02.08.2024

BITS F464: Machine Learning (1st Sem 2024-25)

COURSE ADMINISTRATION & MOTIVATION

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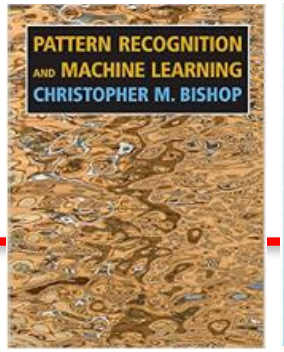
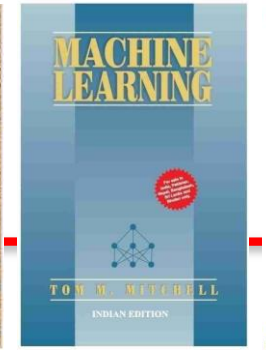
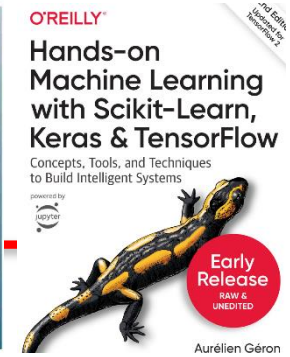
Acknowledgements: Christopher Bishop, Tom Mitchell, Kevin Murphy, Jeremy Watt, Ethem Alpaydin

Text and Ref Books







Text Books:

T1:Christopher Bishop: Pattern Recognition and Machine Learning, Springer-Verlag New York Inc., 2006.

T2:Tom M. Mitchell: Machine Learning, MGH The McGraw-Hill, Indian Edition, 2017.

Reference Books:

R1:Kevin Murphy: Machine Learning: A Probabilistic Perspective, MIT Press, 2012.

R2:Shai Shalev-Shwartz and Shai Ben-David: Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press, 2014.

R3:Ethem Alpaydin: Introduction to Machine Learning, 3rd Edition, MIT Press, 2014.

Evaluation Scheme

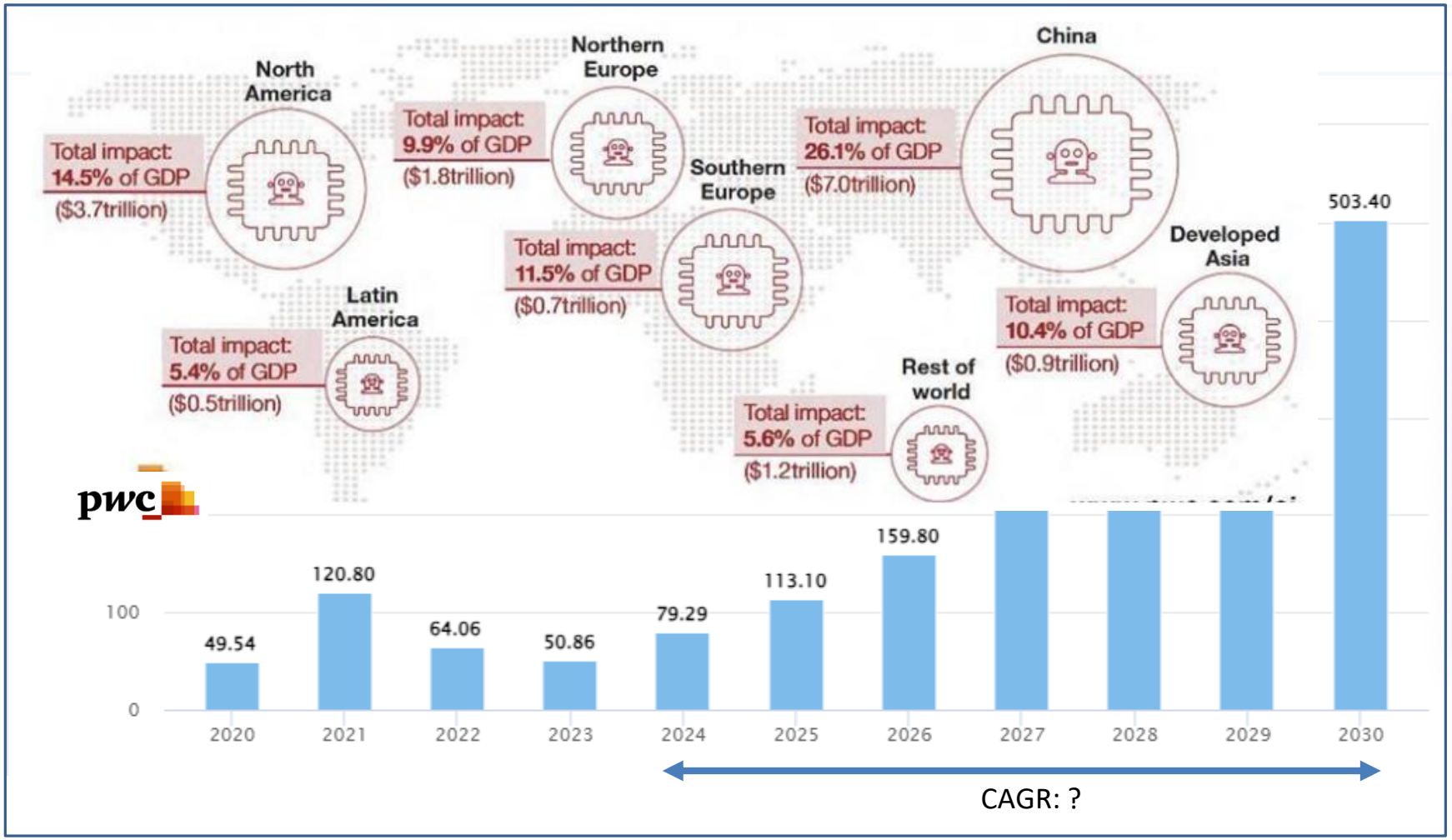
Component	Duration	Date & Time	Weightage	Nature of Component
Mid-Semester Exam	90 mins	08/10/2024 (9.30am-11.00am)	25%	Closed Book
Home Assignments/ Projects (coding)	5 to 6 nos.	1 to 2 assignments every month for 4 months (Aug to Nov).	30%	Open Book
Two announced quizzes	30 mins each	13/09 (5:00pm to 5:30pm) 14/11 (5:00pm to 5:30pm)	10%	Open Book
Comprehensive Exam	3 Hrs	11/12/2024 (FN)	35%	Closed Book

