Departemen Teknik Informatika

Pengantar Pembelajaran Mesin

Deskripsi Matakuliah

- Kode MK : EF234503
- Nama MK : Pembelajaran Mesin
- Sks : 3
- Semester : 4
- MK Prasyarat : Konsep Kecerdasan Artifisial

Capaian Pembelajaran

Mahasiswa mampu menjelaskan konsep Pembelajaran Mesin, jenis pembelajaran, algoritma pembelajaran, dan penerapannya pada berbagai tipe aplikasi

Materi

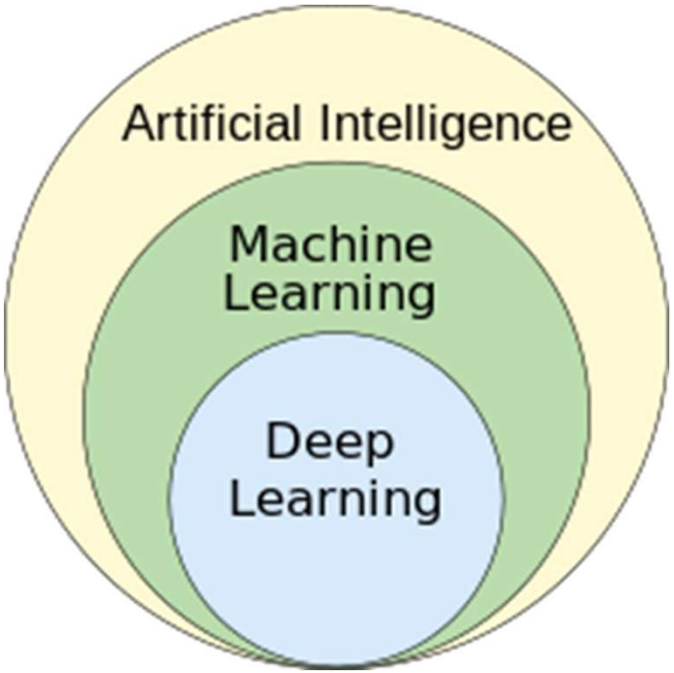
- Pengantar Pembelajaran Mesin
- Clustering : K-Means & Hierarchical Clustering
- k-NN
- Naïve Bayes
- Decision Tree
- Support Vector Machine
- Artificial neural networks
- Pengenalan Deep Learning
- Reinforcement Learning

Machine learning

- Machine learning is a field of study in artificial intelligence concerned with the development and study of statistical algorithms that can learn from data and generalize to unseen data, and thus perform tasks without explicit instructions.
- Machine learning approaches have been applied to many fields including
  - large language models (LLM)
  - computer vision
  - speech recognition
  - email filtering, agriculture, and medicine,

  where it is too costly to develop algorithms to perform the needed tasks.

