3099704: AI for Digital Health

Course Introduction

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Aj.Peerapon Vateekul (Aj.Pop)

- Professor at Department of Computer Engneering, Faculty of Engineering, Chulalongkorn University, Thailand
  - Research: Specialized in applying AI/ML/DL into various domains & design Big Data platform (DB/DW)
  - Course: Data Science and Data Engineering, Data Warehousing, Natural Language Processing, etc.

- Certified SAS instructor

- Certified instructor for Deep Learning Institute

- Parts of NVAITC (NVIDIA AI Technology Center)

- DATA MIND (Data Analytics Group, Machine Intelligence and Knowledge Discovery Lab)

- In collaboration with many organizations (government & private sectors), e.g., Chulalongkorn hospital.

Advanced and Emerging Technologies in Digital Health III: Application Showcases

3099701 Fundamentals of Digital Technology and Applications in Healthcare

Assoc. Prof.Peerapon Vateekul, Ph.D.

Department of Computer Engineering, Faculty of Engineering, Chulalongkorn University, Thailand
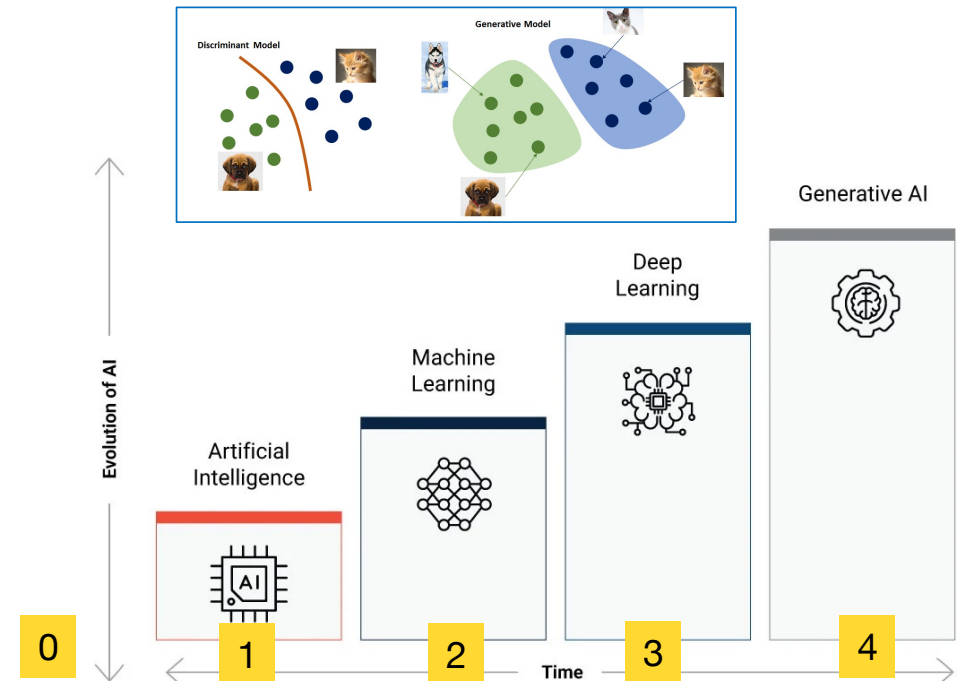
Peerapon.v@chula.ac.th

Many case studies on 22 Aug 2025

Advanced and Emerging
Technologies in Digital Health III:
Application Showcases
3099701 Fundamentals of Digital Technology and Applications in Healthcare