Note: 1. Minimum 40% of the evaluation component will be conducted before the mid semester grading.

2. Chamber consultation hour: Tuesday 5:00 pm to 6:00 pm (H-137).

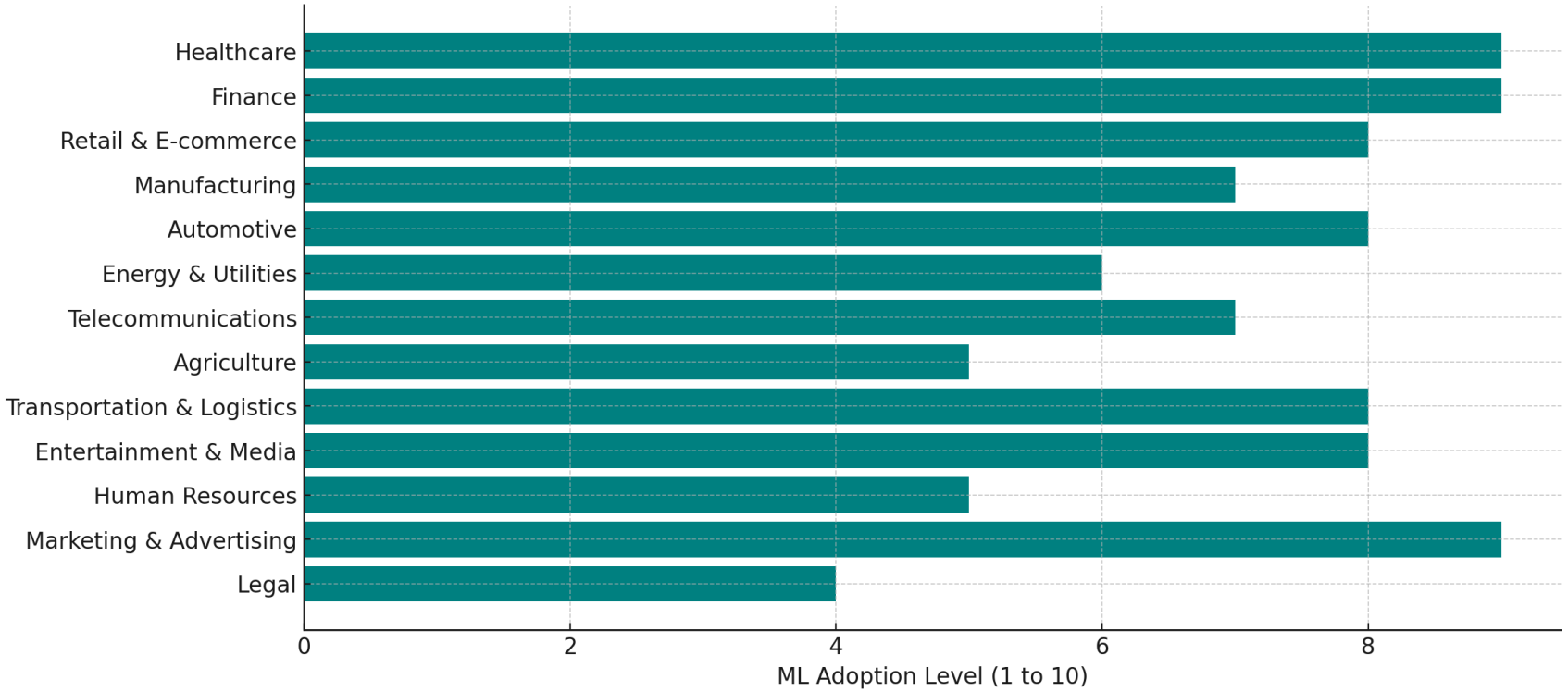
3. Notices: All notices about the course will be put on the google class.

