

# ISOM5240

## Deep Learning Business Applications with Python

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**Certified Information Systems Auditor (CISA)**

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# Attendance Requirement

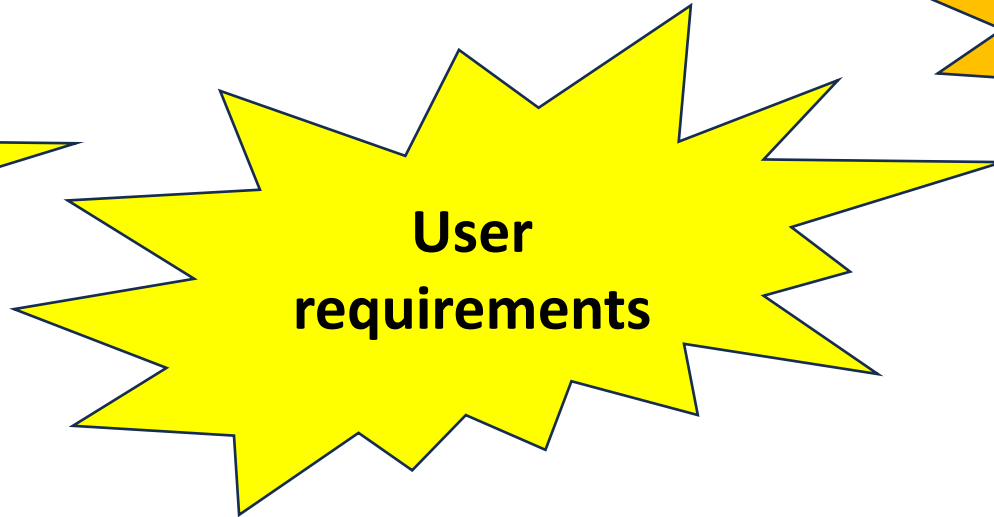
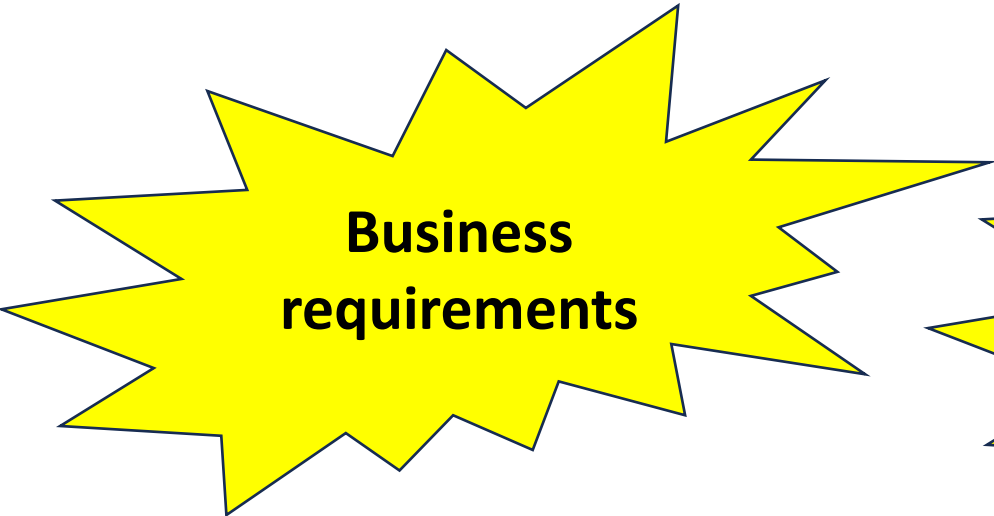
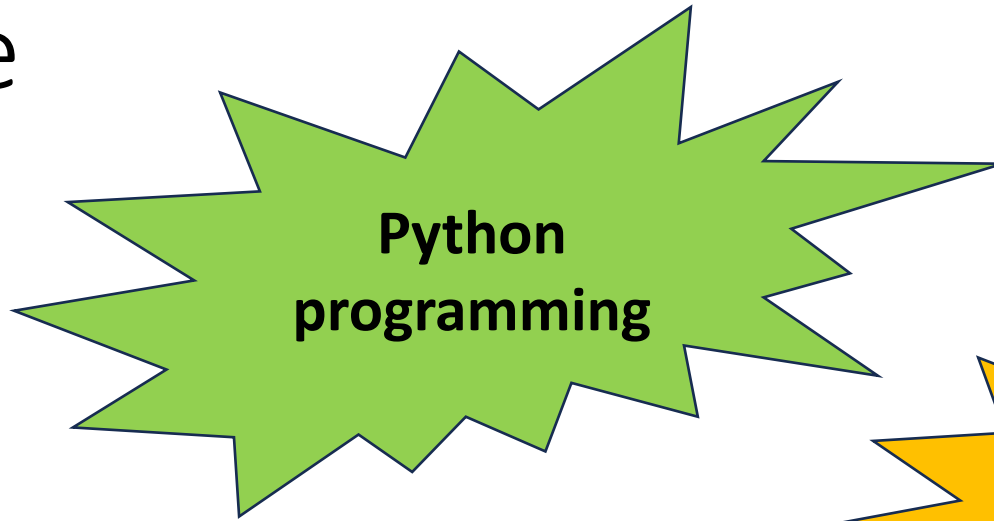
- Attendance at classes is **mandatory** for all courses.
- Students must notify the professor of the course and the HKUST MSBA Program Office **in advance** if they are unable to attend classes.
- Absent with any reason (e.g. sick leave with valid medical proof) will be treated as below:

Absent for	2-credit course (total 8 sessions)
1 <sup>st</sup> time	Allowed (Program Office will issue warning email to students)
2 <sup>nd</sup> time	Allowed (One-third grade reduction will be given)
3 <sup>rd</sup> time	“W” (representing withdrawal from class) will be shown on transcript

- Professors have the discretion to execute a stricter attendance policy at course level.
- Classes will **start on time**.
- Full-time student who are **more than 15 mins late** will be considered **Absent from Class**. Part-time students will be given **30 mins** for the buffer time.
- Students who leave the class early without informing the course instructor and the MSBA Program Office will be considered **absent**.

# About this course

- Python
- Business Applications



# What this course is about

- Deep learning business applications
  - NLP
- Transfer Learning – Pre-trained models
  - Fine-tuned Models
- Python programming
  - Why Python for deep learning
    - Readability
    - Less complexity
    - Easy to understand the code

# Who can benefit from the course?

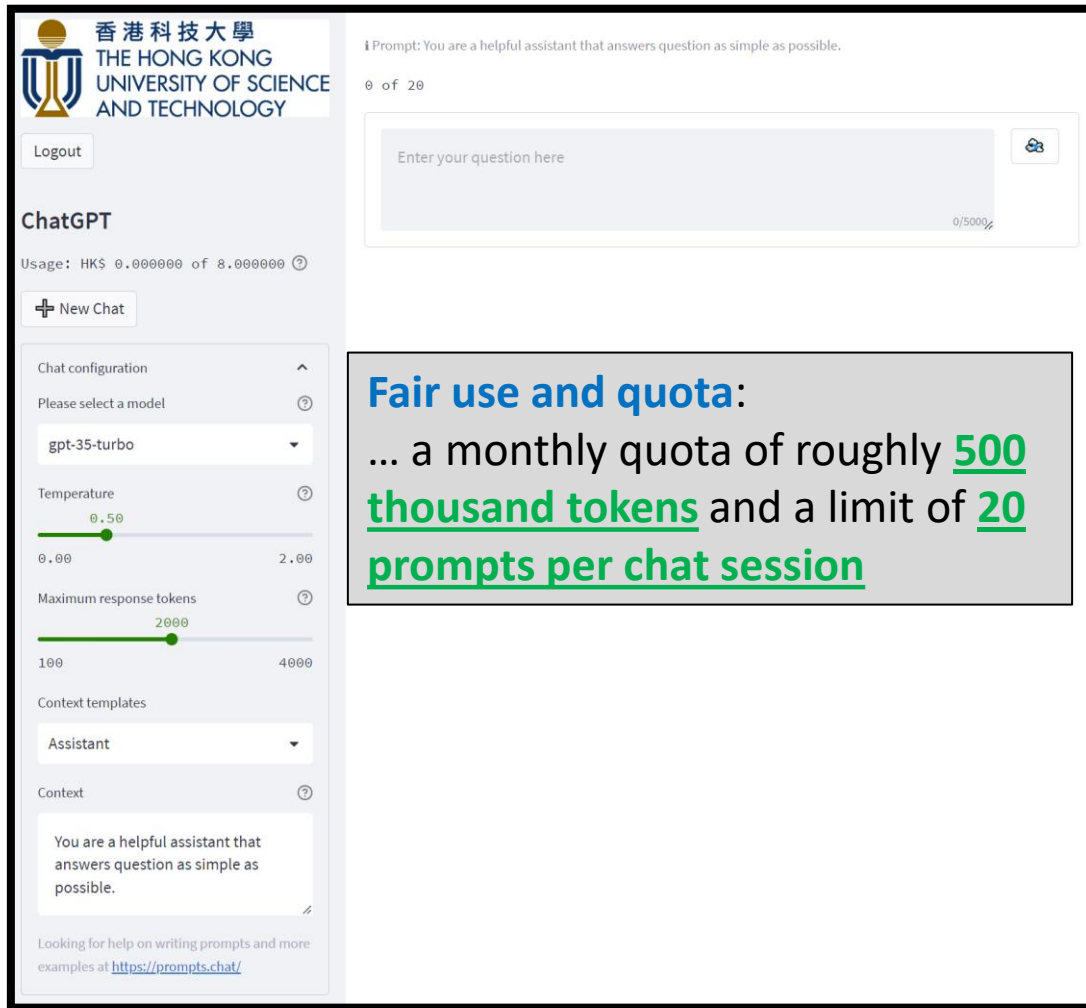
- Those who want to **develop deep learning business applications & models** that can be **used by other users** who need not be familiar with the model
- Those who want to apply **transfer leaning** in business application development
- Those who want to **develop deep learning business applications** which make **tasks easier** for themselves
- Those who want to be aware of the power of Python programming

# Important prerequisites for success

**Get ready to get your hands dirty**

- Learn by doing
  - One **CANNOT** benefit from the course by just **reading lecture materials**
- Learn by yourself (**because you are programmer and developer**)
  - Use google and other resources to learn from others
- Perseverance
  - **Time**
  - **Patience**
- Not scared of programming
  - New to programming: can work with a **partner**, and ask our **TA**

# ChatGPT



香港科技大學  
THE HONG KONG  
UNIVERSITY OF SCIENCE  
AND TECHNOLOGY

Logout

ChatGPT

Usage: HK\$ 0.000000 of 8.000000

+ New Chat

Chat configuration

Please select a model

gpt-35-turbo

Temperature

0.50

0.00 2.00

Maximum response tokens

2000

100 4000

Context templates

Assistant

Context

You are a helpful assistant that answers question as simple as possible.