Assoc. Prof.Peerapon Vateekul, Ph.D.
Department of Computer Engineering, Faculty of Engineering, Chulalongkorn University, Thailand
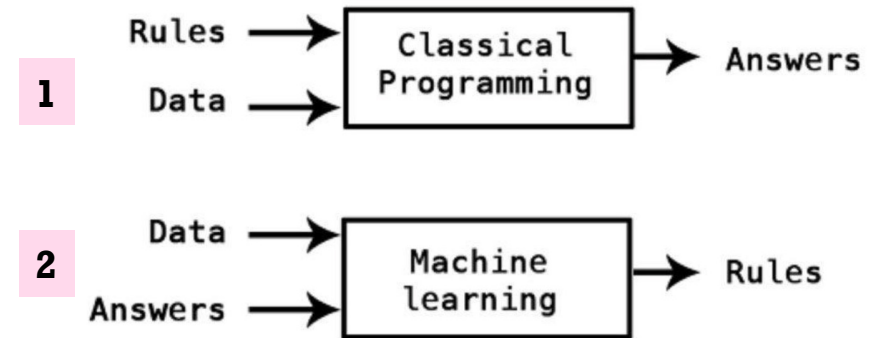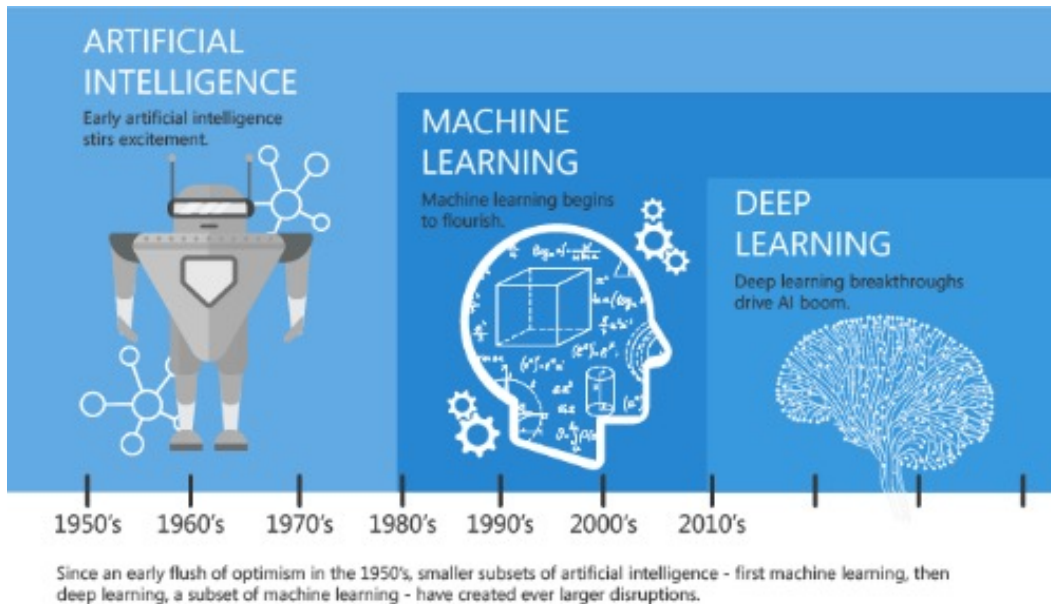Peerapon.v@chula.ac.th

Many case studies
on 22 Aug 2025

Introduction (short recap)

There are many kinds of AI models.

3

AI = Automation

- 0) Not AI Solution (not automatic)

- 1) Rule-based AI

- 2) Machine Learning (ML)

ARTIFICIAL INTELLIGENCE — Early artificial intelligence stirs excitement.

MACHINE LEARNING — Machine learning begins to flourish.

DEEP LEARNING — Deep learning breakthroughs drive AI boom.

1950's 1960's 1970's 1980's 1990's 2000's 2010's

Since an early flush of optimism in the 1950's, smaller subsets of artificial intelligence - first machine learning, then deep learning, a subset of machine learning - have created ever larger disruptions.

1 Rules + Data → Classical Programming → Answers

2 Data + Answers → Machine learning → Rules

Discriminant Model | Generative Model

Evolution of AI

0 | 1) Artificial Intelligence | 2) Machine Learning | 3) Deep Learning | 4) Generative AI
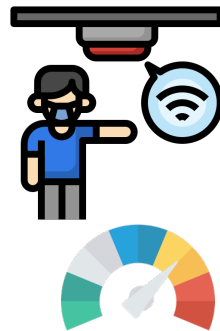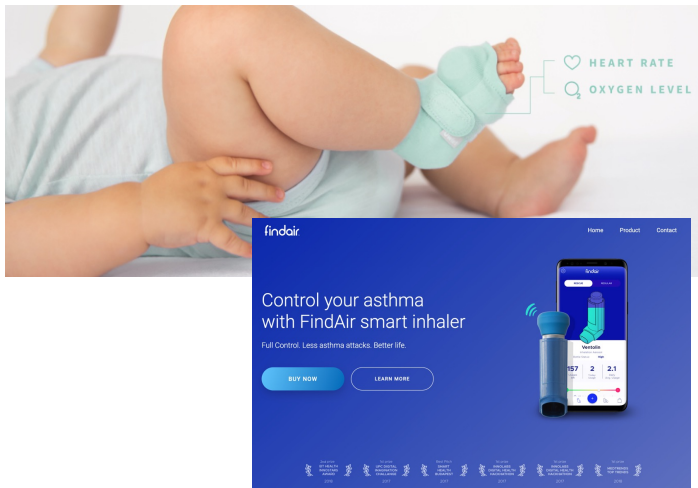
Time