Machine Learning Worldwide



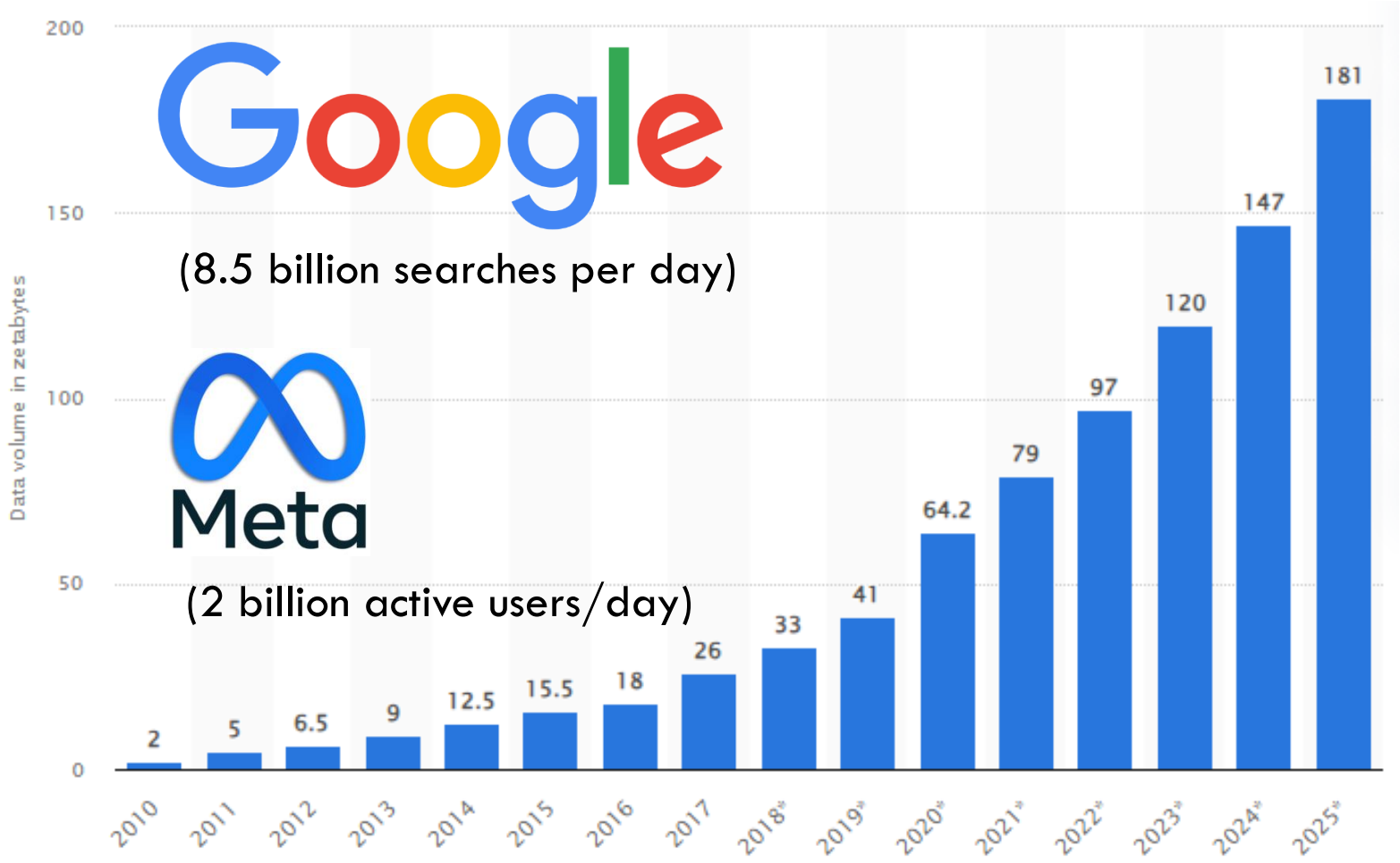
Source: Statista, March 2024

Machine Learning Adoption: Industries



Source: ChatGPT

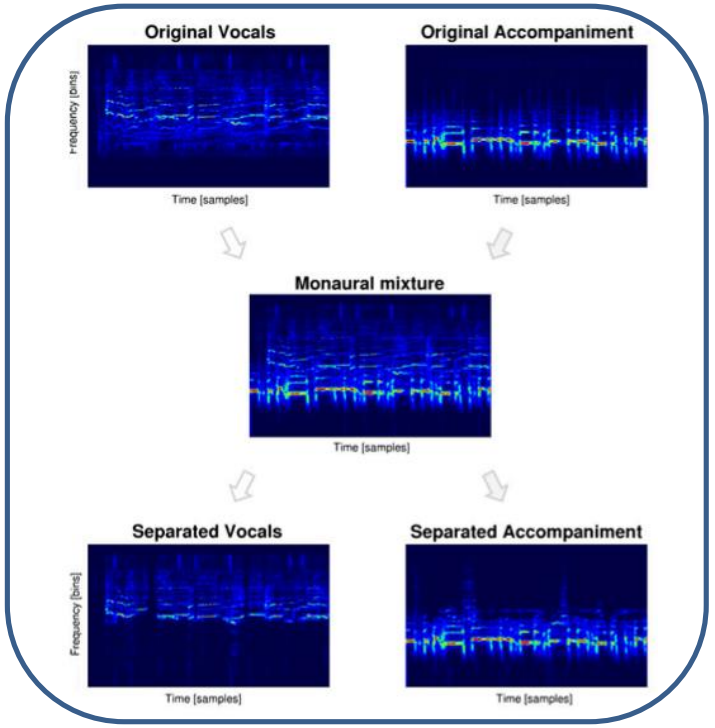
Growth of Data



