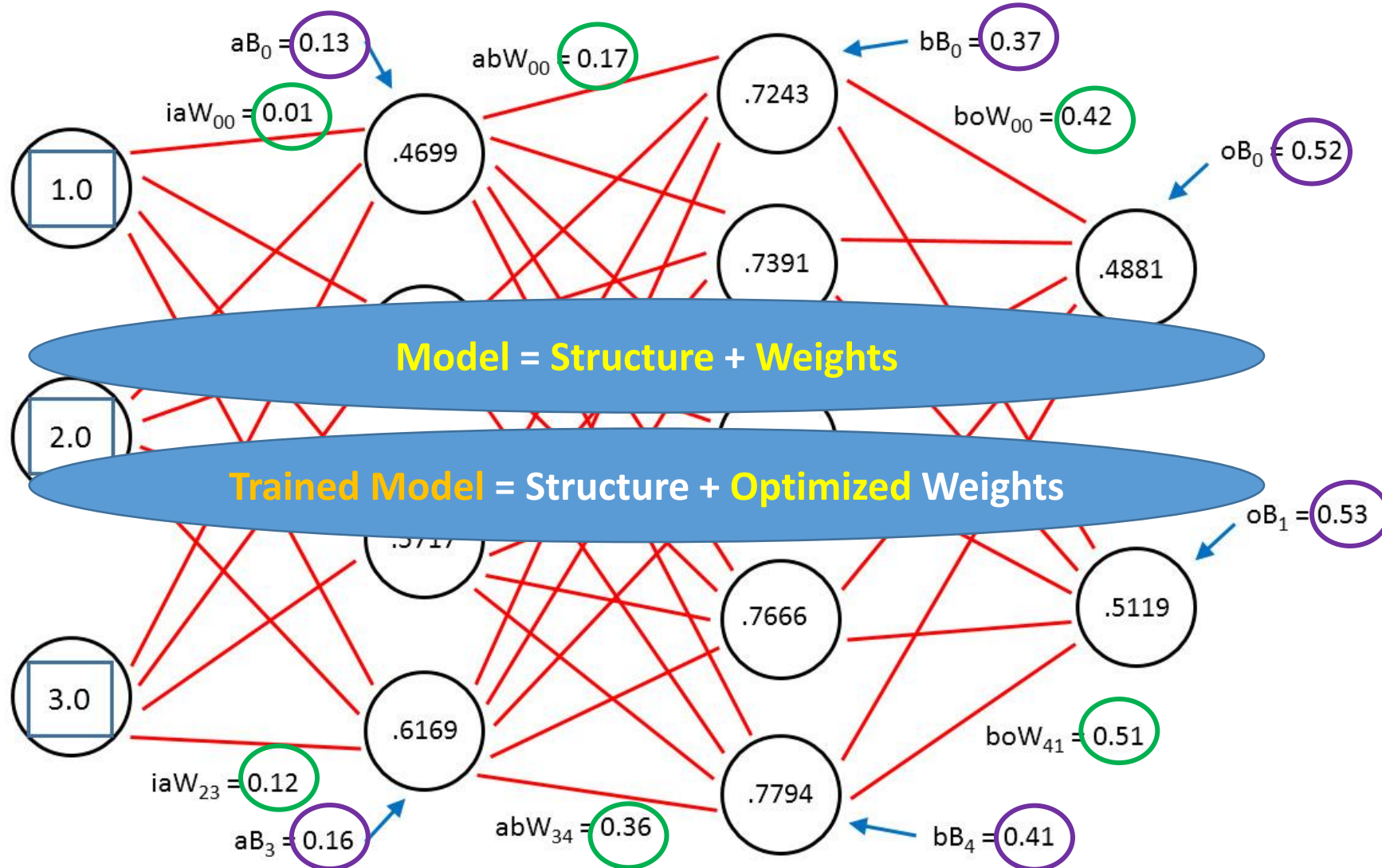
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# Deep Learning Neural Network Model



