

Machine Learning

Introduction

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Pendidikan:

- Sekolah Tinggi Manajemen Informatika dan Komputer Indonesia Mandiri (2009)
- Magister Informatics ITB (2014)

Research interest: software engineering

Position: Head of the Informatics Engineering Program at STMIK IM

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Knowing about **machine learning**?

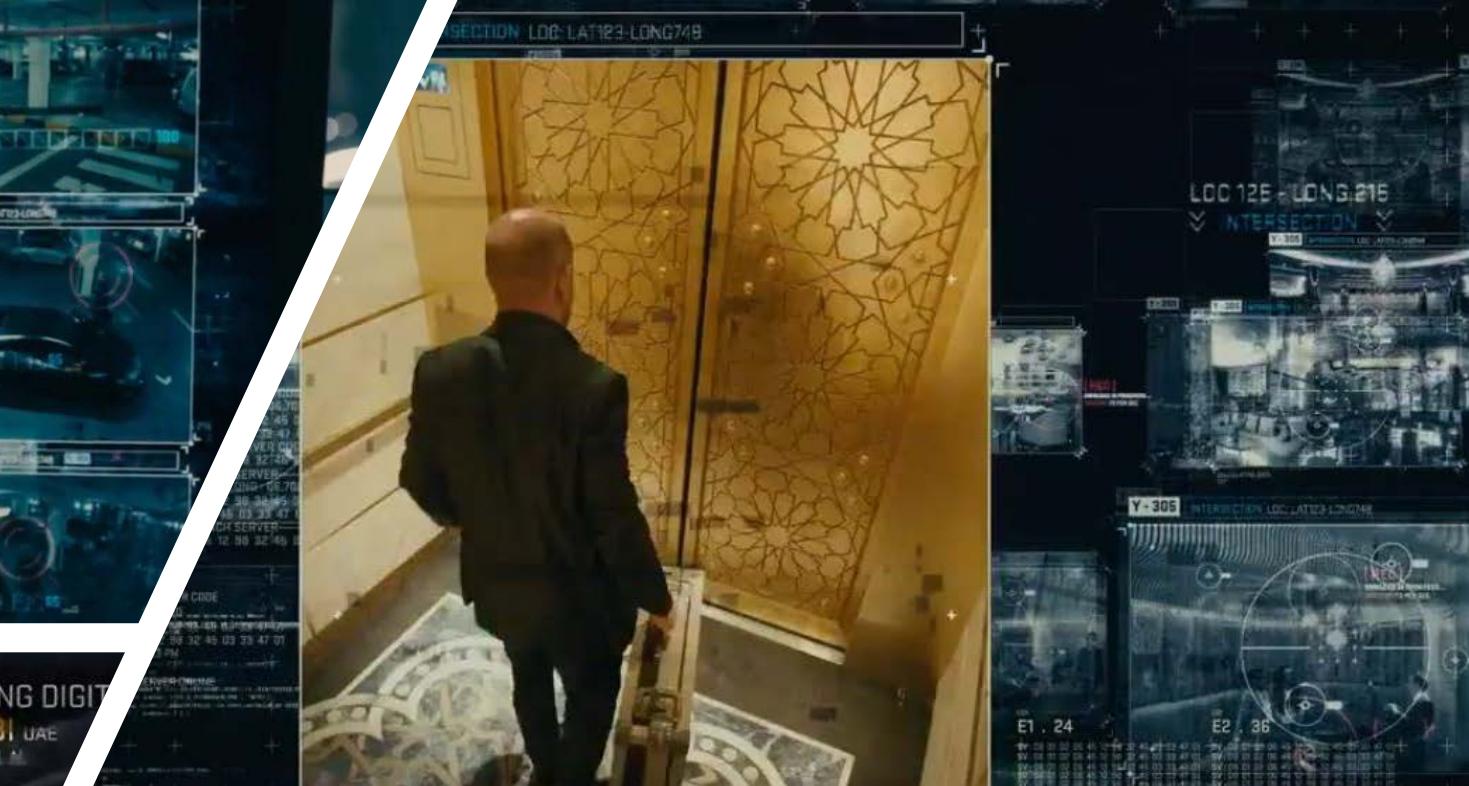
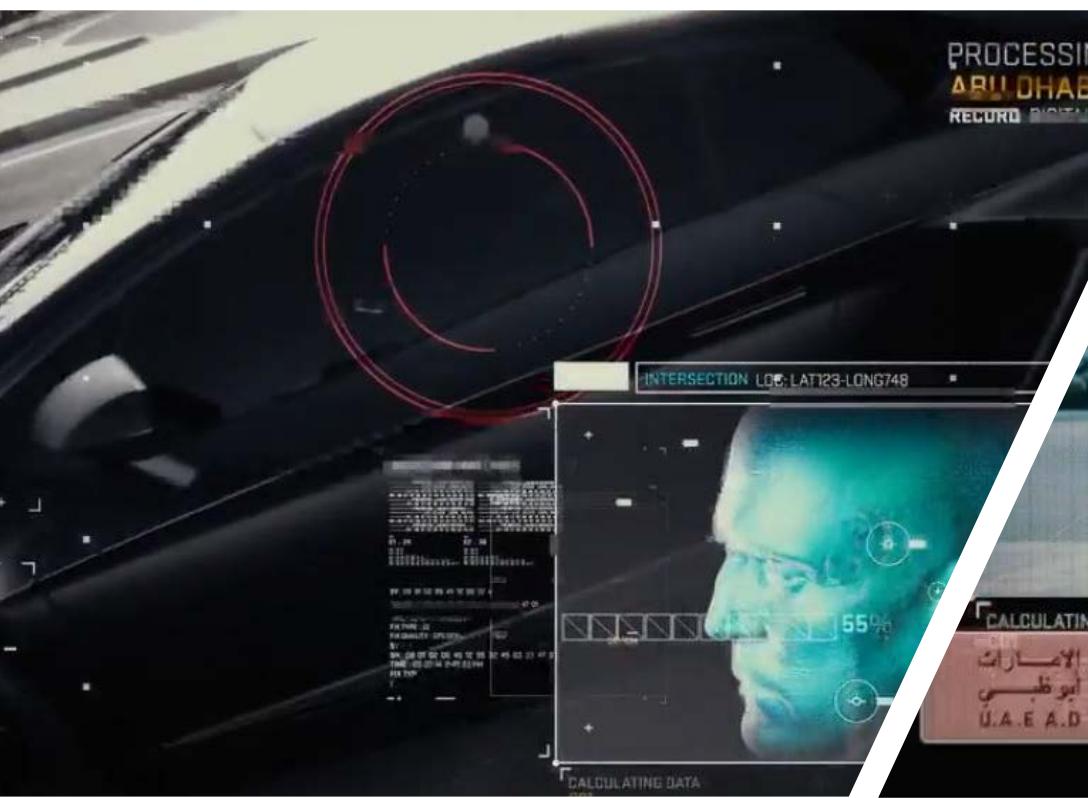
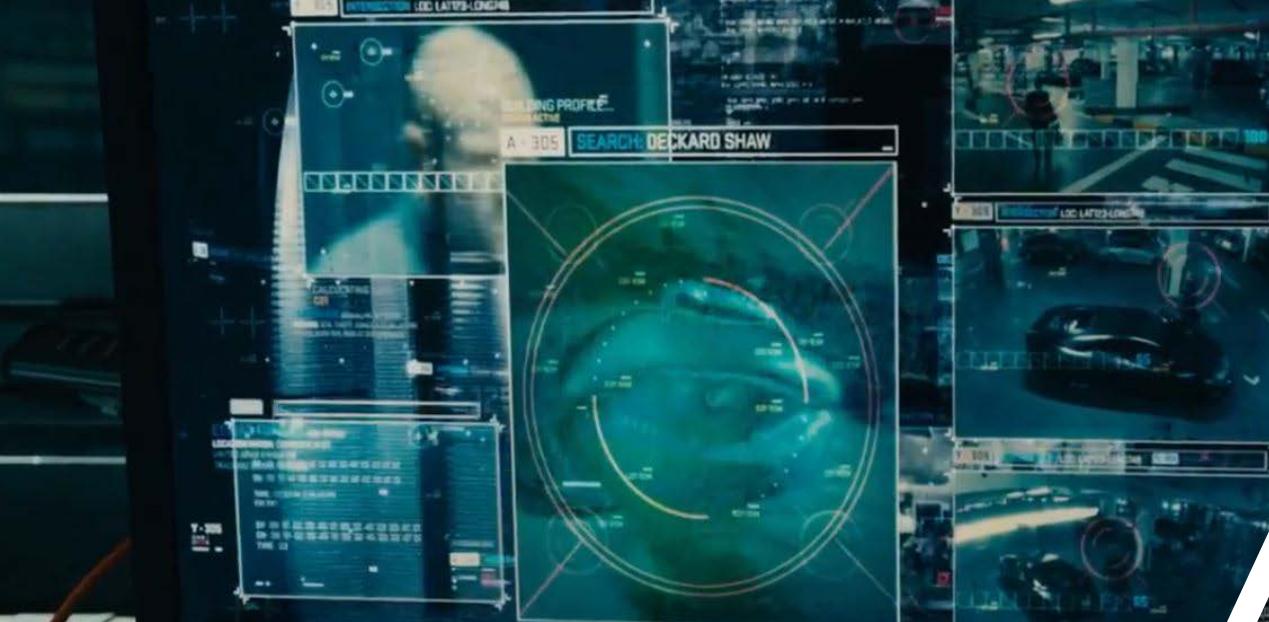