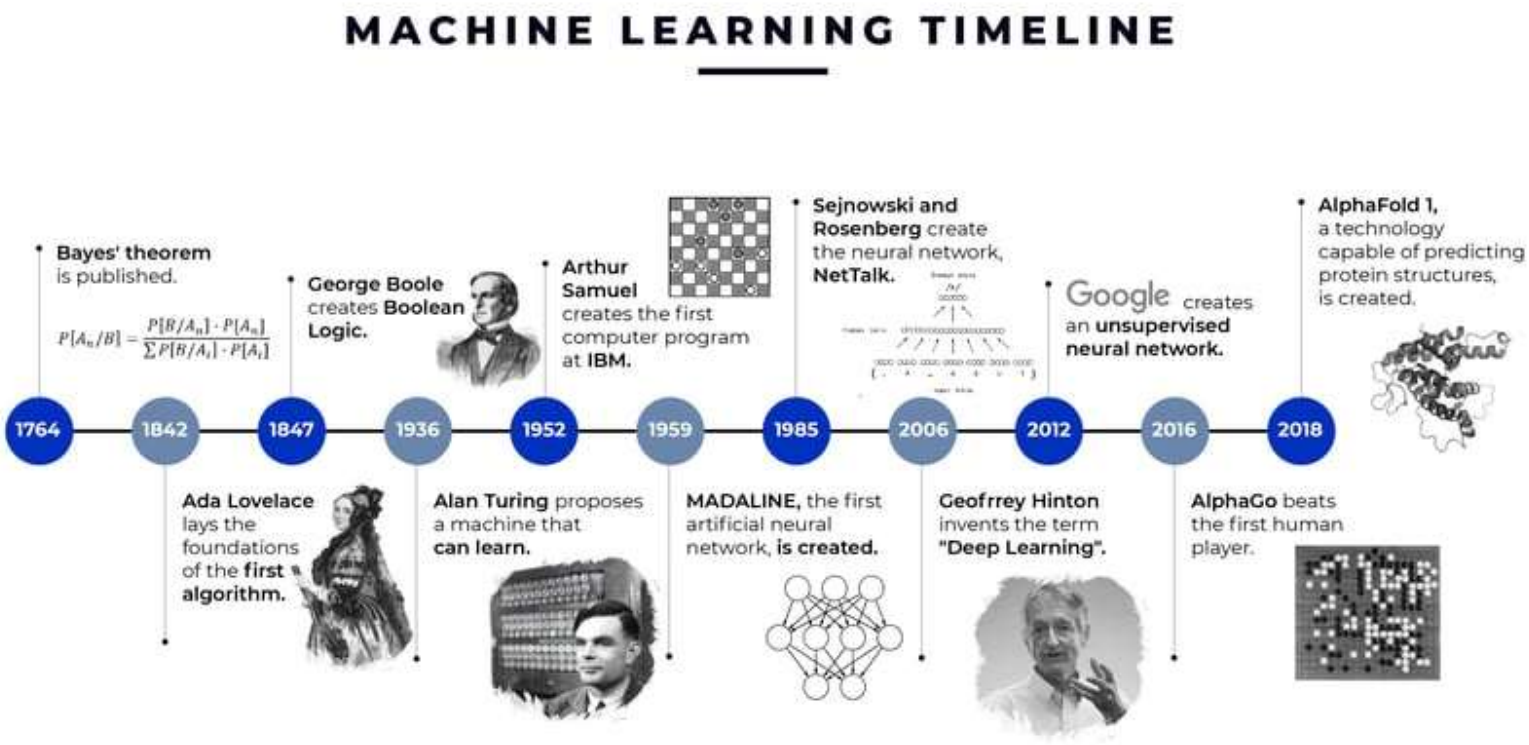
Hubungan AI, Machine Learning dan Deep Learning



Milestones

sumber: https://medium.com/mlearning-ai/

History

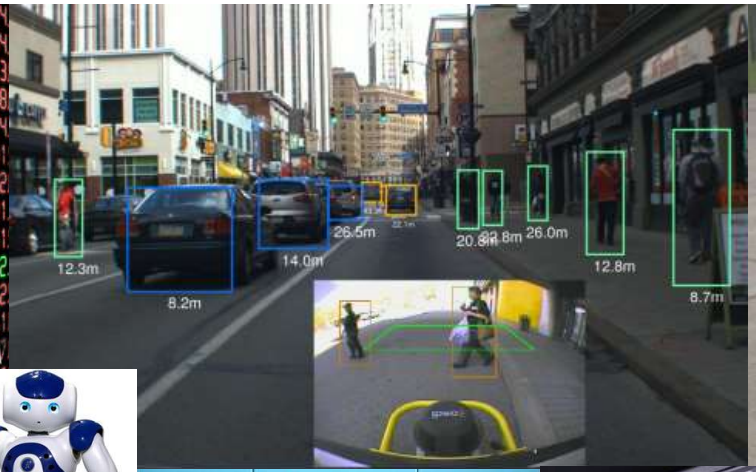


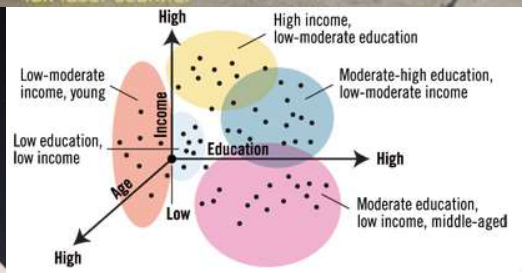
Sumber: https://www.algotive.ai/

Jenis Algoritma Pembelajaran

- *Supervised learning*
  - Terdapat data pelatihan dengan label kelas
  - Tujuan memprediksi kelas pada data uji yang belum ada label kelasnya
- *Unsupervised learning*
  - Terdapat dataset tanpa ada label kelasnya
  - Mengelompokkan data menjadi beberapa klaster berdasarkan kedekatan data (jarak)
- *Reinforcement learning*
  - Terdapat pasangan state dan aksi
  - Memprediksi aksi terbaik berdasarkan *reward* tertinggi