# Deep Learning Neural Network Model



# An Example of Deep Learning Neural Network

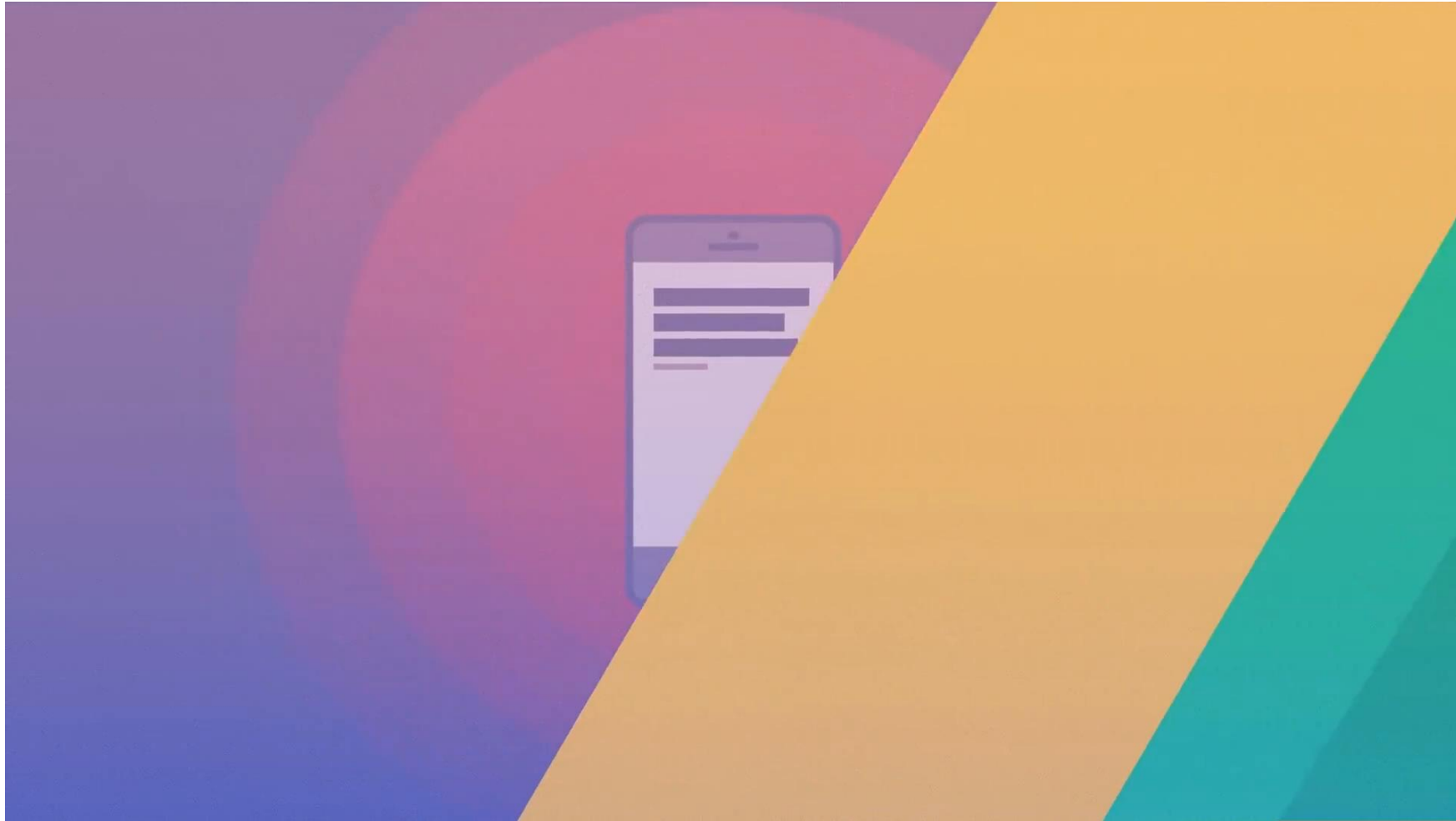
Programming Approach

Try to do: Identify it as a **Cat**

Deep Learning (or ML)  
Approach



# Program vs. Deep Learning



**Source:** <https://www.youtube.com/watch?v=mJeNghZXtMo>

# An Example of Deep Learning

## Key takeaways:

- Train models
- Use Trained models

### Programming Approach

#### Programming Logic:

##### At Pixel level

- (body) Lots of black white colors mixed together
- (eye) black colors surrounded by yellow color (two if them)

**Problem:** Different **Cats**

Try to do: Identify it as a **Cat**



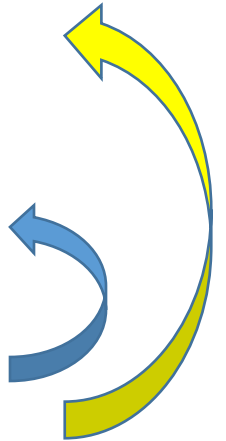
### Deep Learning Approach

**Model**

**Learning:** **Thousands** of **DIFFERENT** cat pictures

**Prediction:** **Evaluate the performance**

**Problem:** Wrong model, data etc.



# An Example of Deep Learning

## Programming Approach

### Programming Logic:

#### At Pixel level

- (body) Lots of black white colors mixed together
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**Problem:** Different **Cats**