https://mc.ai/machine-learning-basics-artificial-intelligence-machine-learning-and-deep-learning/
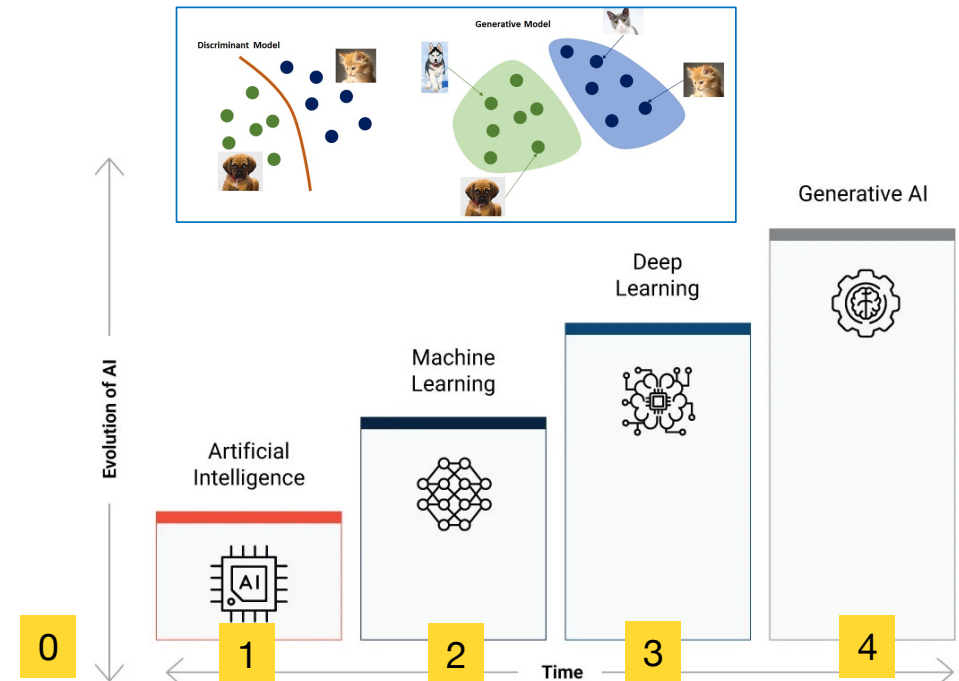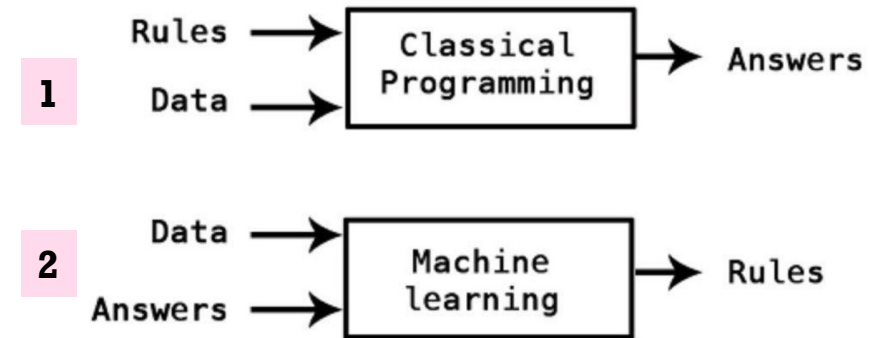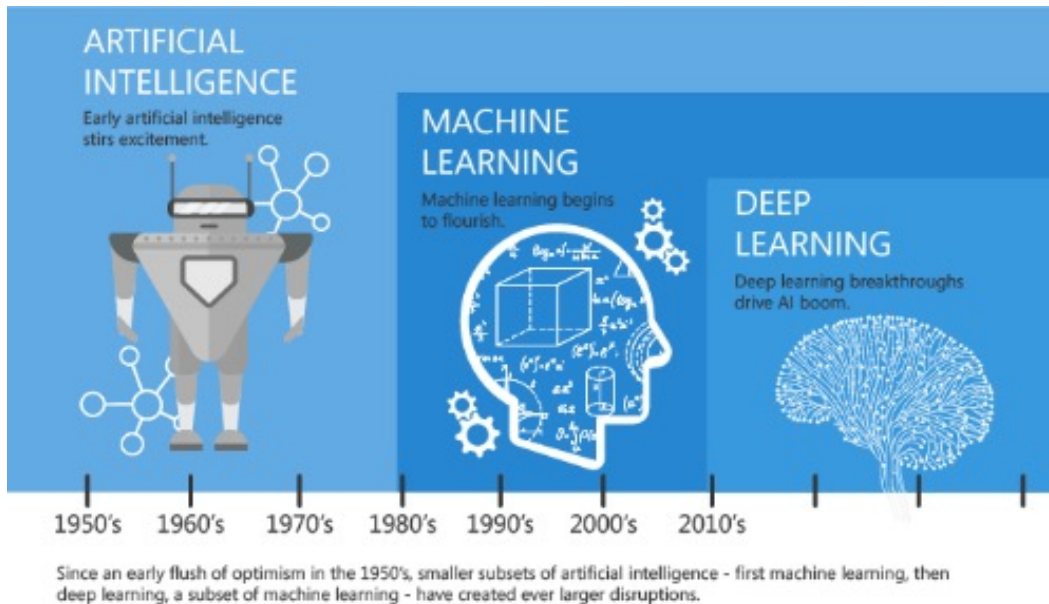
Not AI Solution

Not automatic, not prediction

- 1) Information System (e.g., HIS, Web Application)
- 2) Transform data into valuable insights (sensor)
- 3) Transform data into interesing stories

0

Evolution of AI

Artificial Intelligence

1

Machine Learning

2

Deep Learning

3

Generative AI

4

Time

AI = Automation

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- 1) Rule-based AI

- 2) Machine Learning (ML)

1 Rules, Data → Classical Programming → Answers

2 Data, Answers → Machine learning → Rules

Discriminant Model / Generative Model

Evolution of AI

Artificial Intelligence (0/1)
Machine Learning (2)
Deep Learning (3)
Generative AI (4)

Time

ARTIFICIAL INTELLIGENCE — Early artificial intelligence stirs excitement.