Source: https://www.statista.com/

Why “Learn”?

Img. Source: Josh H. McDermott



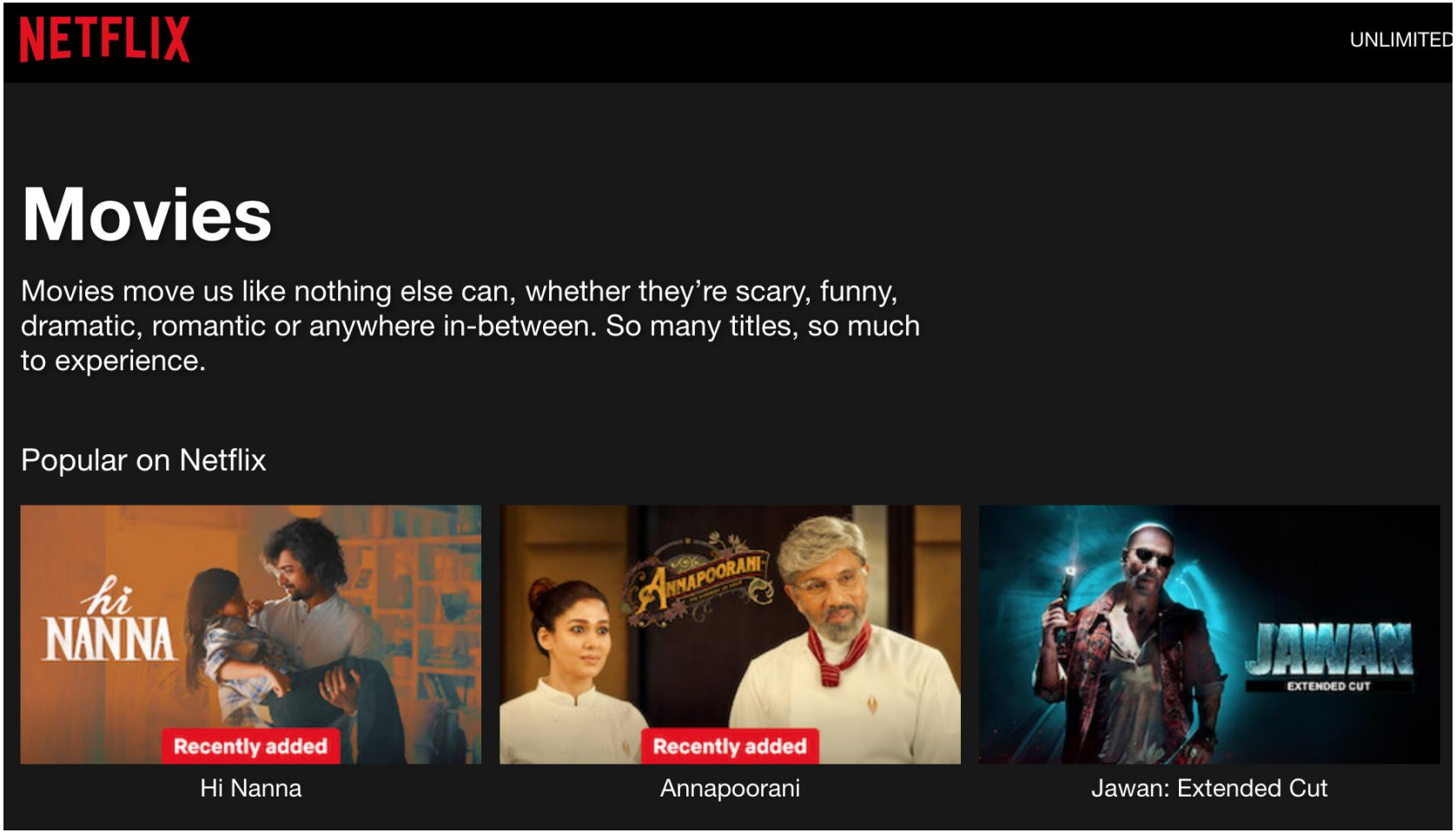
(Img. source: Deep Karaoke: Extracting Vocals from Musical Mixtures Using a Convolutional DNN, Andrew Simpson ...)