**Try to do:** Identify it as a **Cat**

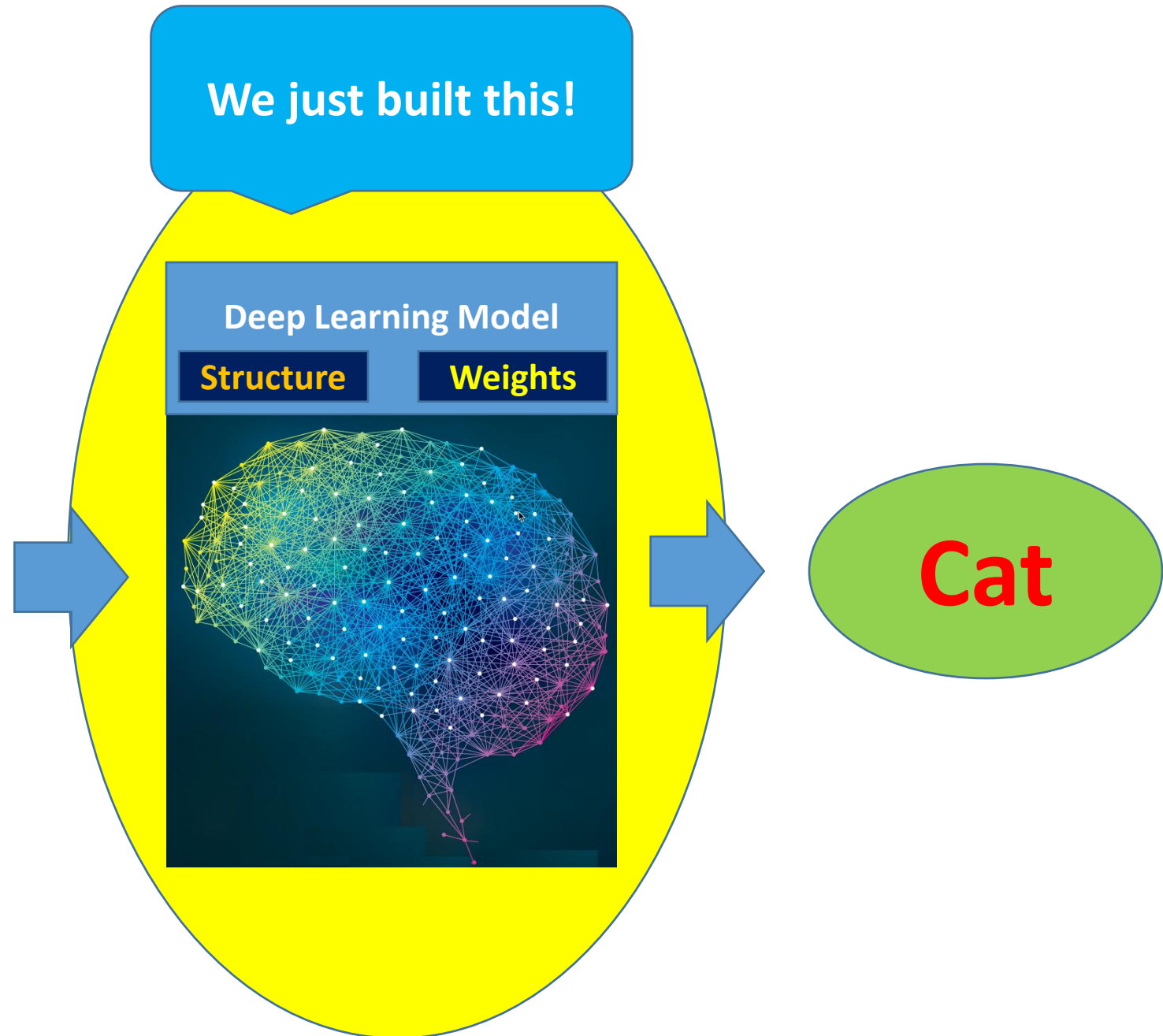


## Deep Learning Approach

**Trained Model**

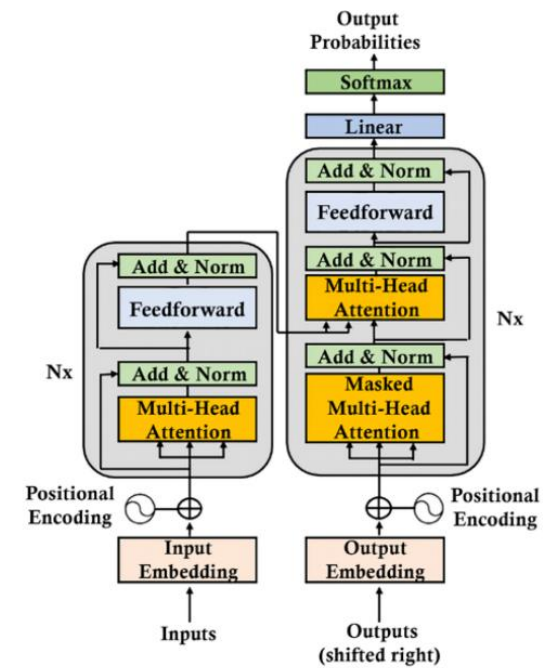