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Supervised Learning (Predictive Task)

inputs   target

Age	Temp	Gender	Smell	Covid
25	39.0	Female	No	Yes
35	38.9	Female	No	Yes
32	36.5	Male	Yes	No

- Goal: To learn a prediction model mapping from inputs to output.

- Data without label (answer) is meaningless!
- Label should be provided by experts!
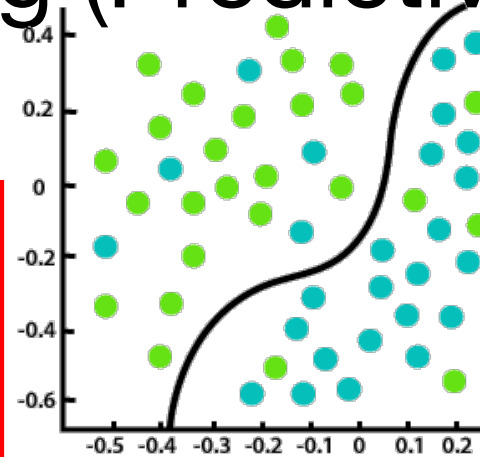
Classification

- Target is categorical variable.
- Example
- Covid diagnosis (yes/no)
- Disease diagnosis from gait information:
  - 1) Normal,
  - 2) Sick/Knee OA
  - 3) Sick/Parkinson
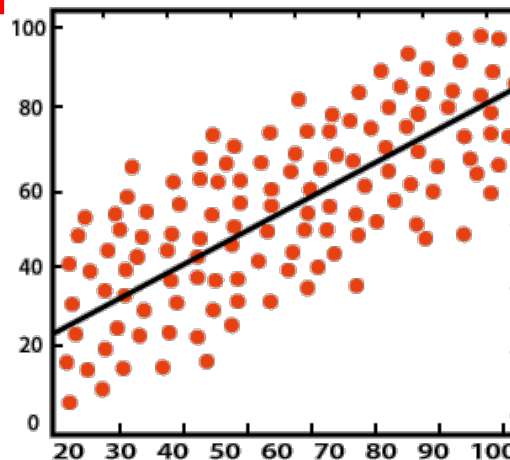
Regression

- Target is numeric variable.
- Example
- PD's state diagnosis from movement data.
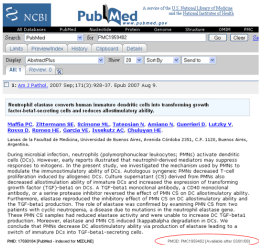- Glucose level prediction from breath particles.