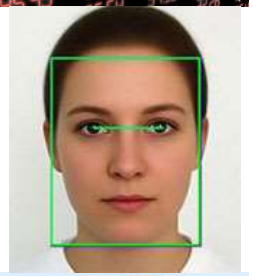
Contoh Aplikasi

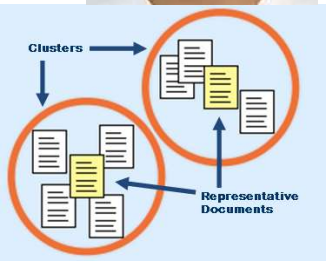




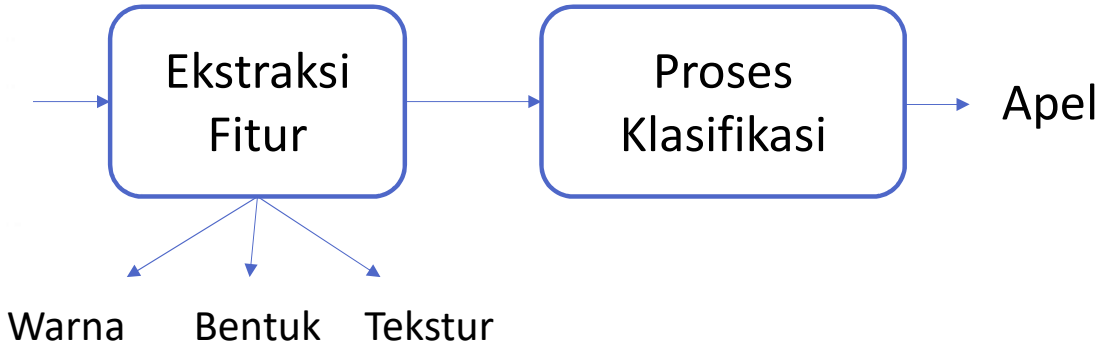
Tipe Aplikasi

- Prediksi (Regresi)
  - Indeks saham, cuaca, penjualan,...
- Klasifikasi (Pengenalan)
  - Suara, wajah, sidik jari, penyakit,...
- Pengelompokan
  - Dokumen, segmentasi gambar, data sosial media, ...





Contoh Tahapan Aplikasi Klasifikasi



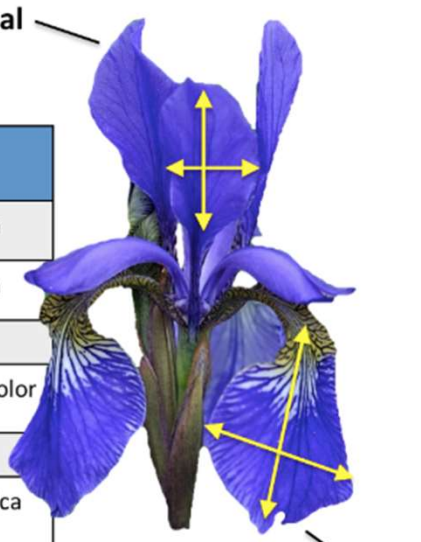
Contoh Dataset

- Deskripsi dataset bunga Iris
  - Fitur/Atribut: Sepal length, Sepal width, Petal length, Petal width
  - Jumlah data: 150
  - Kelas: Iris-setosa (50), Iris-versicolor (50), Iris-virginica (50)

Iris Versicolor | Iris Setosa | Iris Virginica

Samples
(instances, observations)

	Sepal length	Sepal width	Petal length	Petal width	Class label
1	5.1	3.5	1.4	0.2	Setosa
2	4.9	3.0	1.4	0.2	Setosa
...					
50	6.4	3.5	4.5	1.2	Versicolor
...					
150	5.9	3.0	5.0	1.8	Virginica



Features
(attributes, measurements, dimensions)

Class labels
(targets)