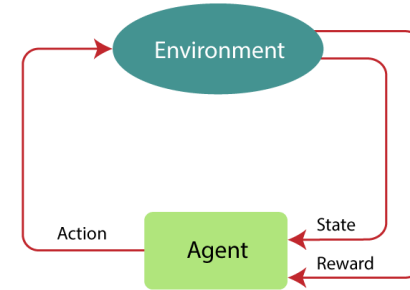
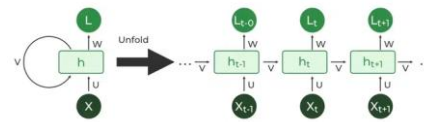
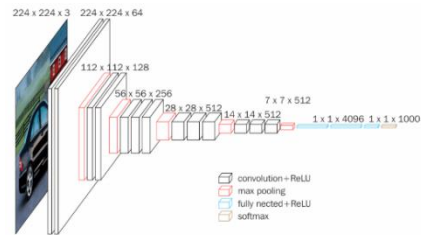
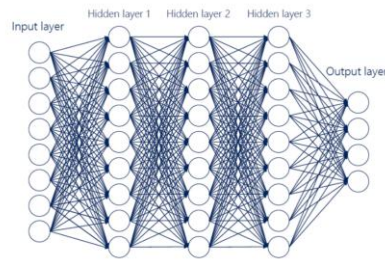
**Problem:** Wrong model, data etc.