Continued…

How can a Robot cook?

Is it a dog or a fox in the image?

Continued…



Recommender System

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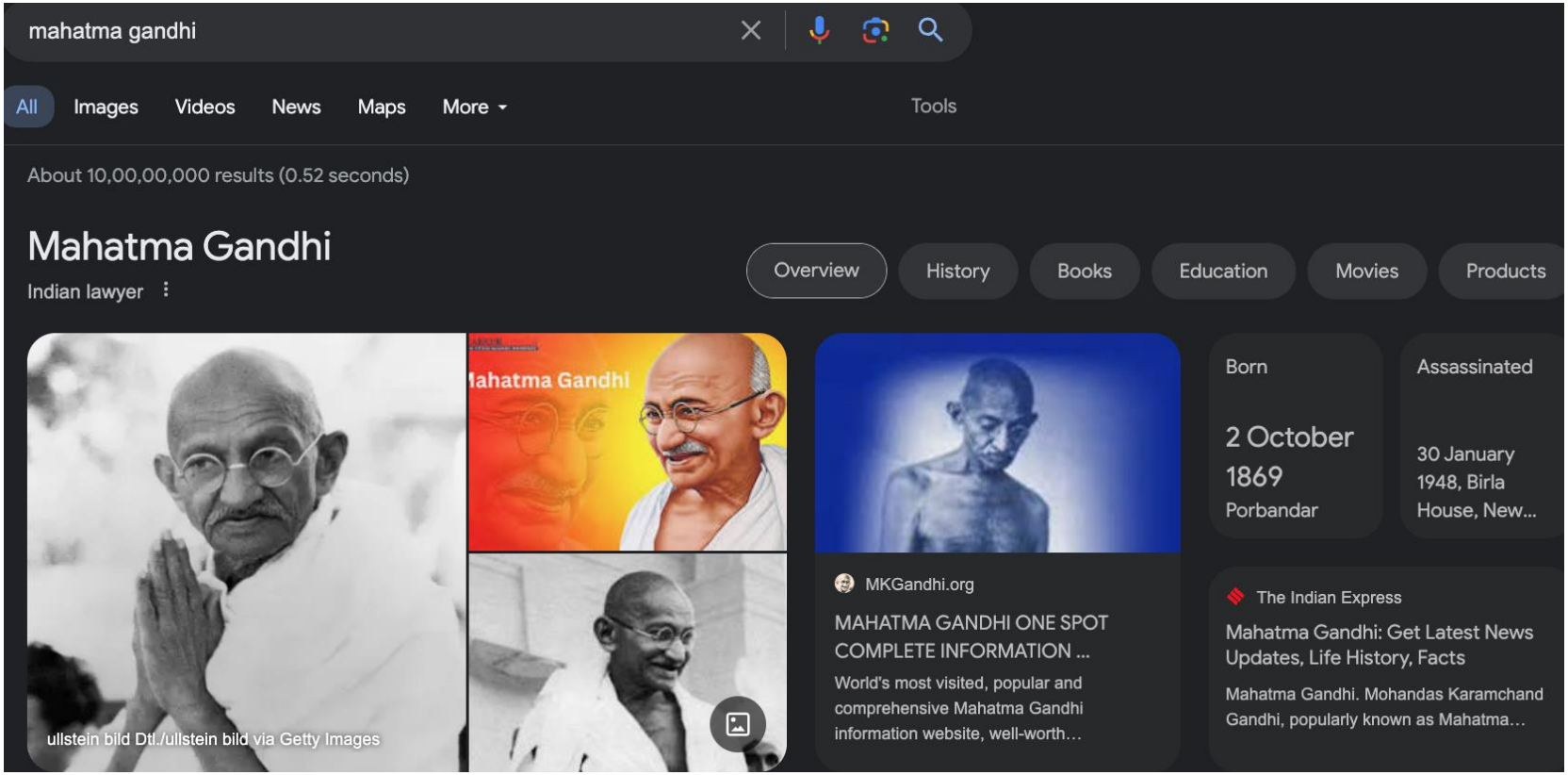