Imagine about **machine learning**?

Quick
question. What
do u?

God's eye from
Fast and
Furious





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Magic? No!

- Aplikasi / program tersebut hanya ditanamkan suatu mesin cerdas (Artificial Intelligent)
- AI merupakan konsep umum tentang bagaimana membuat mesin yang mampu **berpikir secara cerdas** (smart machine) seperti layaknya manusia, atau **mesin yang mampu belajar** dari berbagai input yang diberikan hingga menghasilkan outcome yang akurat
- Mesin hanya dapat belajar karena ada software dengan algoritma tertentu yang ditanamkan.
- Algoritma ini dikenal dengan **Machine Learning Algorithm** atau cukup **Machine Learning (ML)**

History of ML

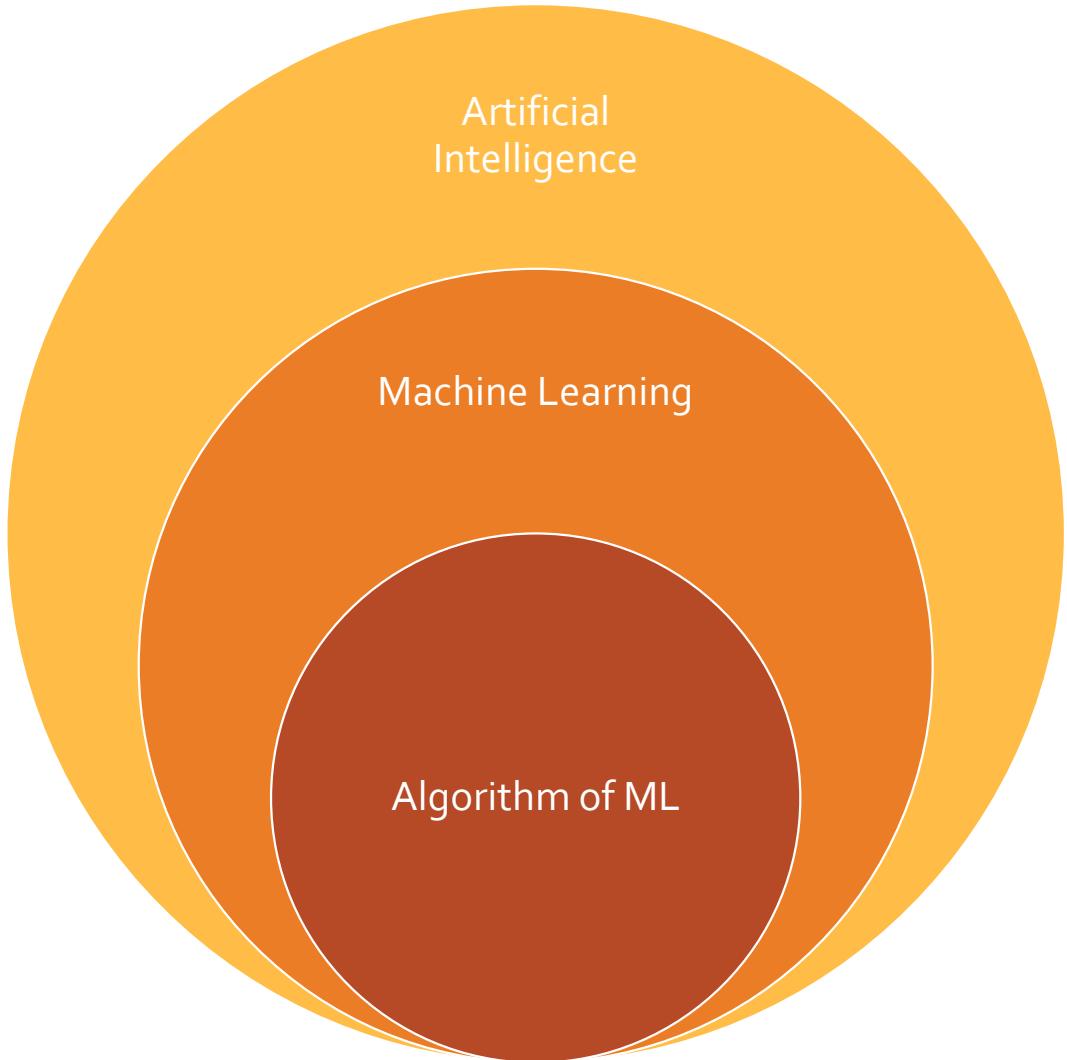
- Machine learning diperkenalkan oleh Arthur Samuel tahun 1959 melalui jurnal yang berjudul “Some Studies in Machine Learning Using the Game of Checkers”
- Arthur Samuel mencoba mengajari program komputer untuk bermain catur lebih baik dari dirinya
- Pada tahun 1962, program buatannya dapat mengalahkan juara catur dari negara bagian Connecticut