# Summary



# 3. Different Deep Neural Networks

# Different Deep Neural Networks



Deep Neural  
Network (DNN)

Convolutional  
Neural Network  
(CNN)

Recurrent  
Neural Network  
(RNN)  
  
Long Short Term  
Memory (LSTM)

Reinforcement  
Learning (RL)

Transformer

**Transformer**

# The Aficionado

Deep music classification. Real time.

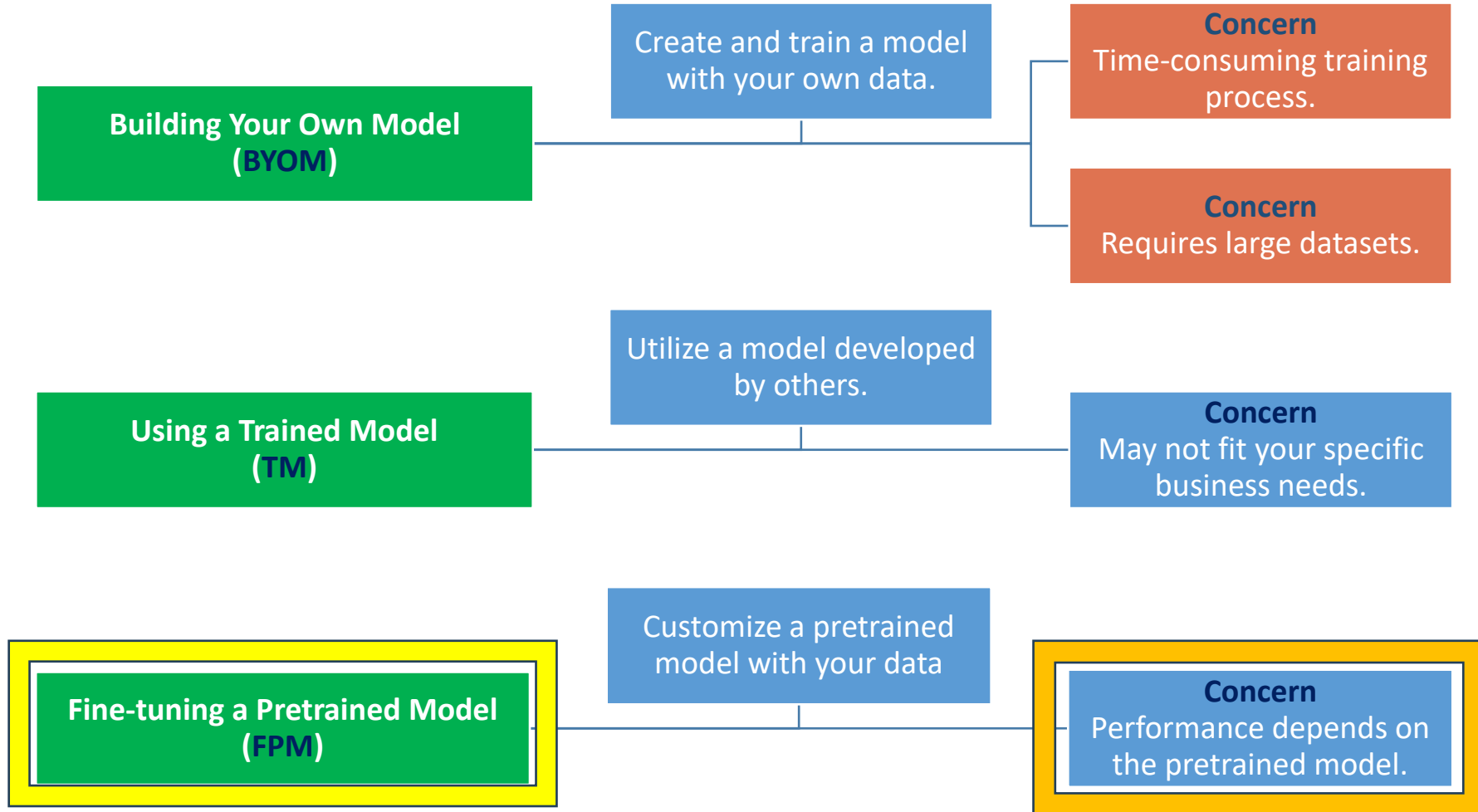
Source: [https://www.youtube.com/watch?v=nOdz80J4\\_Rc](https://www.youtube.com/watch?v=nOdz80J4_Rc)