Arise of Deep Learning
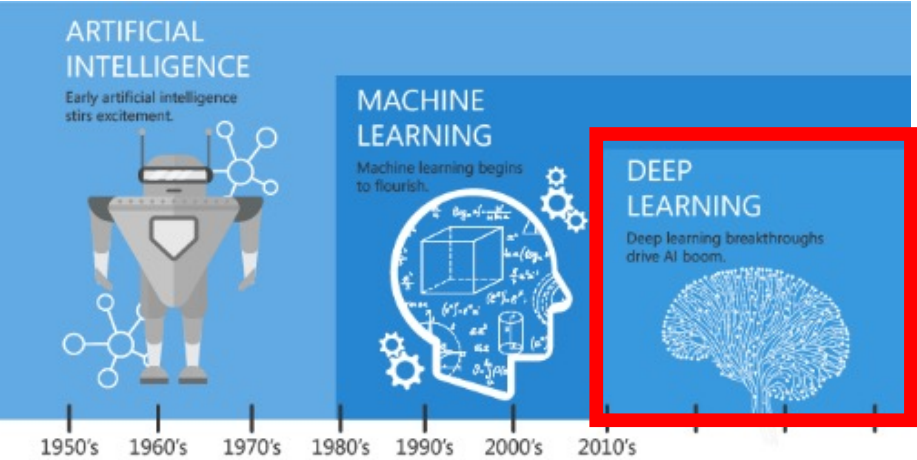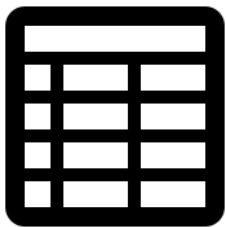
VS
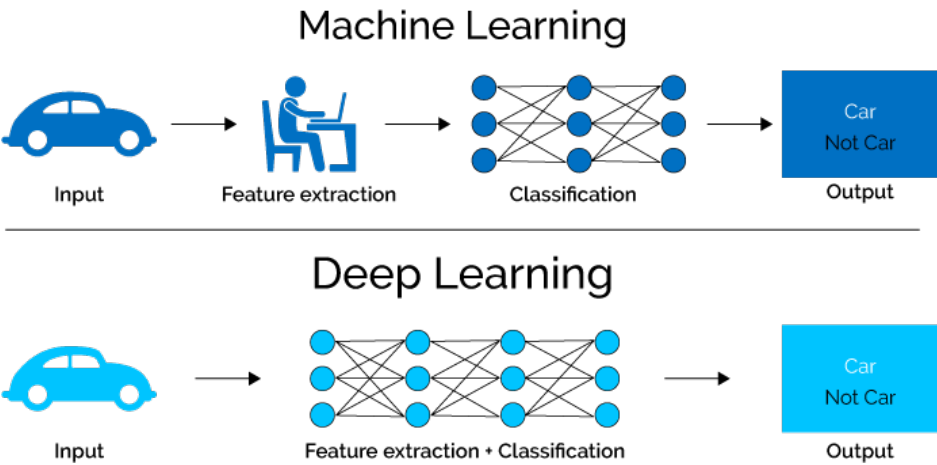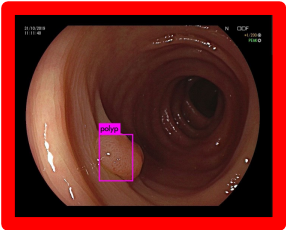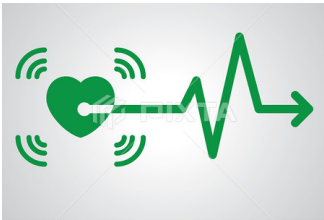
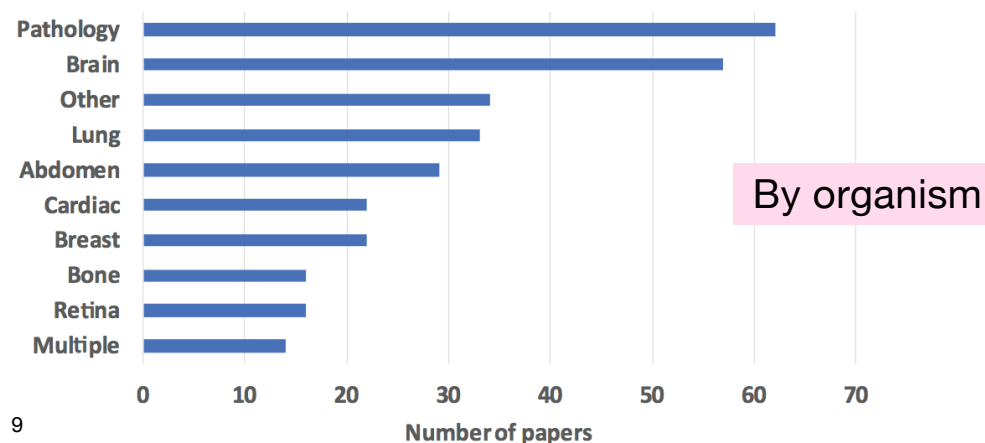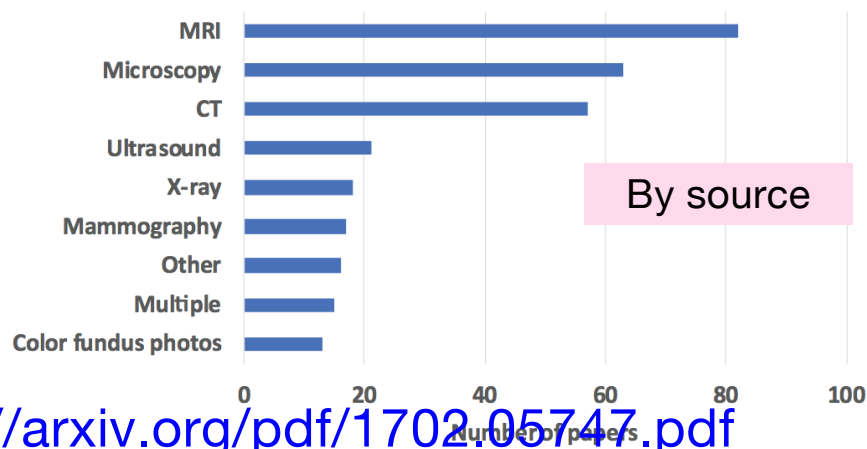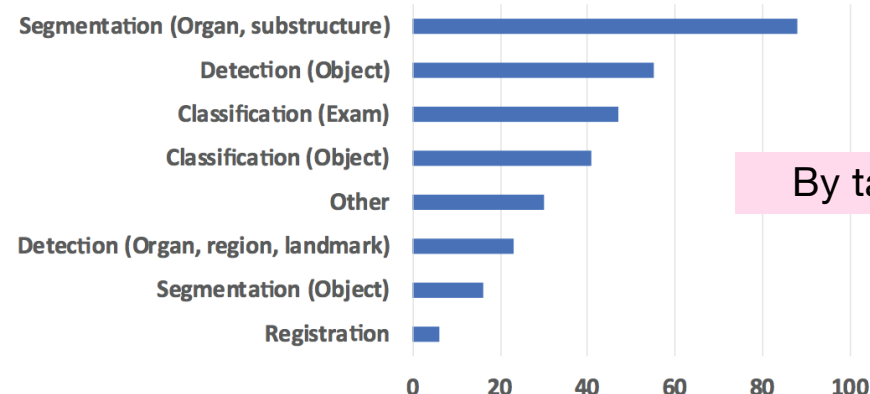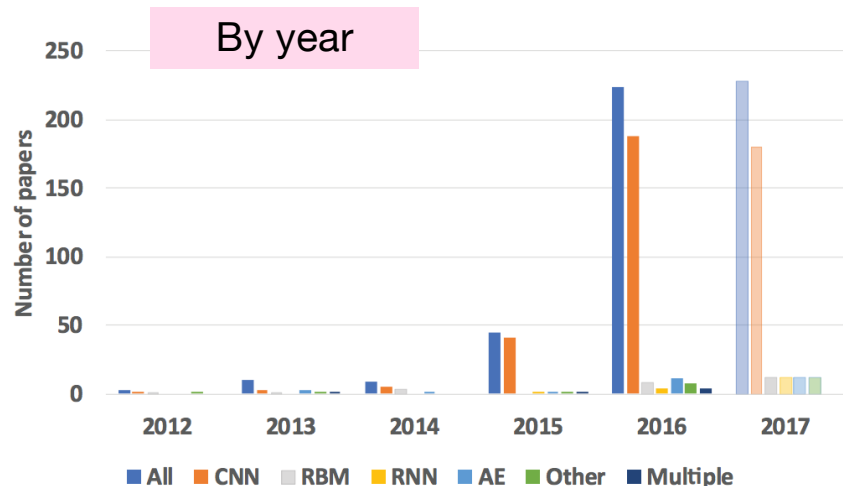Image, video   signals, voice   NLP