Machine Learning (ML)

- Machine learning is the study of computer algorithms that **improve automatically through experience**. Application range from data mining program that discover general rules in large data set, to information filtering system that **automatically learn** users' interest (Tom Mitchell, 1997)
- Machine Learning is a field of computer science that gives computers the ability to **learn without being explicitly programmed**
- Machine learning is a subset at AI technique which use statistical methods to enable machines to **improve with experience**

Machine Learning (ML)

- Machine learning adalah pemograman komputer untuk mencapai kriteria/performa tertentu dengan menggunakan **sekumpulan data training** atau **pengalaman di masa lalu** (past experience) (Rifkie Primartha, 2018)
- Machine learning melibatkan berbagai disiplin ilmu seperti statistika, ilmu komputer, matematika bahkan neurologi



Artificial Intelligence and Machine Learning

Machine Learning (ML)

Machine Learning dapat bersifat:

- Predictive (untuk memprediksi masa depan)
- Descriptive (untuk memperoleh pengetahuan dari data)
- Or both predictive and descriptive (gabungan)

Traditional programming vs machine learning

Traditional programming

Data &
Program

Computer

Output

Machine learning

Data & Output

Computer

Program

Type of machine learning

- Supervised learning
- Unsupervised learning
- Reinforcement learning
- Deep learning

Supervised learning

- **Supervised learning** adalah sebuah algoritma untuk mempelajari **mapping function** antara input dan output
- Dinamakan seperti ini karena **traning dataset** (sekumpulan data untuk training) **akan memandu dan mengajari** komputer agar menghasilkan outcome sesuai harapan
- Proses training akan berhenti apabila algoritma sudah mencapai apa yang disebut dengan **an acceptable level of performance**

Supervised learning

Supervised learning dikelompokan menjadi:

- **Classification**: bertujuan untuk memprediksi outcome dari input (sample data), dimana output variable berbentuk katagori-katagori. **Contoh**: pria/wanita, sehat/sakit, tinggi/rendah, dll
- **Regression**: bertujuan untuk memprediksi outcome dari input (sample data), dimana output variable berbentuk nilai-nilai aktual (real value). **Contoh**: tinggi badan seseorang, curah hujan, dll