Looking for help on writing prompts and more examples at <https://prompts.chat/>

**Fair use and quota:**  
... a monthly quota of roughly **500 thousand tokens** and a limit of **20 prompts per chat session**

Prompt: You are a helpful assistant that answers question as simple as possible.

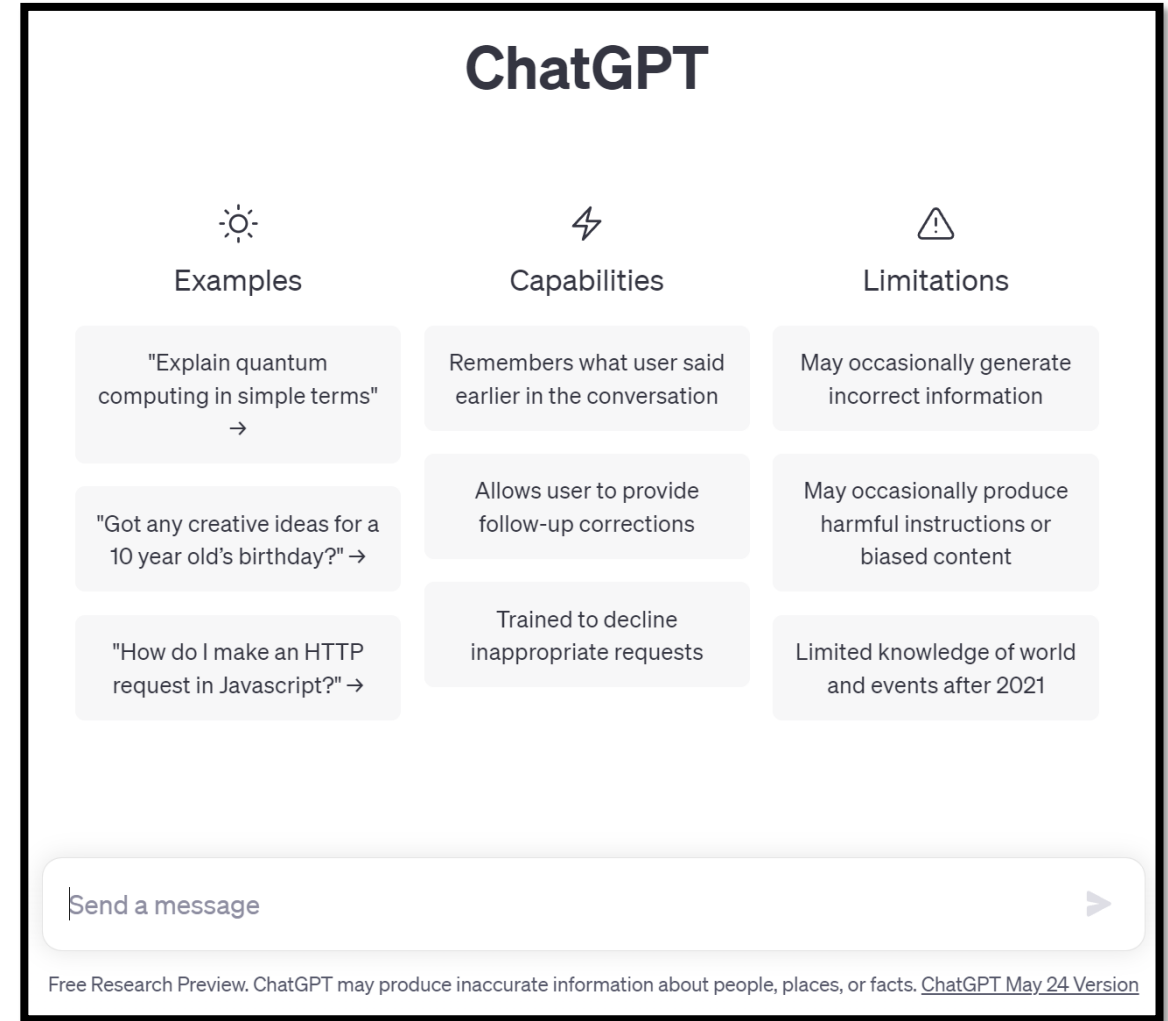
0 of 20

Enter your question here

0/5000

<https://chatgpt.ust.hk/>

<https://itsc.hkust.edu.hk/services/general-it-services/generative-ai-tools/help>



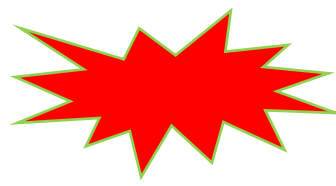
## ChatGPT

Examples	Capabilities	Limitations
"Explain quantum computing in simple terms" →	Remembers what user said earlier in the conversation	May occasionally generate incorrect information
"Got any creative ideas for a 10 year old's birthday?" →	Allows user to provide follow-up corrections	May occasionally produce harmful instructions or biased content
"How do I make an HTTP request in Javascript?" →	Trained to decline inappropriate requests	Limited knowledge of world and events after 2021

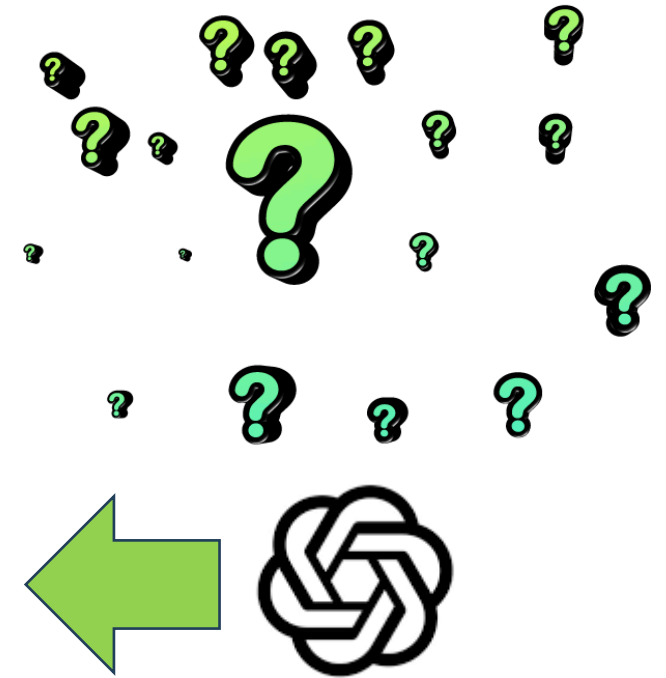
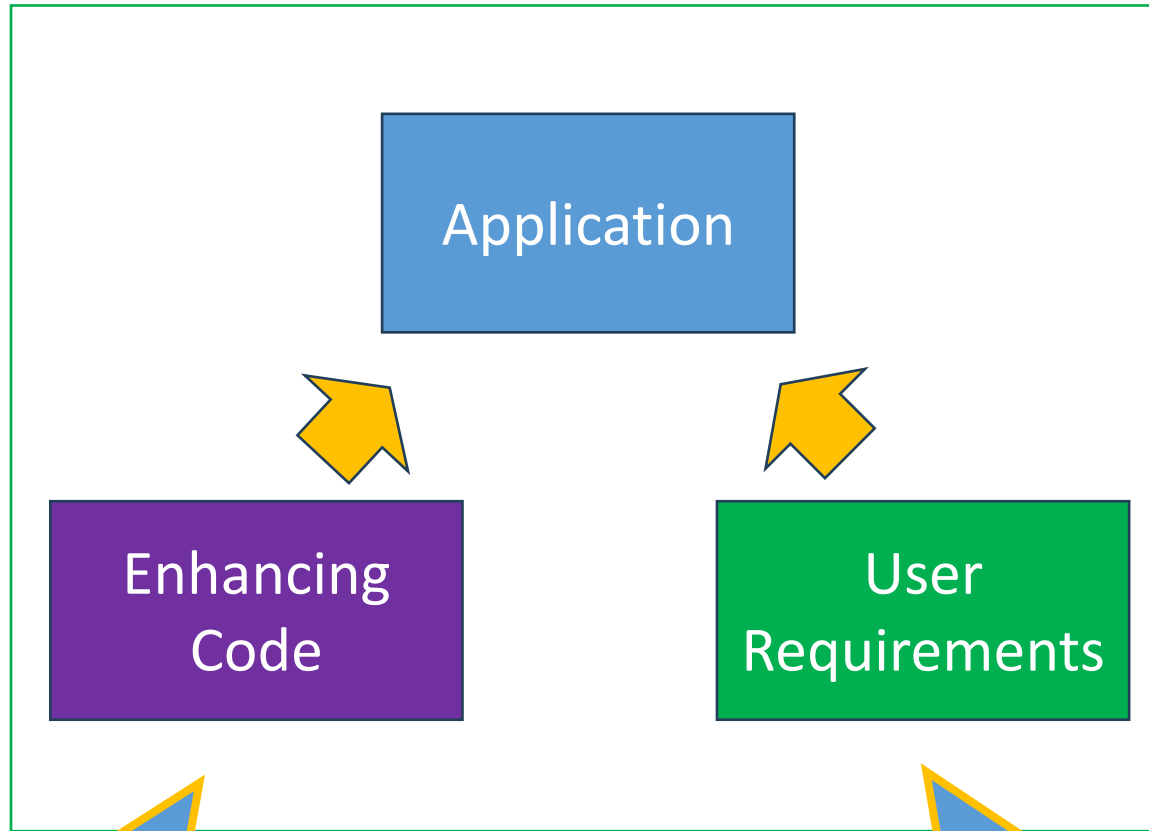
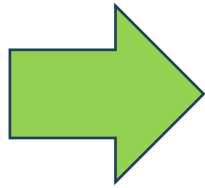
Send a message