Arise of Deep Learning

A Survey on Deep Learning in Medical Image Analysis

Geert Litjens, Thijs Kooi, Babak Ehteshami Bejnordi, Arnaud Arindra Adiyoso Setio, Francesco Ciompi, Mohsen Ghafoorian, Jeroen A.W.M. van der Laak, Bram van Ginneken, Clara I. Sánchez

Diagnostic Image Analysis Group
Radboud University Medical Center
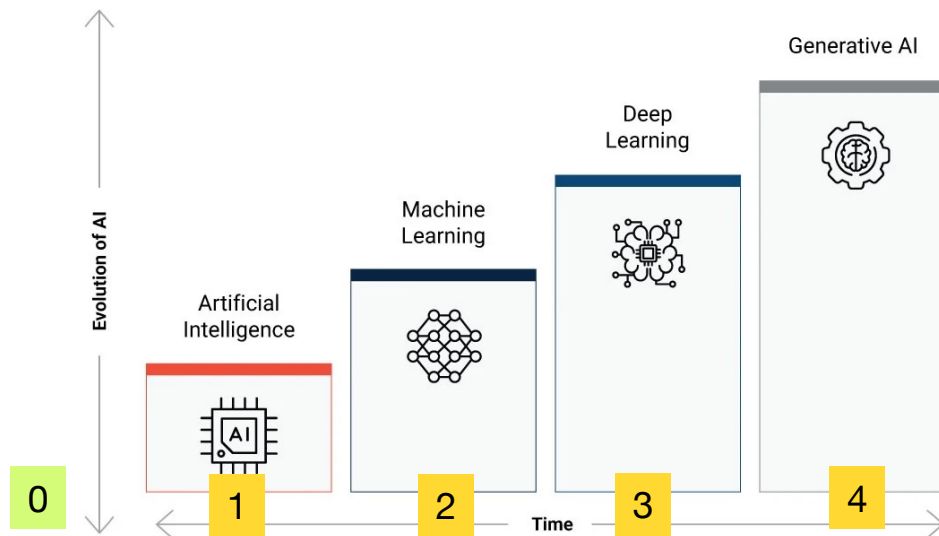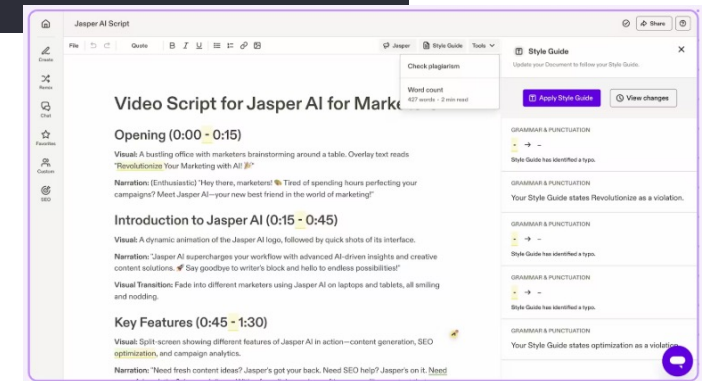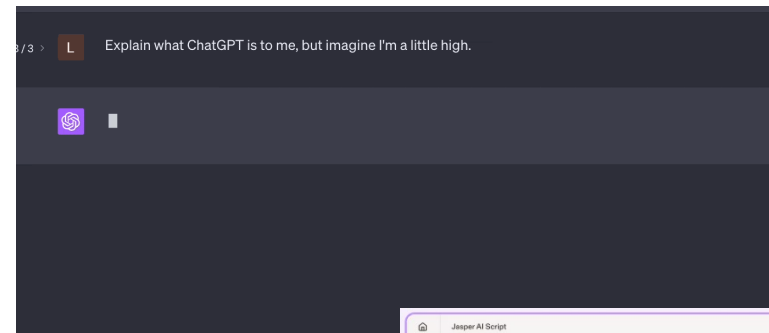Nijmegen, The Netherlands