Supervised learning algorithm

- Decision tree
- Naive Bayes Classifier
- Suport Vector Machine
- Linear Regression
- KNN (K-Nearest Neighbor)
- dll

Unsupervised learning

- **Unsupervised learning** menggunakan **unlabeled training** dataset untuk **memodelkan** struktur dari data
- **Unsupervised learning** bermanfaat untuk kasus-kasus dimana kita ingin menemukan **relasi implisit** (implicit relationship) dari **unlabeled dataset** yang disediakan

Unsupervised learning

Unsupervised learning dikelompokan menjadi:

- **Association:** bertujuan untuk menemukan peluang (probabilitas) berdasarkan keterkaitan dari item-item dalam sebuah kumpulan. **Contoh:** jika seseorang memberi teh maka kemungkinan besar ia juga membeli gula
- **Clustering:** bertujuan untuk mengelompokan sample dalam cluster yang sama berdasarkan kemiripan
- **Dimensionality Reduction:** berarti mengurangi sejumlah variables dari dataset namun tetap memastikan informasi penting masih tersedia

Unsupervised learning algorithm

- K-Means
- Hierarchical Clustering
- DBSCAN
- Fuzzy C-Means
- Self-Organizing Map
- dll

Reinforcement learning

- **Reinfocement learning** merupakan metode learning yang dipengaruhi oleh **feedback dari lingkungan** dengan teknik learning yang **iterative** (berulang-ulang) dan **adaptive** (menyesuaikan)
- Pada **reinforcement learning** tidak ada traning dataset, data-data diperoleh berdasarkan pengalaman
- Algoritma **reinforcement learning** mengijinkan agent untuk memutuskan aksi selanjutnya berdasarkan kondisi saat ini (current state)
- Banyak diimplementasikan pada **game theory, control theory, simulation-based optimazation, multi-agent system, robotic, swarm intelligent**, dll

Reinforcement learning algorithm

- Genetic Algorithm (GA)
- Dynamic Programming (DP)
- Generalized Policy Iteration (GPI)
- Monte Carlo
- dll



Search engine (google, yahoo, AOL, Bing, Baidu, Ask.com)



Netflix (the app that know what do you what)



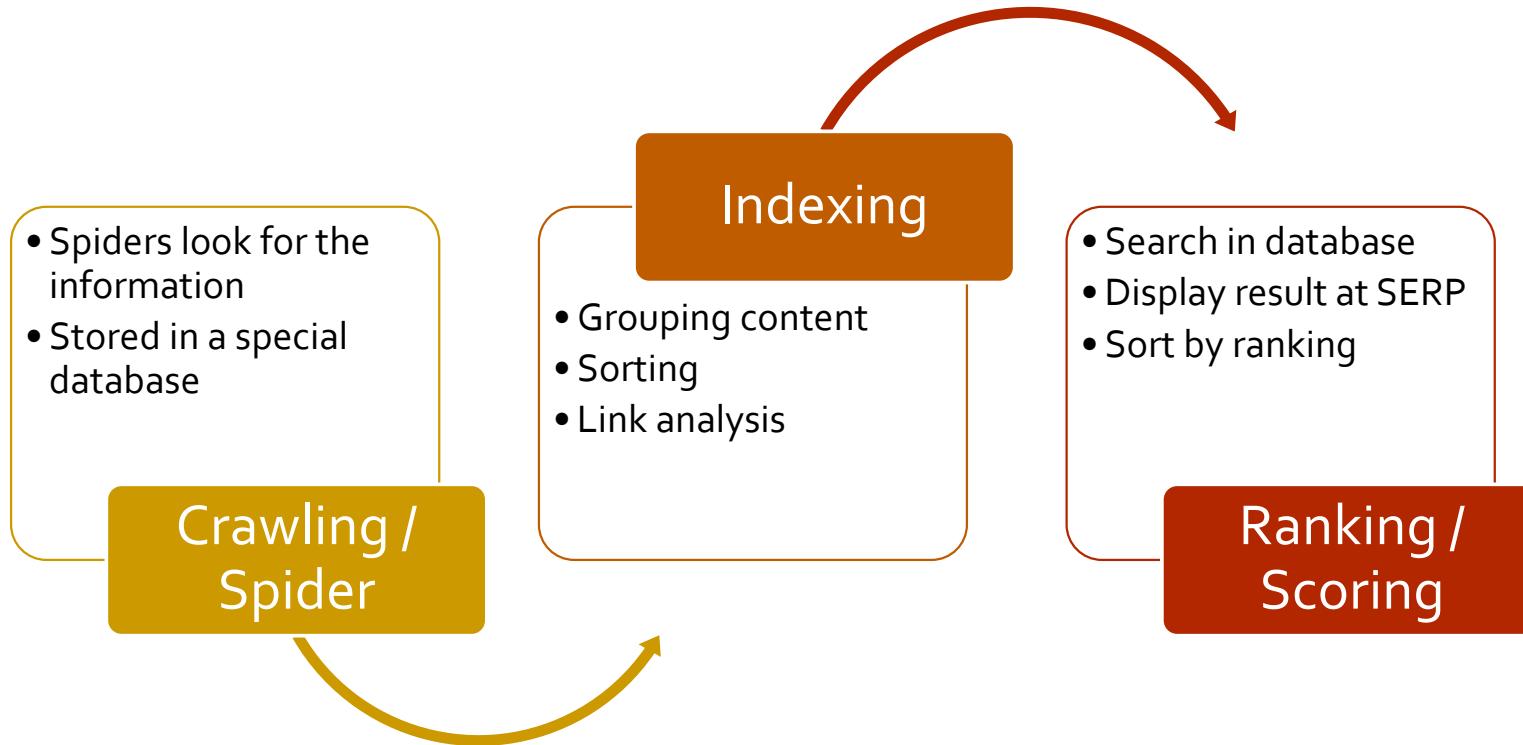
Snapchat's filters (use augmented reality and machine learning for your flower crowns selfies)