## Google DeepMind's Deep Q-learning

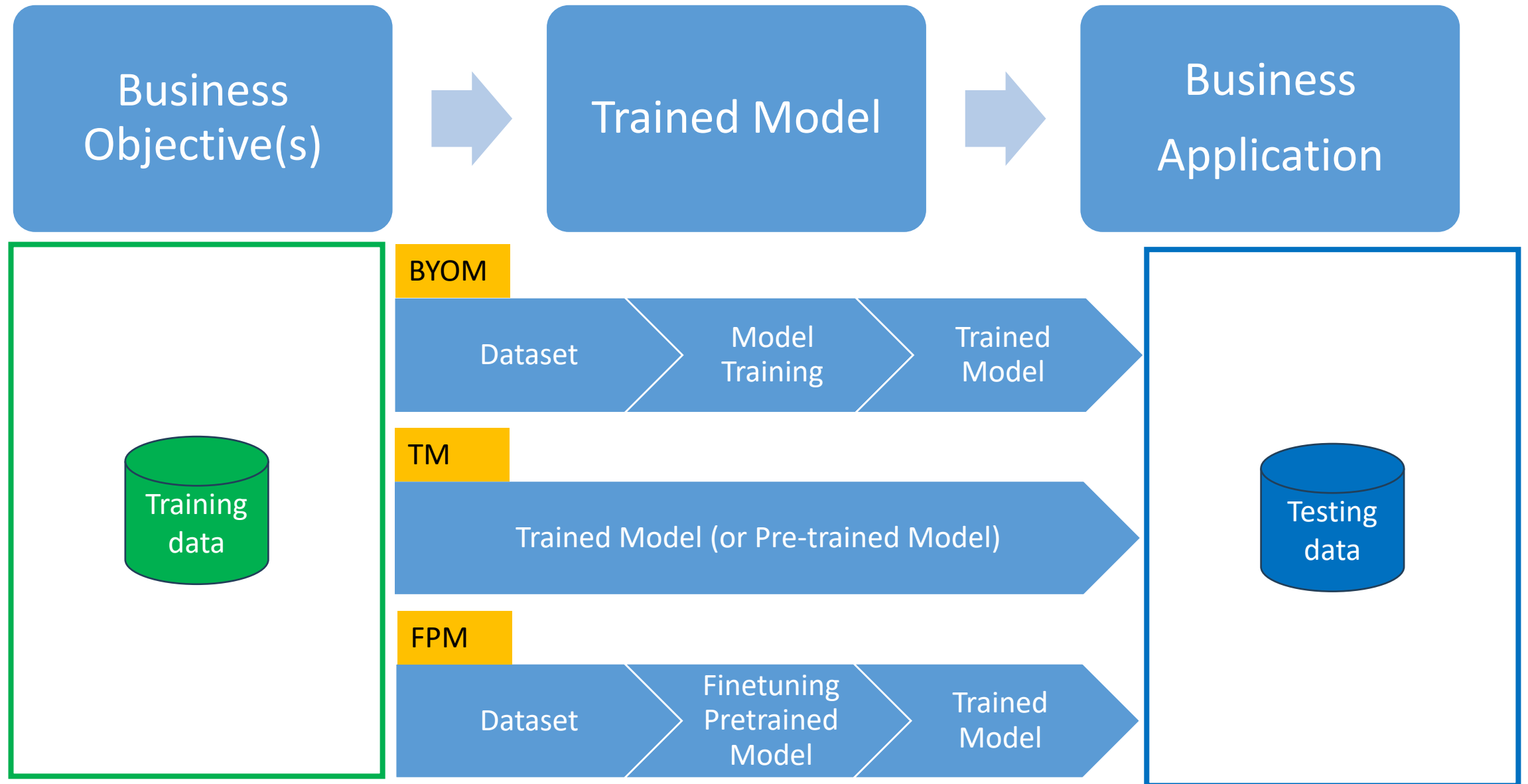
Source: <https://www.youtube.com/watch?v=V1eYniJ0Rnk>