2017

By year

By task

By source

By organism

https://arxiv.org/pdf/1702.05747.pdf

9

Gen AI
Not automatic, not prediction

	Generative AI
	Deep Learning
	Machine Learning
Artificial Intelligence	

Evolution of AI

Time

0   1   2   3   4

1) Assistant Chatbot
2) Text Summarization
3) Content Creation
4) Data Analytics
5) Etc.

How to implement these AI models?

Top Python Libraries for Machine Learning

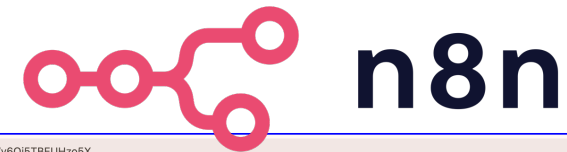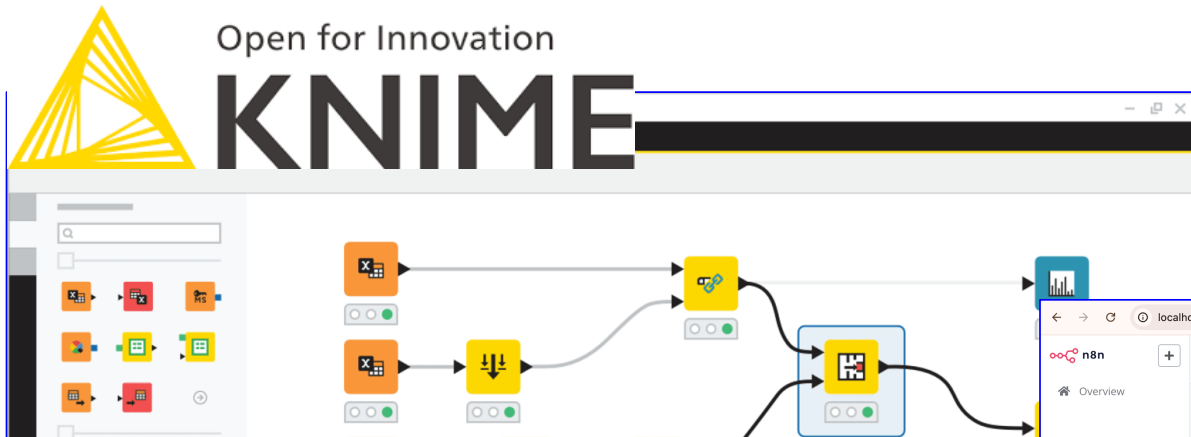|			
TensorFlow	Keras	Hugging Face Transformers	NumPy
PyTorch	XGBoost	Fastai	Matplotlib
Scikit-learn	LightGBM	Pandas	Seaborn
OpenCV			