Information Retrieval

Artificial Intelligence: Good Old Days

1964-66: MIT AI Lab

1966-72: Stanford Research Institute

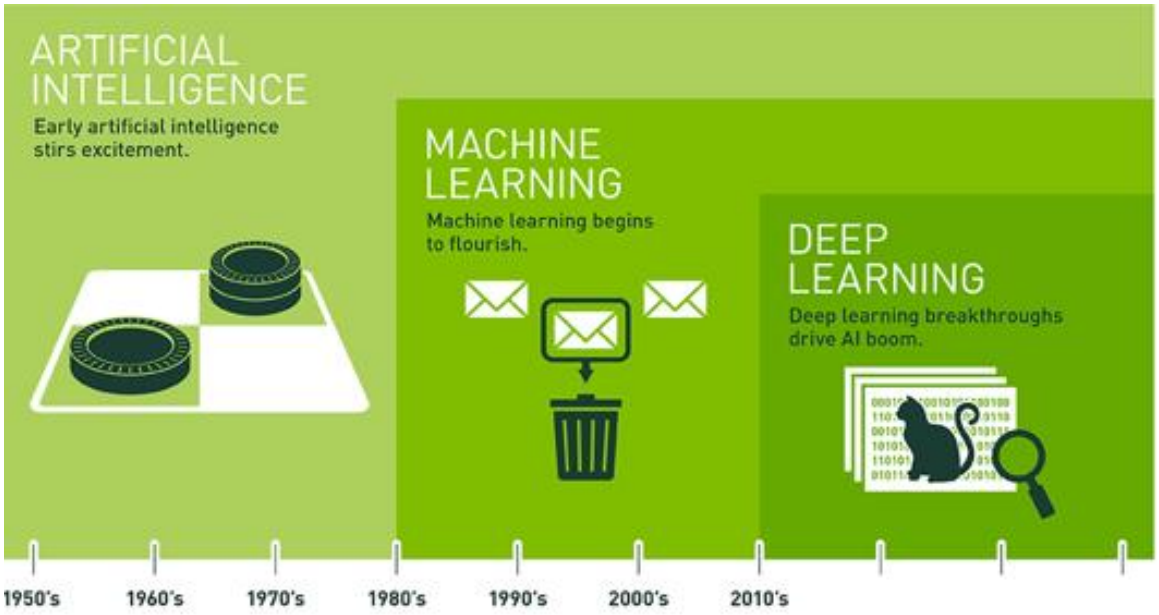
Img. Source: https://www.formica.ai/

Kasparov Vs Deep Blue

Img. Source: https://www.britannica.com/

Moving from Artificial to Real Intelligence

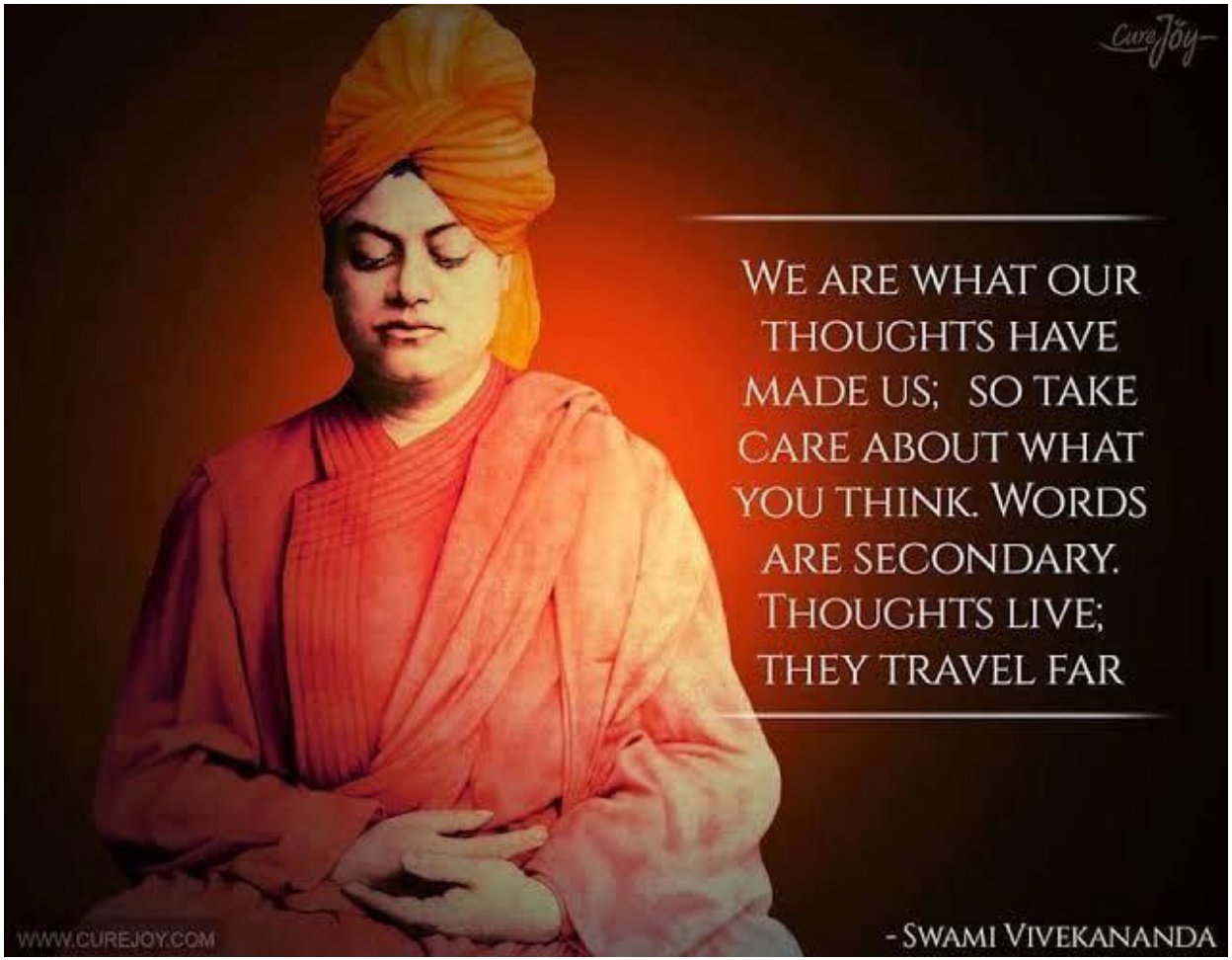
Hyderabad to Dwarka travel plan: Let me do it through a digital machine (Computer). AI