Free Research Preview. ChatGPT may produce inaccurate information about people, places, or facts. [ChatGPT May 24 Version](#)

<https://chat.openai.com/>



# Application Development in Python



**“Skilled Developers No Need to Worry About ChatGPT”**

**“ChatGPT is Additional Asset to Developers;  
Not a Replacement”**

**“ChatGPT Can’t Handle Complex Tasks”**

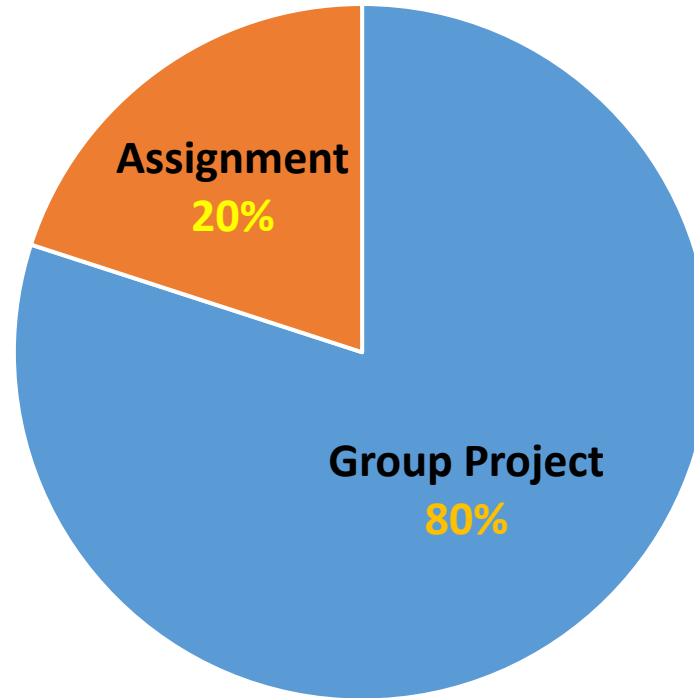
**“Developers Still Needed for Quality Checking”**

**“No Tech is Proven to Replace Creativity”**

**“AI Won’t Steal Your Job; Person Using AI Will”**

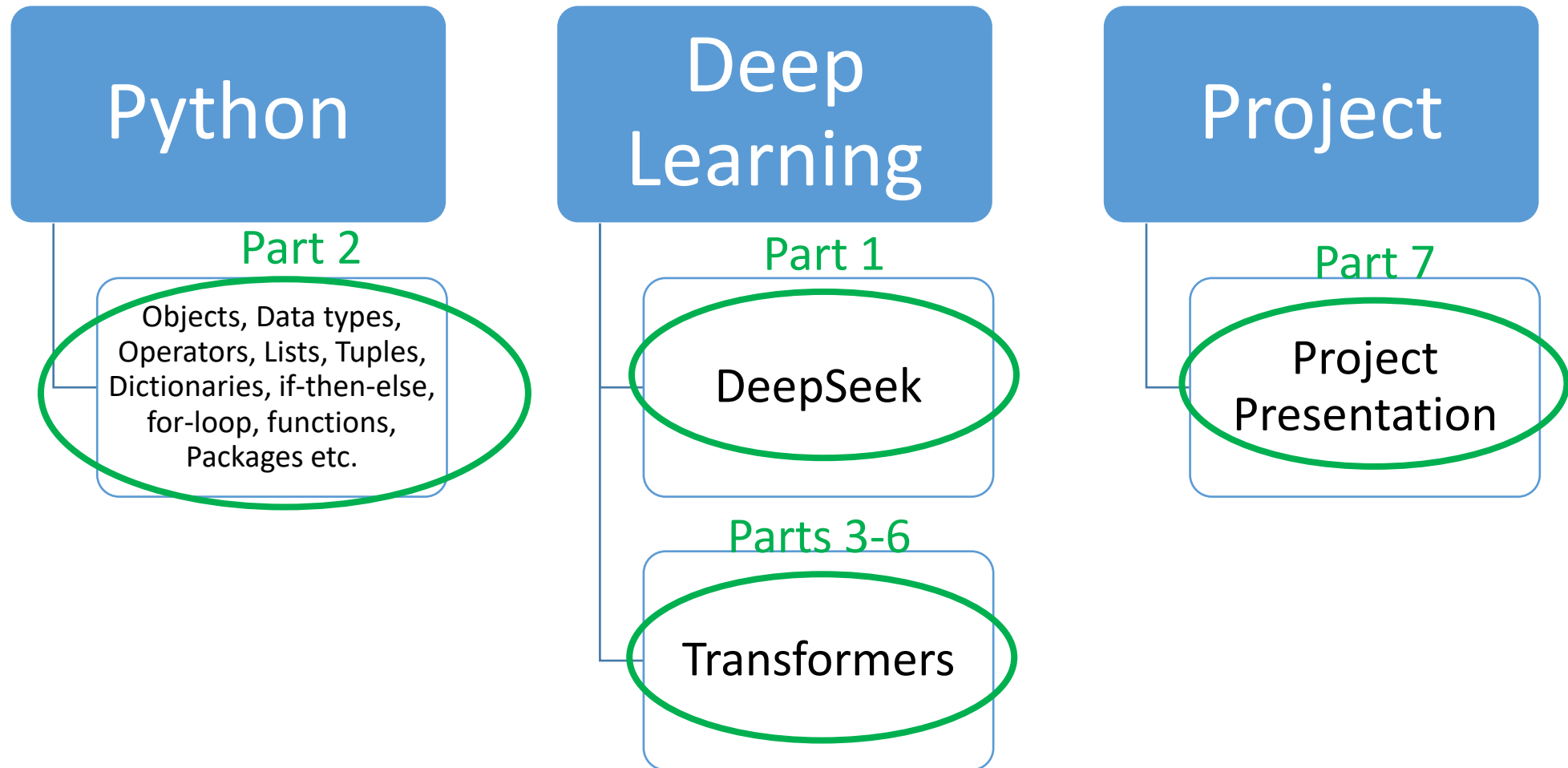


# Grading



- You may work **alone or in a group of two students** for project.
- The submission deadline of lab assignment will be announced during class.
- The topic of project should be discussed with the instructor beforehand.