Low-Code/No-Code Software
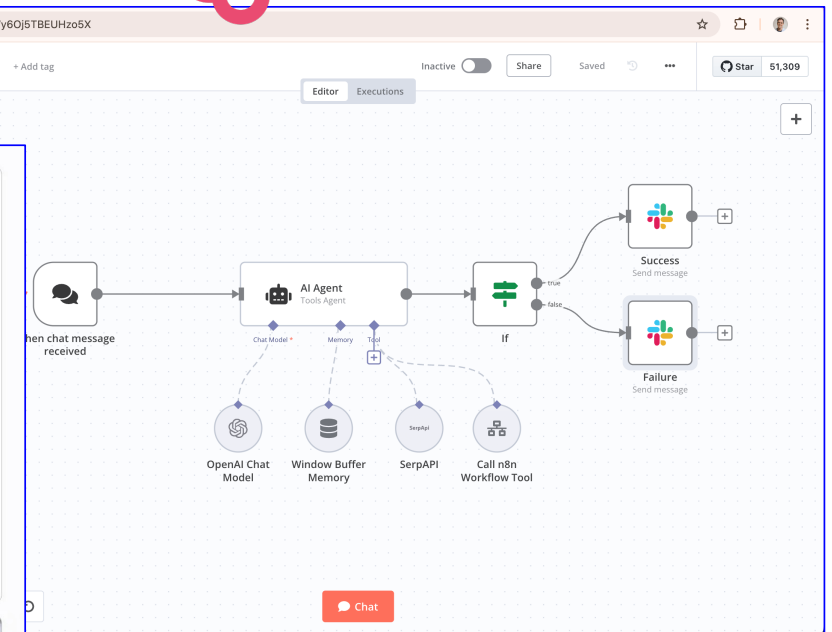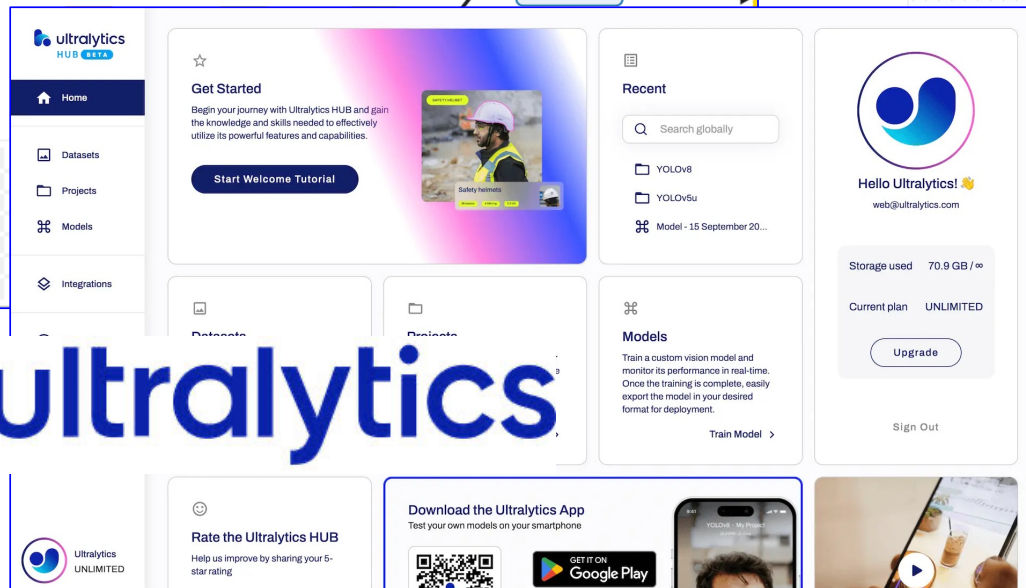
Course Objectives

- Understand different types of AI models

- Apply AI to a variety of healthcare tasks

- Prepare data for training AI models

- Mainly use Low-Code / No-Code software

- Disclaimer: This course does not cover in-depth technical or mathematical details of AI models.
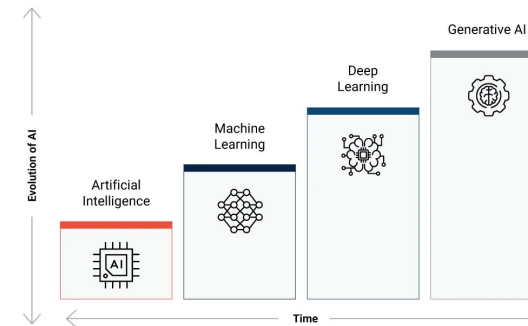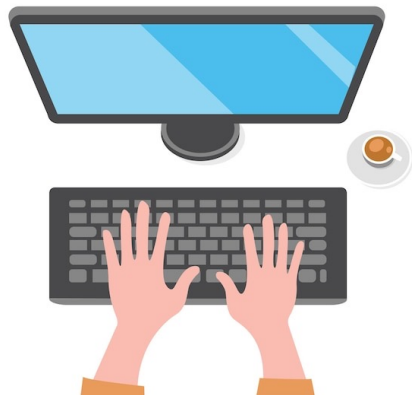
#	Date (5PM-8PM)	Topic	Note
1	Wed 7 Jan 2026	Introduction to AI/ML (Data Table) Data Preparation Supervised Learning (1)	Tools: KNIME & Python
2	Thu 8 Jan 2026	Supervised Learning (2) Unsupervised Learning	Tools: KNIME & Python
3	Fri 9 Jan 2026	Introduction to Deep Learning Image Classification (e.g., skin cancer detection)	Teachable Machine Pytorch
4	Tue 13 Jan 2025	Object Detection (e.g., polyp detection)	Tools: YOLO & Pytorch
5	Wed 14 Jan 2026	Image segmentation 2D (e.g., X-ray), 3D (e.g., CT-Scan)	Tools: YOLO & Pytorch
6	Thu 15 Jan 2026	Image Labeling tools (e.g., LebelMe, CVAT, etc.)	
7	Fri 16 Jan 2026	Interesting SDKs, e.g., facial expression & speech (ASR)	Group Project Assignment
8	Tue 20 Jan 2025	Introduction to GenAI/LLM Prompting	Tools: N8N & Python
9	Wed 21 Jan 2026	Advanced LLM (OCR & RAG)	Tools: N8N & Python
10	Thu 22 Jan 2026	Project Presentation	

13

Thank you
& any questions