It is difficult to program this computer to make it understand what I want it to do. Let it do it by itself using right structure and a set of examples. ML

I do not know how to make this computer understand what I know. Let it create its' own structure and figure out the data for itself. DL

Recap: What is Intelligence?



Can you give some examples of Intelligent Applications?

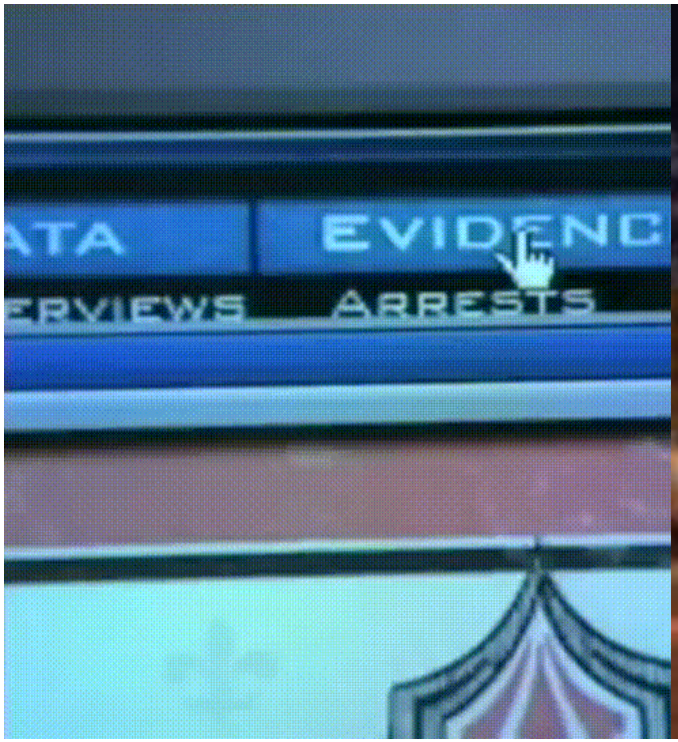
Food for Intelligent Behaviour: Data, Training & Testing Examples, Algorithms and Models, Resources, Human Expertise, …

Recap: Why “Learn”?

- Do we need to “learn” to calculate Payroll?

- Learning is used when:
  - Human expertise does not exist (ISRO’s Chandrayaan 3).
  - Humans are unable to explain their expertise (Speech recognition, Cocktail party communication).