# Course Plan – 7 parts in total



End

ISOM5240

Deep Learning Business Applications  
with Python

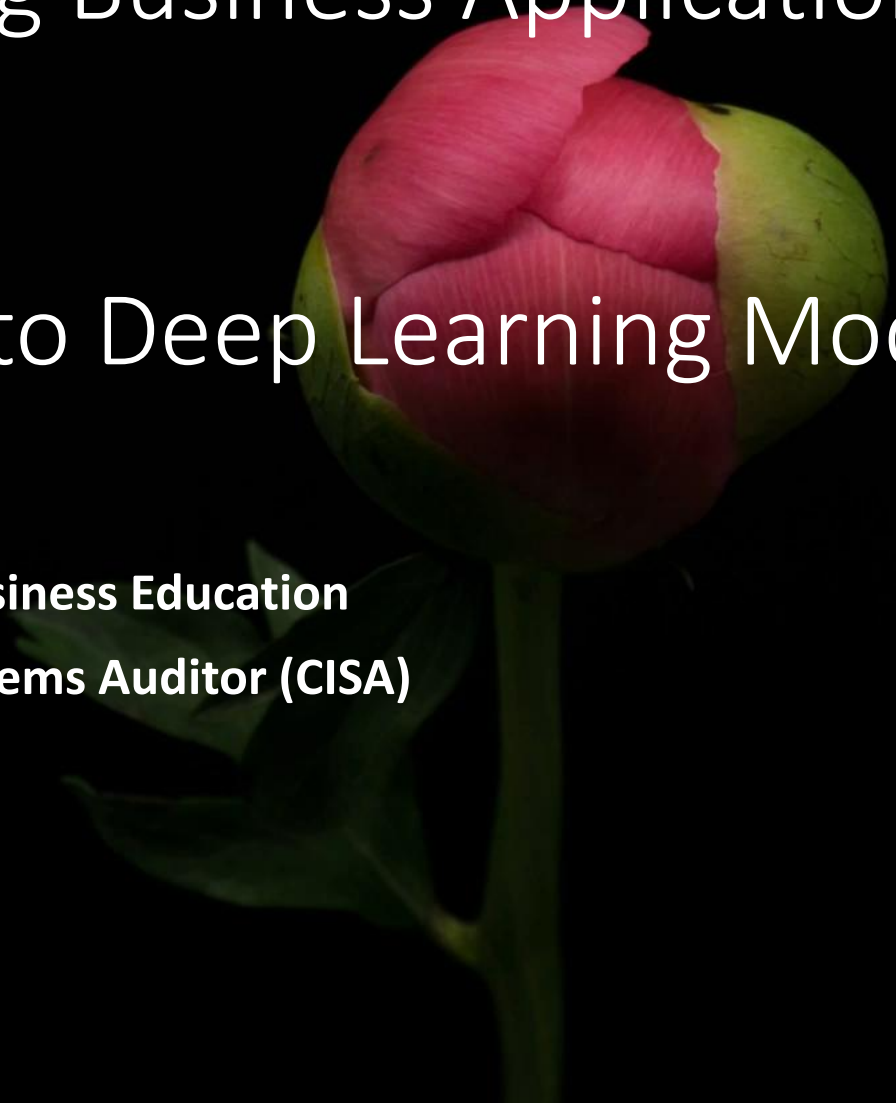
Introduction to Deep Learning Models

**Prof. James Kwok**

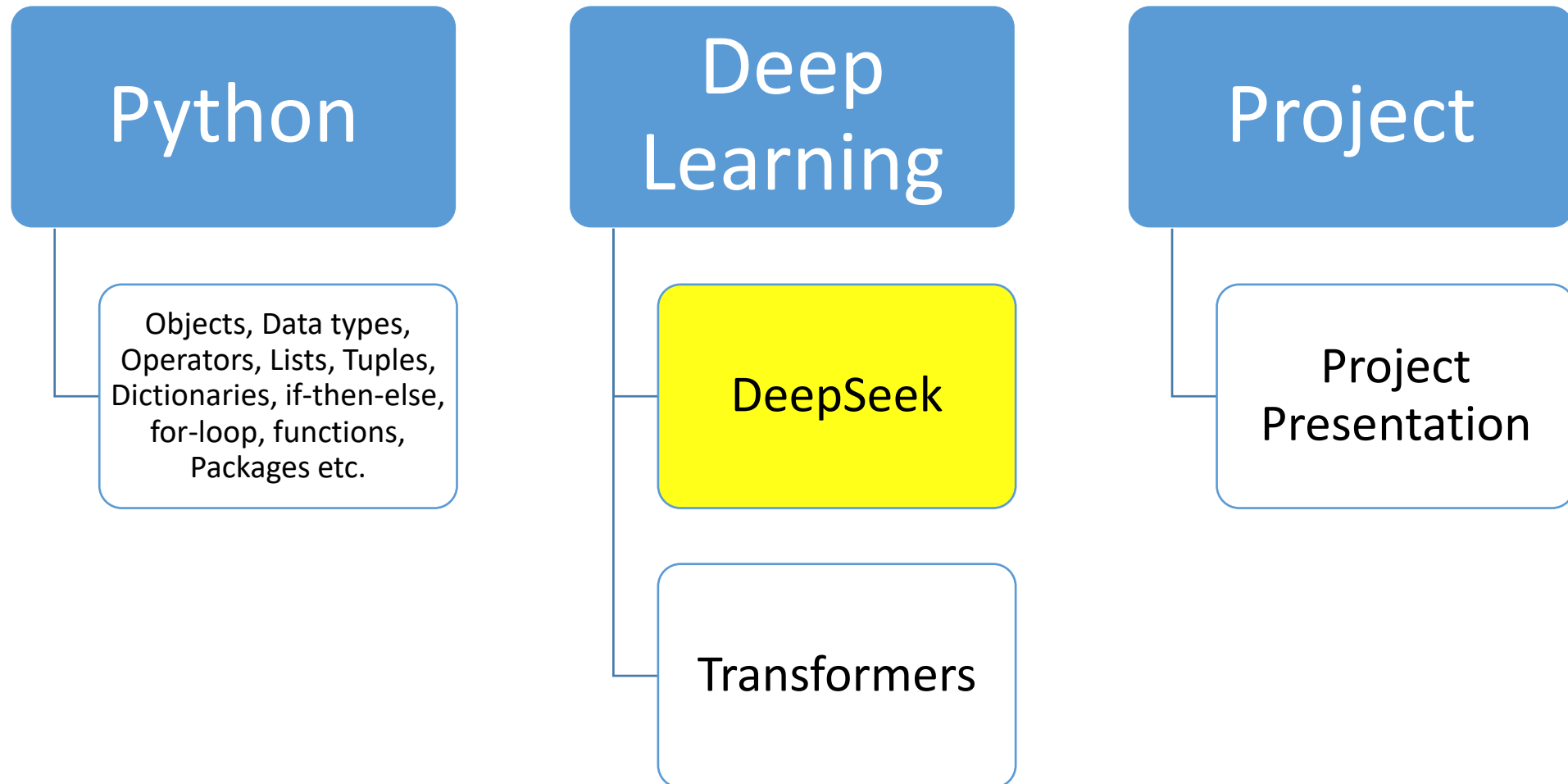
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# Course Plan – 7 parts in total

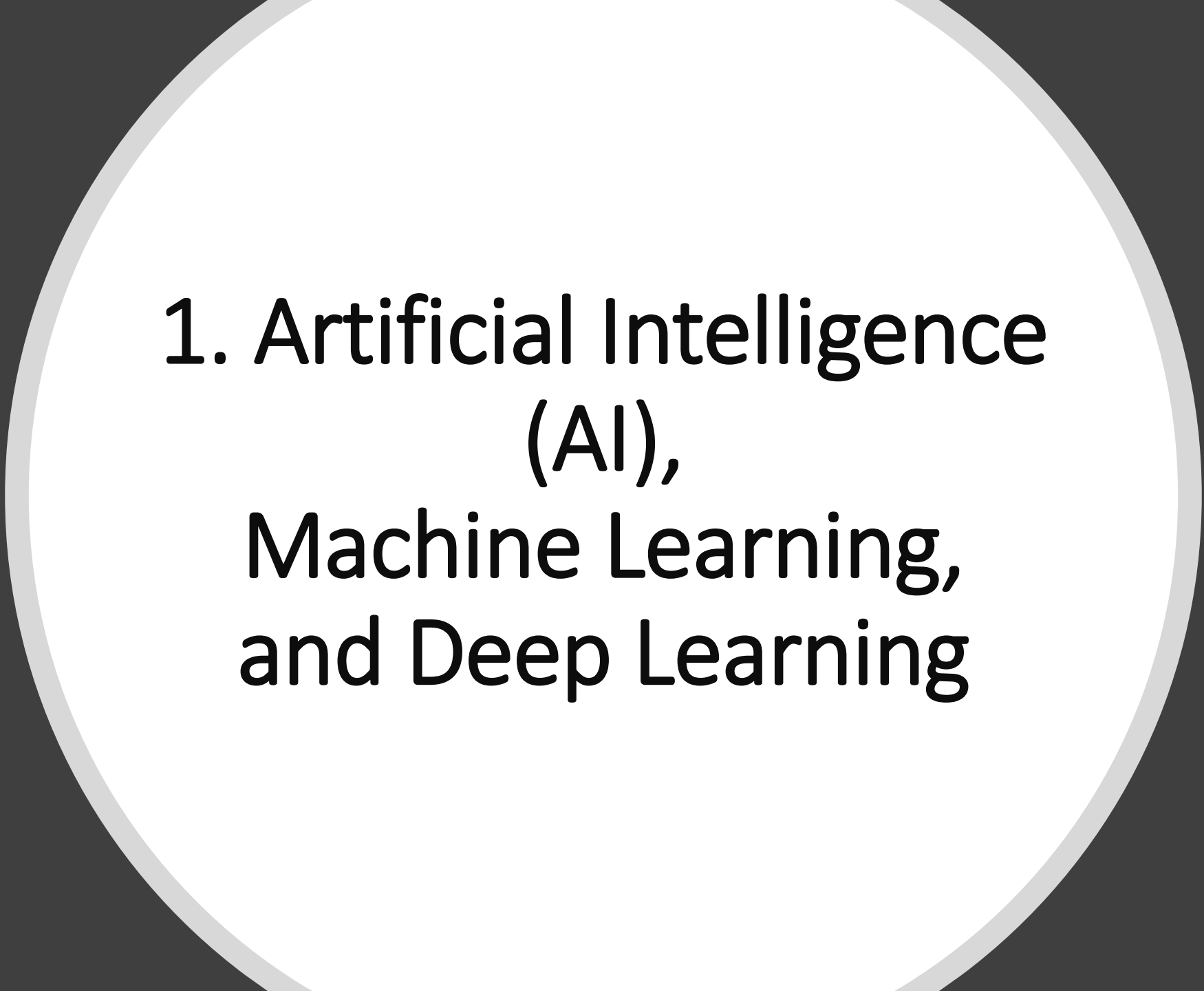




# Outline

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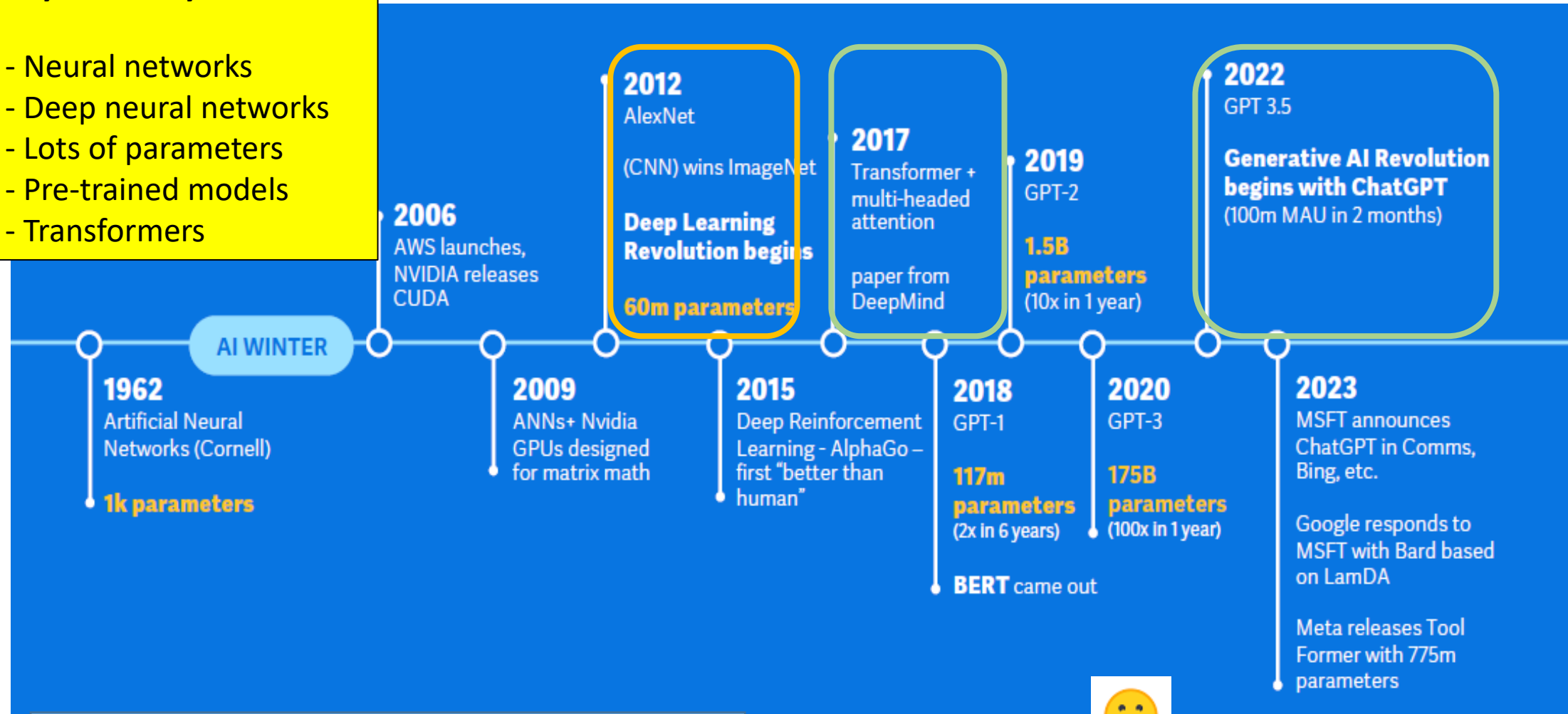
1. Artificial Intelligence (AI), Machine Learning, and Deep Learning
2. Human Brain Vs Deep Learning
3. Different Deep Neural Networks
4. Implementing Deep Learning in Business
5. <<Your First Deep Learning Business Application>>
6. Final Remarks