Sumber gambar : https://rpubs.com/wjholst/322258

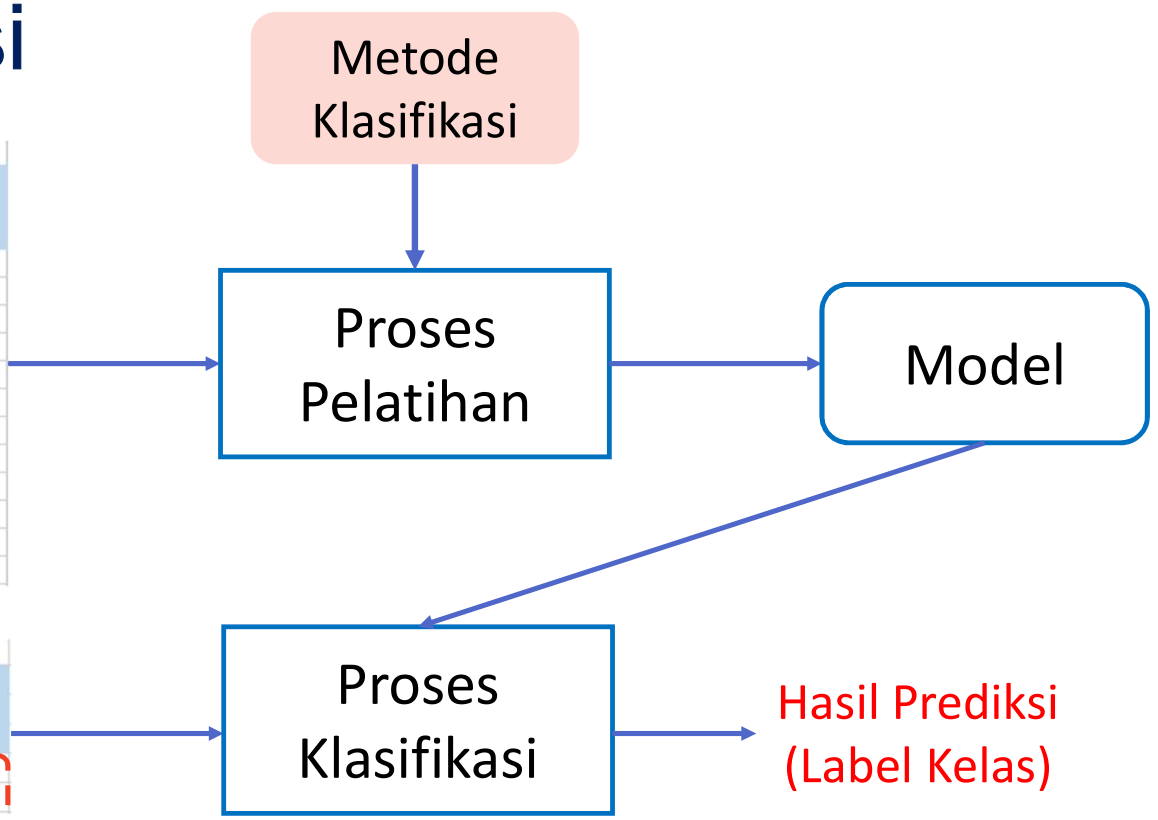
Tahapan Klasifikasi

TRAINING DATA (DATA PELATIHAN)

No.	FEATURES (FITUR) Sepal width x1	Sepal length x2	Petal width x3	Petal length x4	Class Label y	Iris Type
1	5,1	3,5	1,4	0,2	1	Iris-setosa
2	6	2,9	4,5	1,5	2	Iris-versicolor
3	4,7	3,2	1,3	0,2	1	Iris-setosa
4	5,7	2,6	3,5	1	2	Iris-versicolor
5	4,9	3	1,4	0,2	1	Iris-setosa
6	5,5	2,4	3,8	1,1	2	Iris-versicolor
7	4,6	3,1	1,5	0,2	1	Iris-setosa
8	5,5	2,4	3,7	1,2	2	Iris-versicolor
9	6,3	3,3	6	2,5	3	Iris-virginica
10	5,8	2,7	5,1	1,9	3	Iris-virginica
11	7,1	3	5,9	2,1	3	Iris-virginica
12	5,7	2,5	5	2	3	Iris-virginica

TESTING DATA (DATA UJI)

No.	FEATURES (FITUR) Sepal width x1	Sepal length x2	Petal width x3	Petal length x4	Class Label y	Iris Type
13	5	2	3,5	1	?	?
14	5,8	2,8	5,1	2,4	?	?



- TERIMA KASIH -