Computer Vision



Crime Scene Investigation: TV Serial

HANSON ROBOTICS

Self Driving Cars

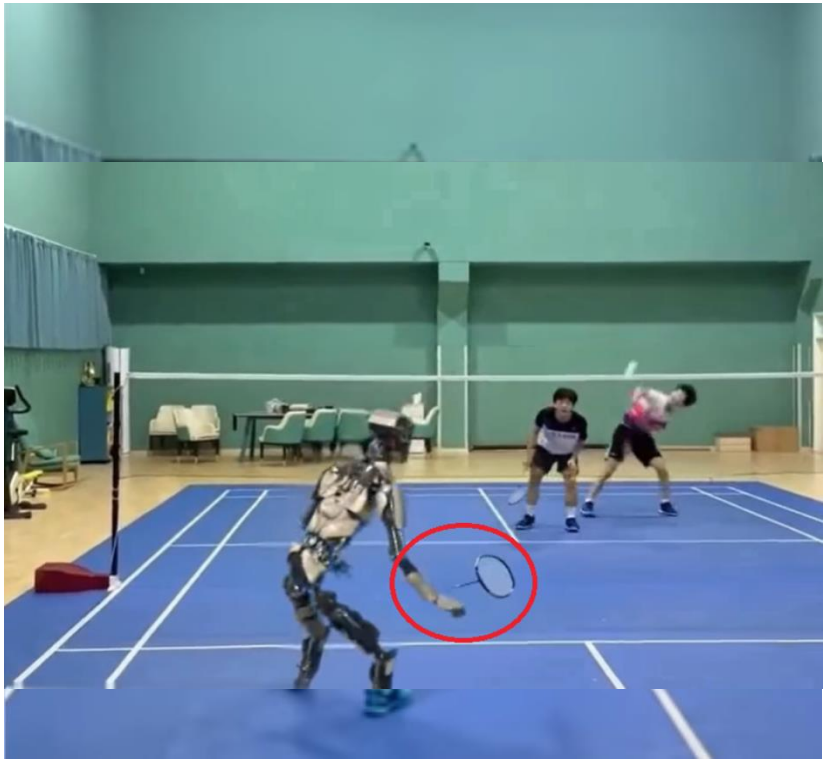
Source: https://www.ri.cmu.edu/

Source: https://developer.nvidia.com/

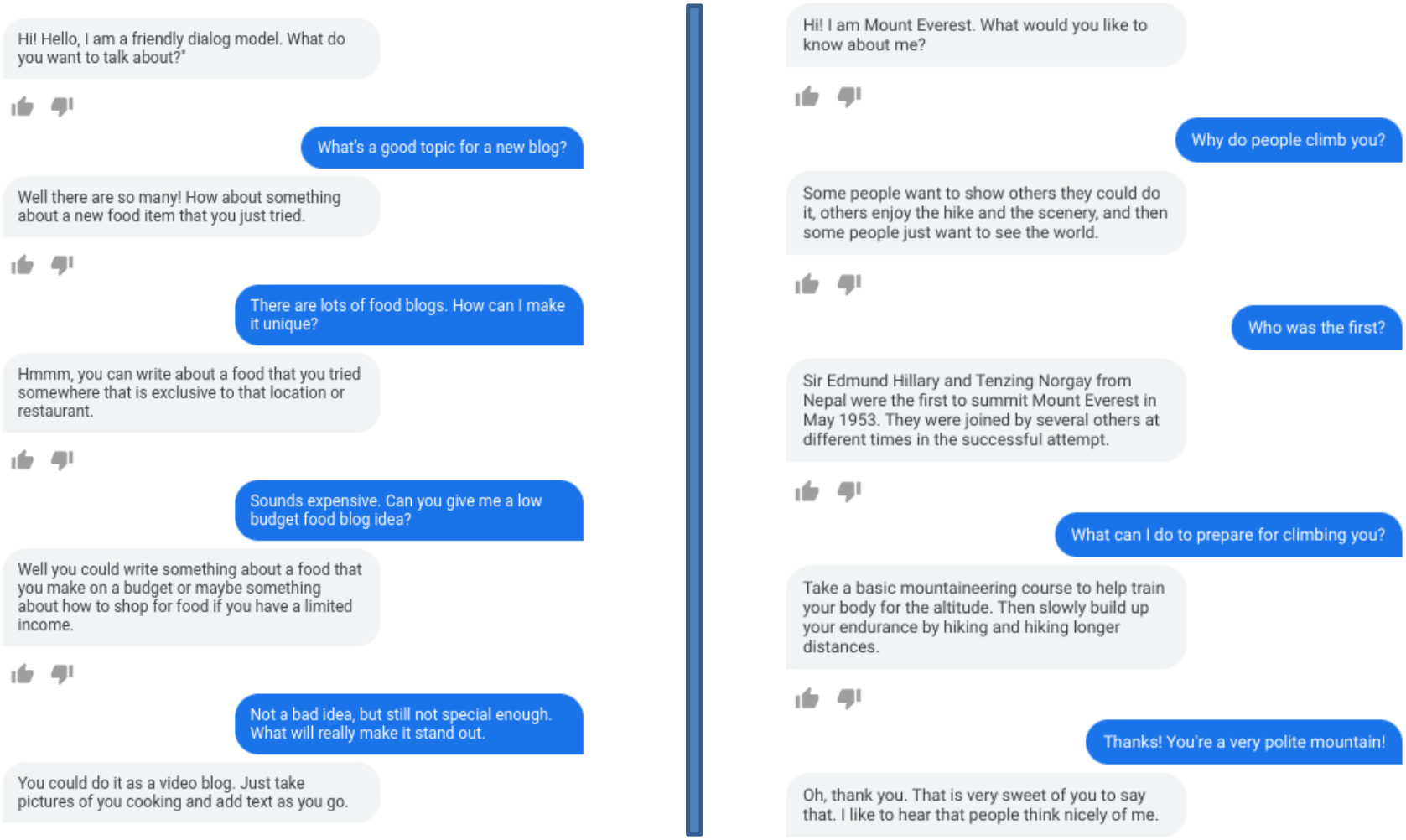
US Cities: Arizona, Phoenix, San Francisco, Texas Austin, Los Angeles, Miami, Pittsburgh

Deepfake

Generative AI (Ability to generate new content): CNNs, GANs, Auto-encoders, Transformers, …



Large Language Models (LLMs)



Source: Google's LAMDA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NAMED ‘THE ORON,’ THE AI-EQUIPPED JET DETECTS
DRONES, BALLISTIC MISSILES, AND AIRCR

Many more…

- Stock markets and Trading
- Credit card fraud detection
- E-mail spam filtering
- Language translation
- Virtual personal assistants
- Banking and Finance
- Healthcare
- Transportation and traffic prediction
- Manufacturing industry
- Human resource management

Thank You!