# 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**

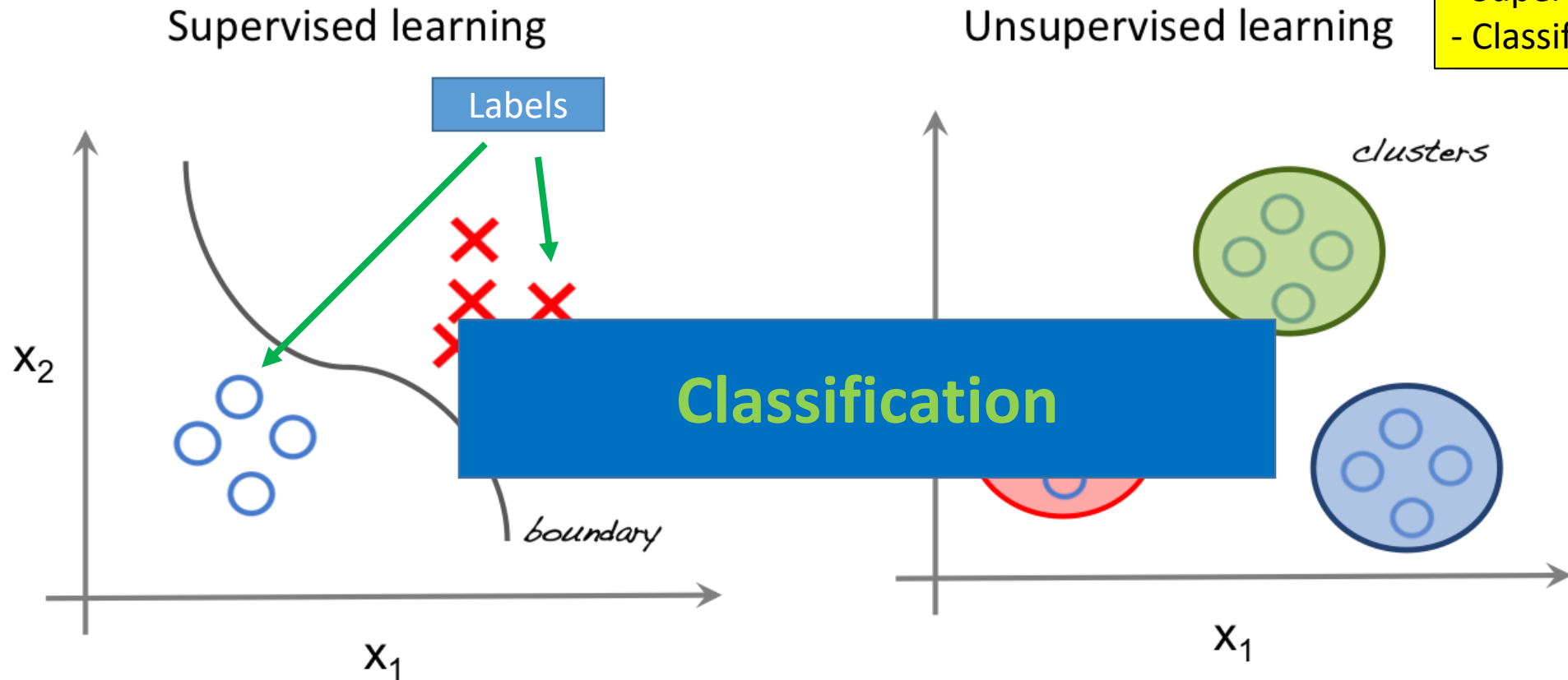
  
**Hugging Face Transformers**

**ChatGPT**

**DeepSeek**

# Supervised Learning Vs Unsupervised Learning

ChatGPT uses supervised learning



Key takeaways:

- Supervised learning
- Classification

## Key takeaways:

- Lots of data

# Artificial Intelligence

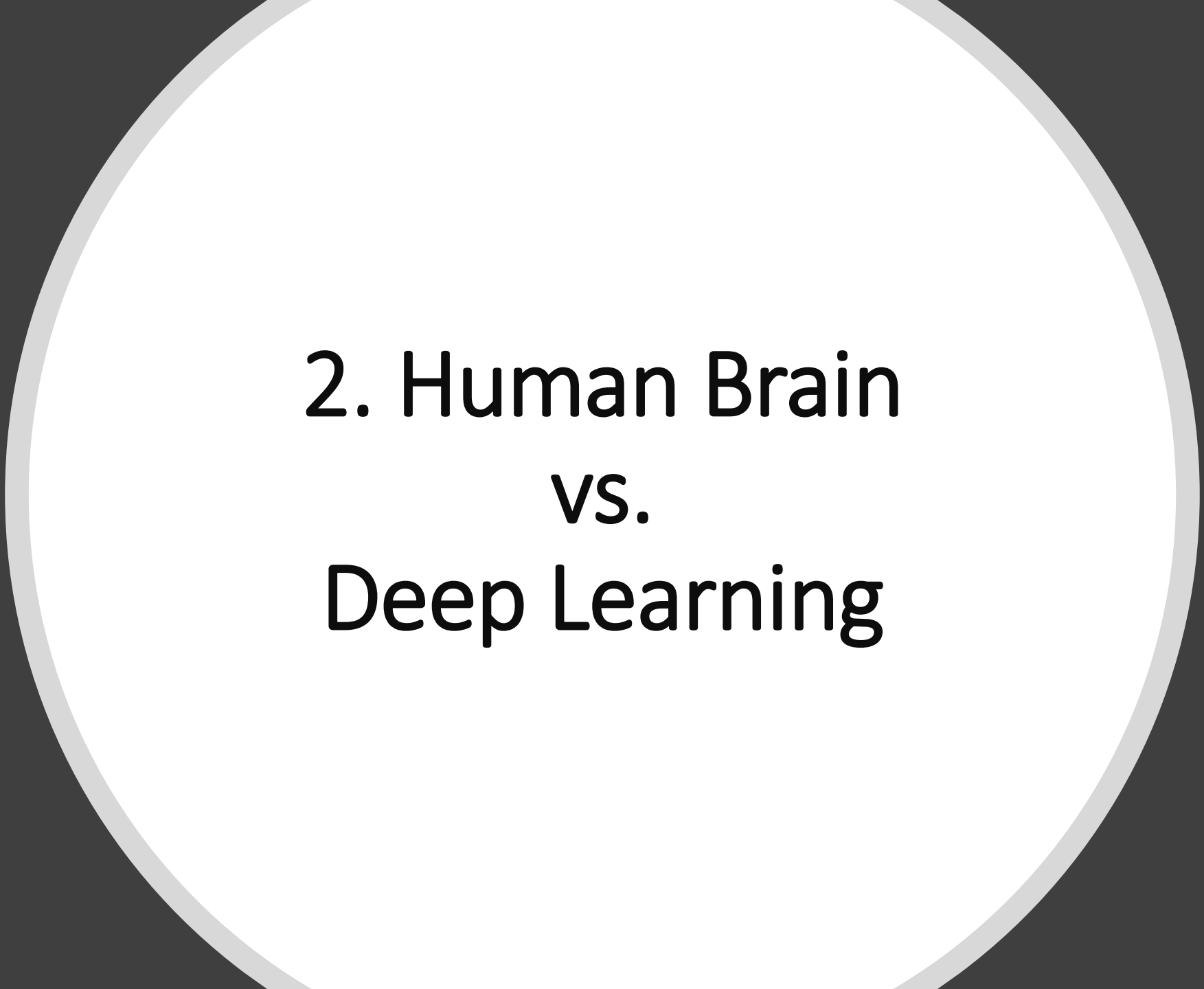
## Machine Learning

### 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.

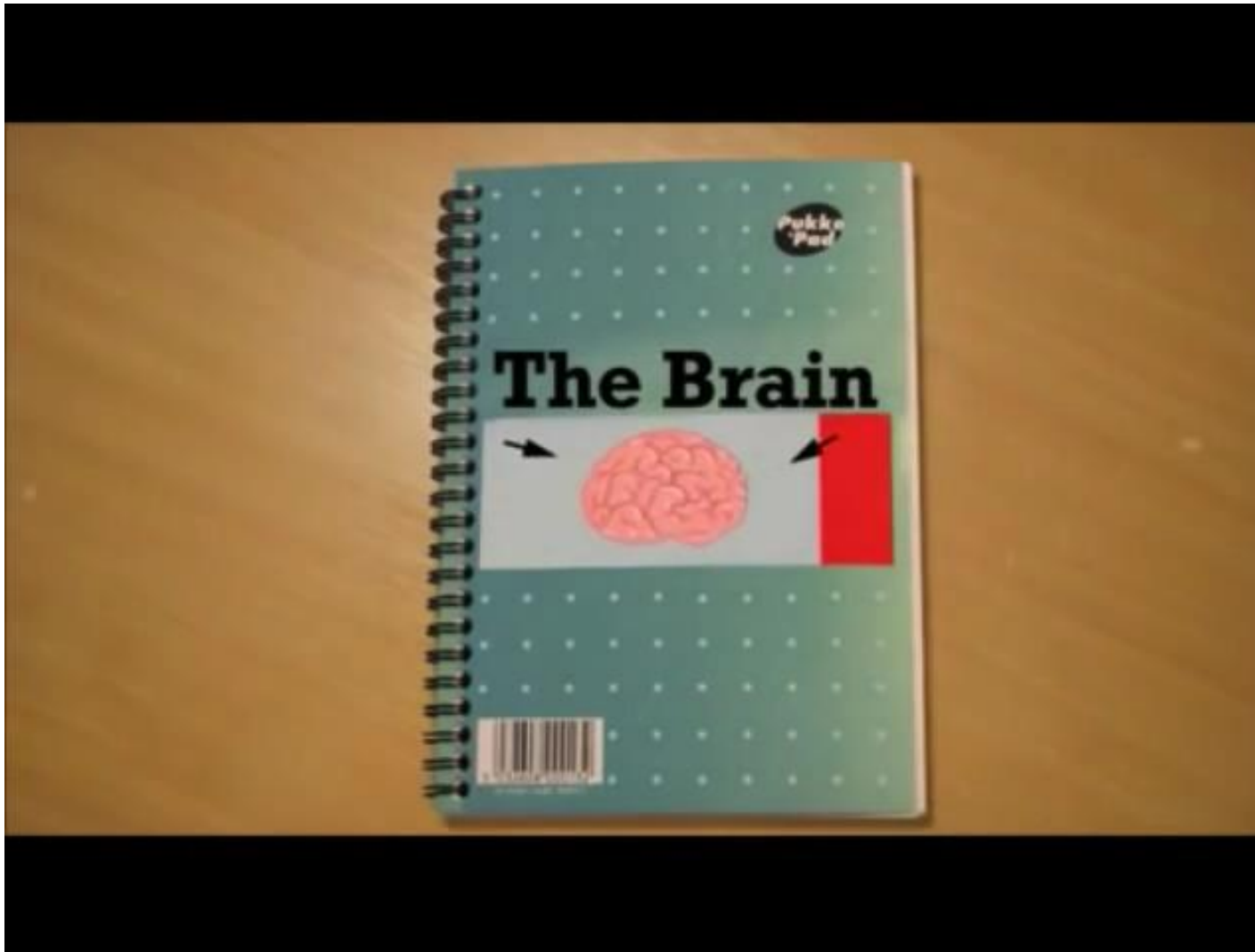
**AI** refers to machines or computer systems that can perform tasks that typically require human intelligence.



## 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:

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## Deep Learning:

**Boss** – e.g., Learning

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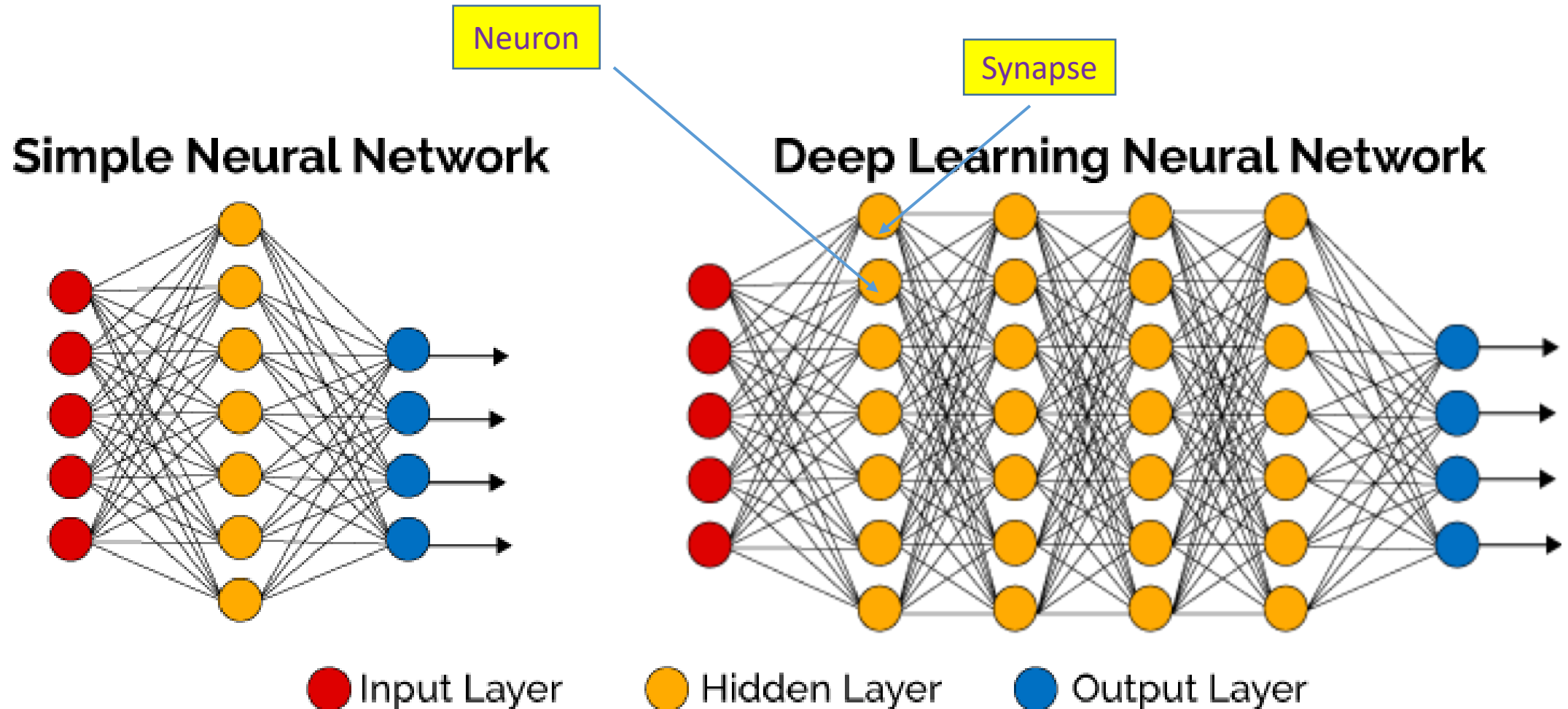
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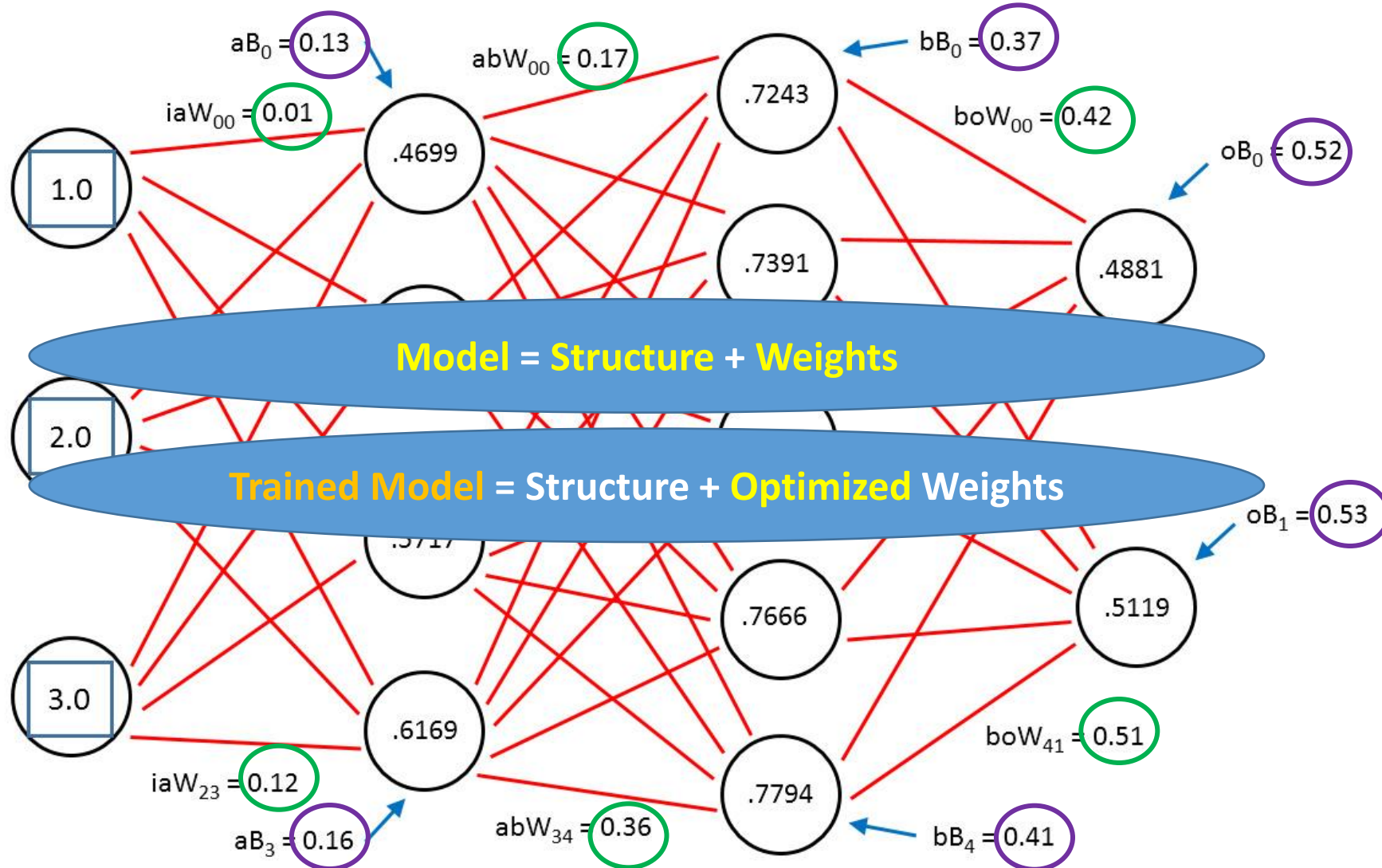
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# Deep Learning Neural Network Model