## 4. Implementing Deep Learning in Business

# Implementing Deep Learning in Business



# Deep Learning Business Application



# Deep Learning Business Application: Example

**Key takeaways:**

- Business Obj
- Testing acc

Business Objective(s)

Trained Model

Business Application

**Objective:** Assist medical professionals in predicting whether **a patient in your hospital** has **cancer or not**.

BYOM

Dataset

Model Training

Trained Model

Testing data

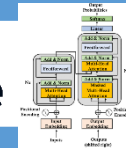
TM

Trained Model (or Pre-trained Model)

FPM



**Hugging Face**



Dataset

Finetuning Pretrained Model

Trained Model

**Testing dataset:** Capture a chest X-ray image from a **new patient**, apply the trained model to the new image, and examine the model's output – **cancer or not**.



Training data

**Dataset:** Utilize chest X-ray images of the **patients in your hospital**.

A yellow starburst graphic with a blue outline, containing the text "In-class Activity".

**In-class  
Activity**

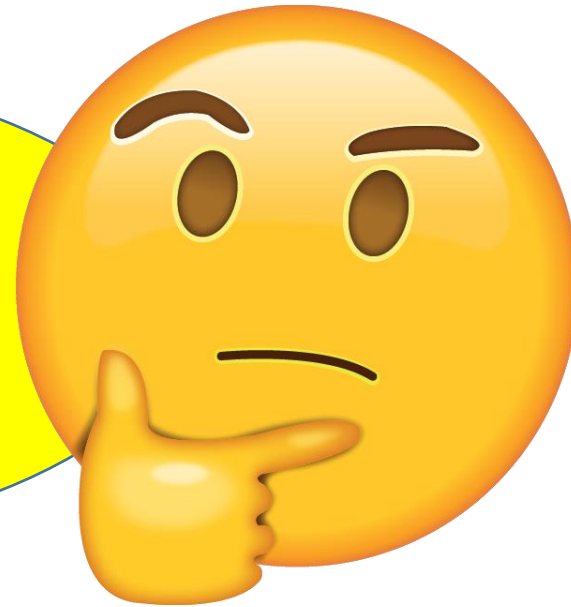
## 5. Your First Deep Learning Business Application

## 6. Final Remarks

# Final Remarks

- Deep learning is the future

**Would AI replace  
Human?**



# No evidence of jobs being entirely automated by AI, analysis shows

Anthropic's assessment of over 4 million user-submitted AI prompts found that most workers used the technology to augment their work, not replace it.

Published Feb. 11, 2025

<https://www.hrdive.com/news/anthropic-report-AI-software-engineers-automation-augmentation/739833/>

## The Anthropic Economic Index

Feb 10, 2025 • 9 min read



<https://www.anthropic.com/news/the-anthropic-economic-index>

End