Machine
Learning use
for..

Search Engine

- **Search engine** merupakan program atau script yang disediakan di Internet dan dapat diakses oleh user untuk keperluan mencari dokumen atau file-file berdasarkan keyword dan menampilkan hasilnya sesuai dengan keyword tersebut.
- Tidak semua informasi dapat ditemukan dengan menggunakan search engine.
- Berbagai content Internet yang tidak dapat dicari dan ditemukan oleh web search engine disebut sebagai deep web.

Search engine process



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Showing results for **albert einstein**

Search instead for albert einstein

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https://en.wikipedia.org/wiki/Albert_Einstein ▾
Albert Einstein was a German-born theoretical physicist who developed the theory of relativity, one of the two pillars of modern physics (alongside quantum ...
Doctoral advisor: Alfred Kleiner Fields: Physics, philosophy
Other academic advisors: Heinrich Friedrich W... Spouse(s): Mileva Marić (m. 1903; div. 1919); ...
Hans Albert Einstein · Albert Einstein's brain · Albert Einstein House · Elsa Einstein

Albert Einstein (@AlbertEinstein) - Twitter
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Albert Einstein
Theoretical physicist

Albert Einstein was a German-born theoretical physicist who developed the theory of relativity, one of the two pillars of modern physics. His work is also known for its influence on the philosophy of science. [Wikipedia](#)

Born: March 14, 1879, Ulm, Germany
Died: April 18, 1955, Princeton Medical Center at Plainsboro, New Jersey, United States
Education: University of Zurich (1905), ETH Zurich (1896–1900), [MORE](#)

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Albert Einstein - Wikipedia
https://en.wikipedia.org/wiki/Albert_Einstein ▾
Albert Einstein was a German-born theoretical physicist who developed the theory of relativity, one of the two pillars of modern physics (alongside quantum ...
Doctoral advisor: Alfred Kleiner Fields: Physics, philosophy
Other academic advisors: Heinrich Friedrich W... Spouse(s): Mileva Marić (m. 1903; div. 1919); ...
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Albert Einstein - Biographie... nobelpriize.org