# Deep Learning Neural Network Model



# An Example of Deep Learning Neural Network

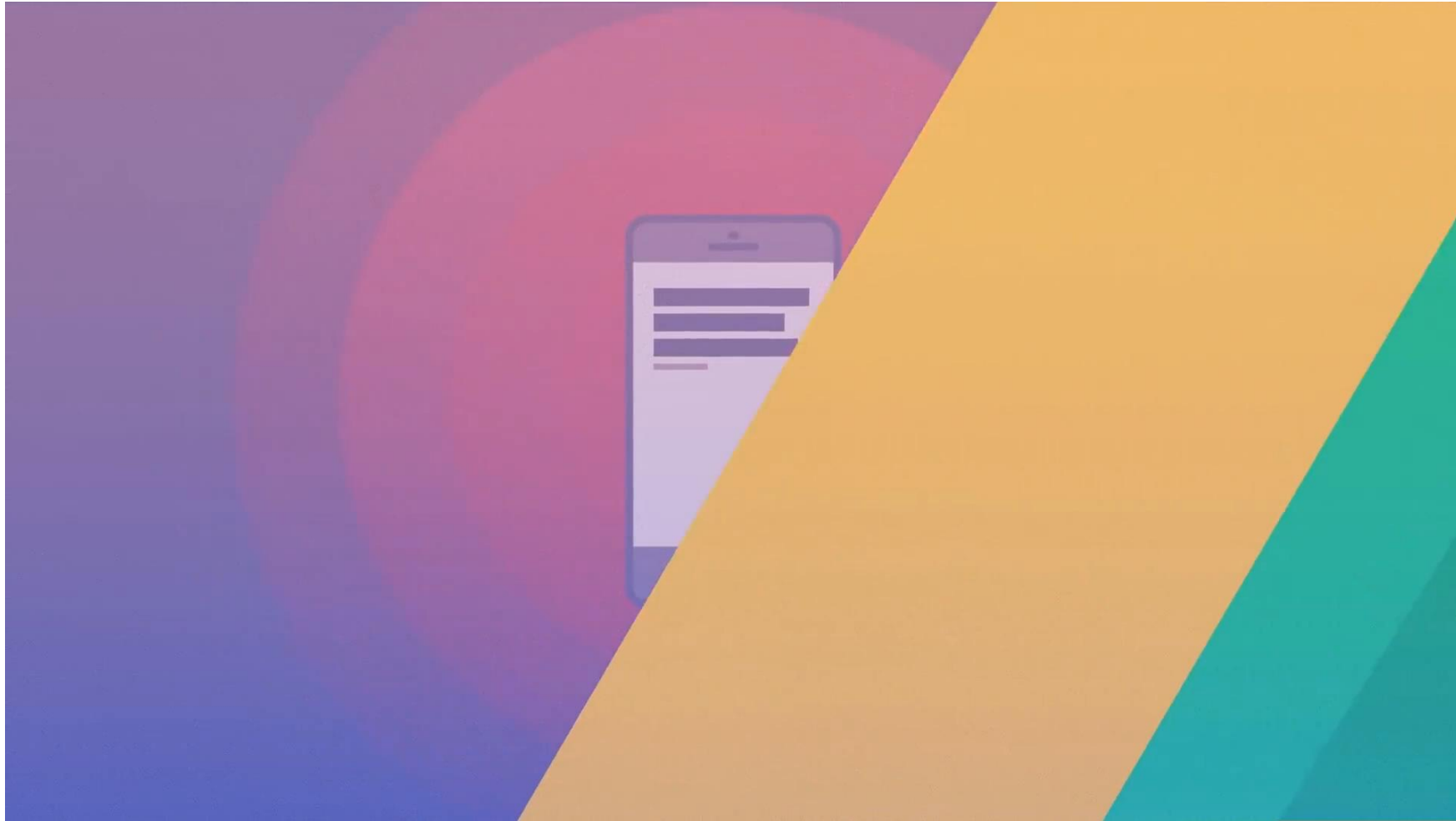
Programming Approach

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**



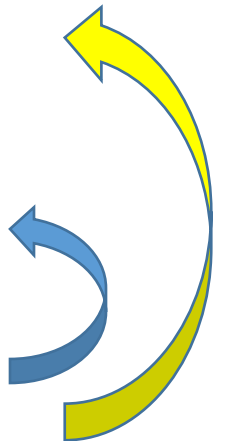
### Deep Learning Approach

**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**

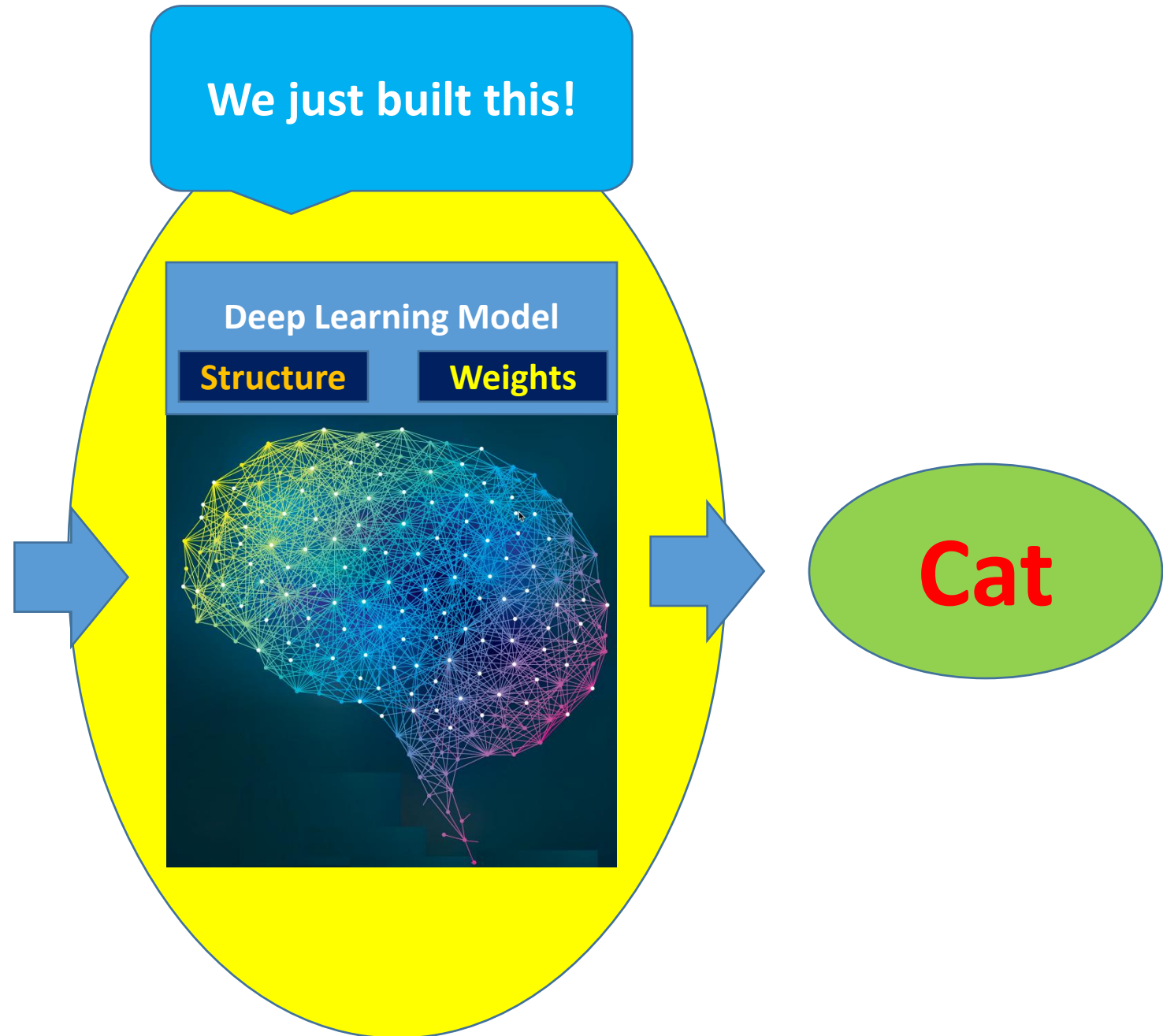


## Deep Learning Approach

**Trained Model**

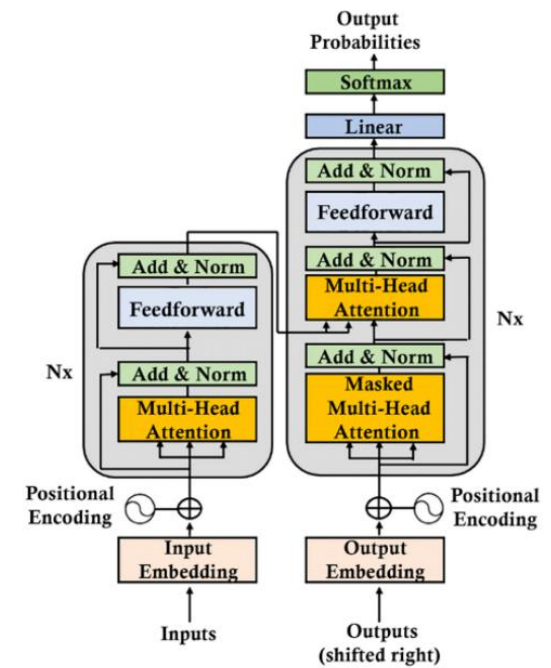
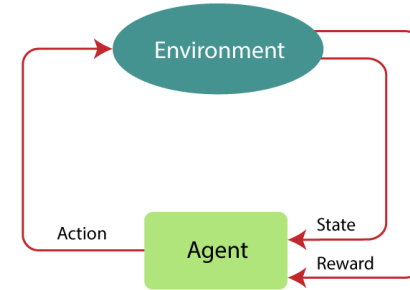
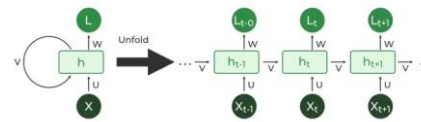
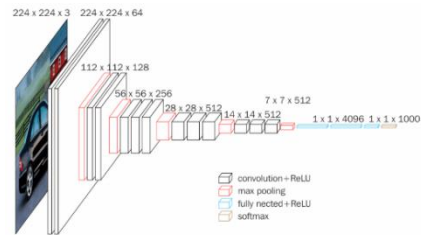
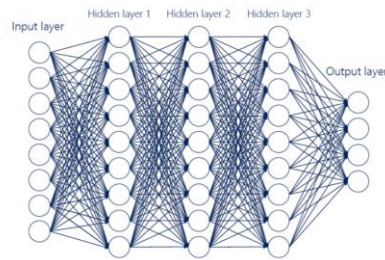
**Problem:** Wrong model, data etc.

# 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.

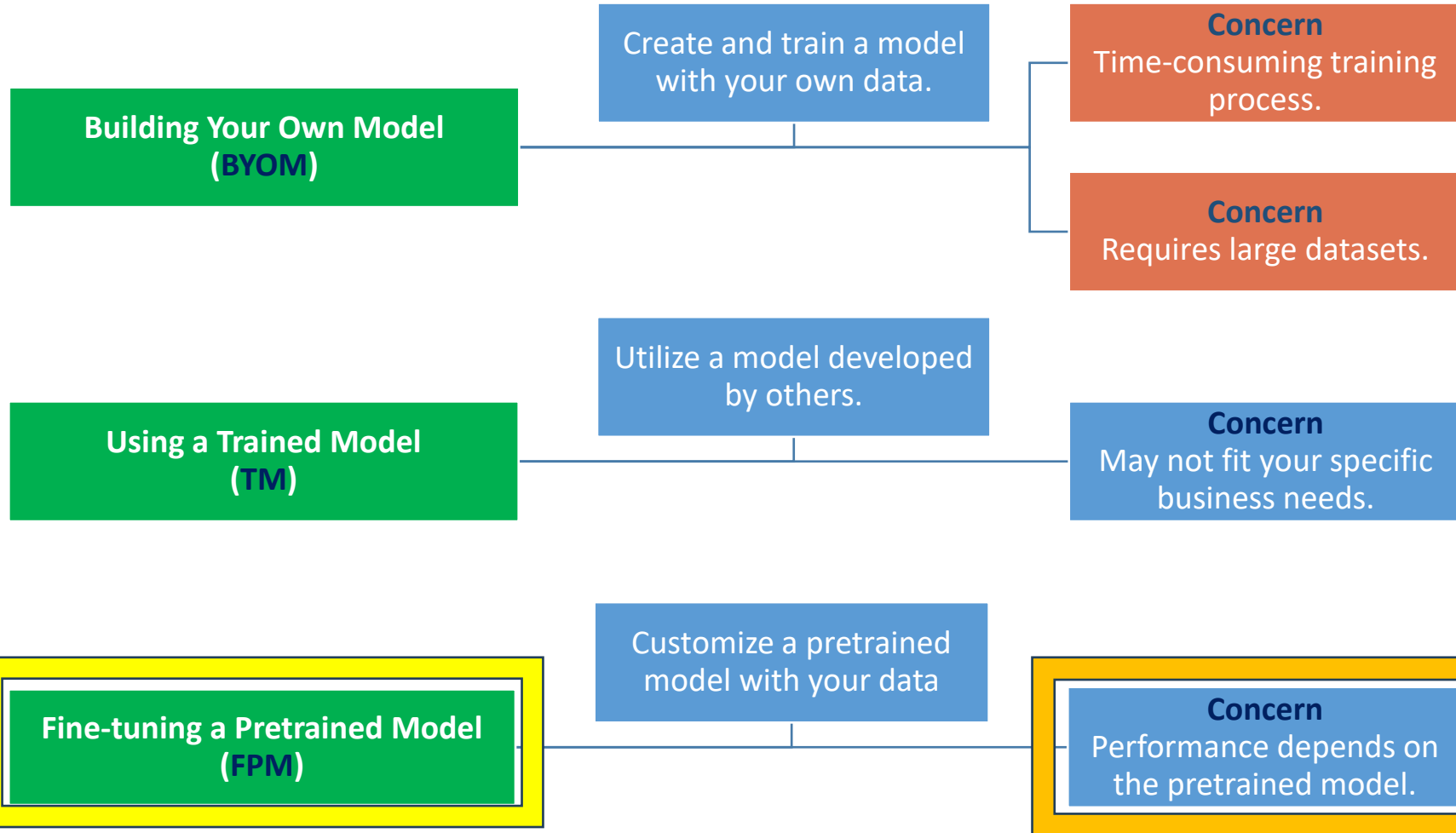
Source: [https://www.youtube.com/watch?v=nOdz80J4\\_Rc](https://www.youtube.com/watch?v=nOdz80J4_Rc)

## **Google DeepMind's Deep Q-learning**

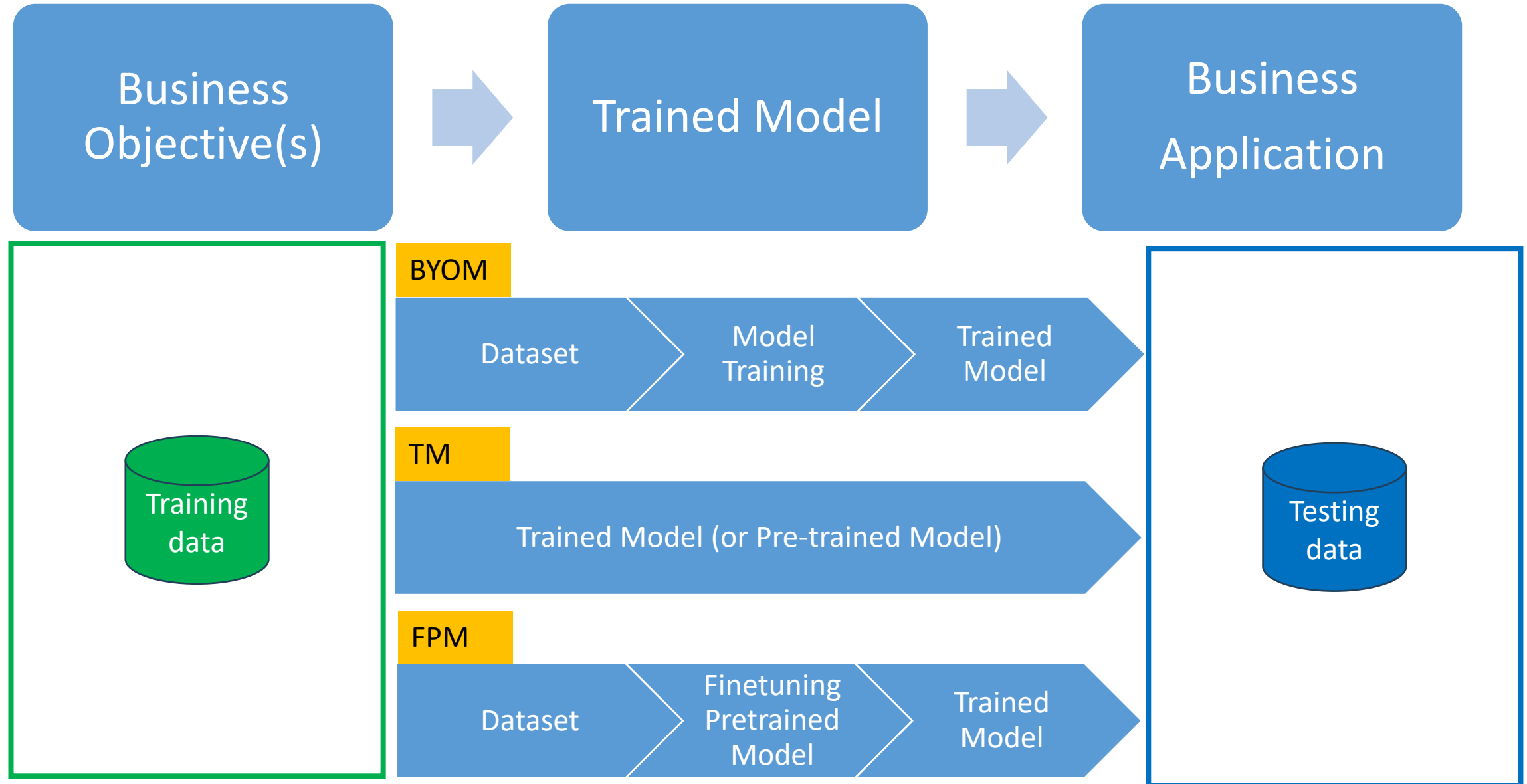
**Source:** <https://www.youtube.com/watch?v=V1eYniJ0Rnk>

## 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**

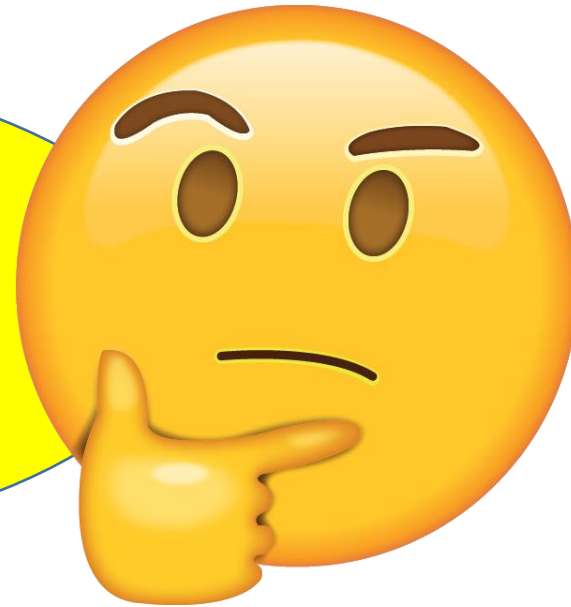
## 5. Your First Deep Learning Business Application

## 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