Albert Einstein - Wikipedia en.wikipedia.org

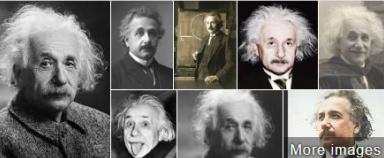
Albert Einstein - Wikiquote en.wikiquote.org

man who stole Albert Einstein's brain ... fromthegrapevine.com

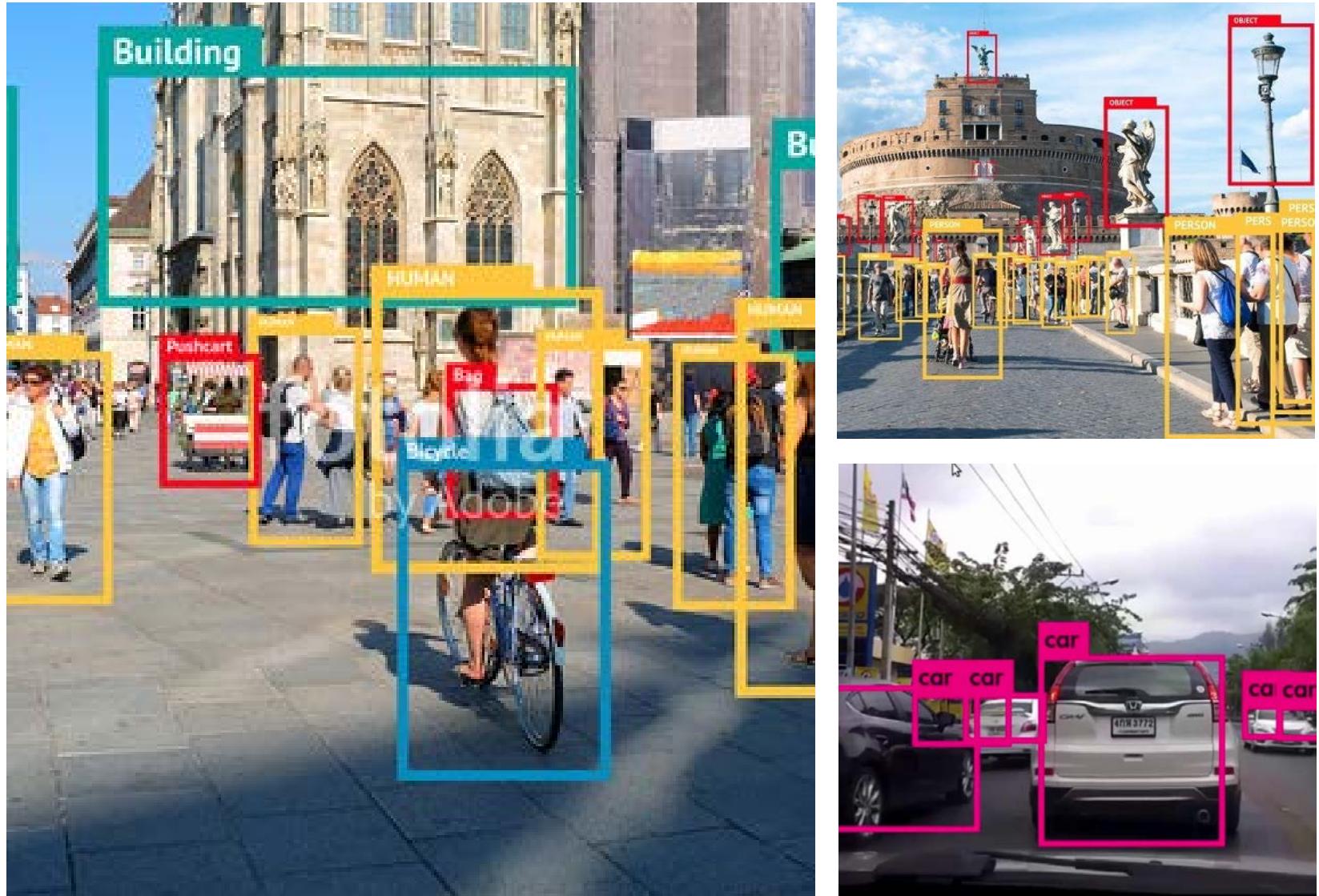
Albert Einstein (@AlbertEinstein... twitter.com

Einstein's Letter to Marie C... biography.com

Albert Einstein



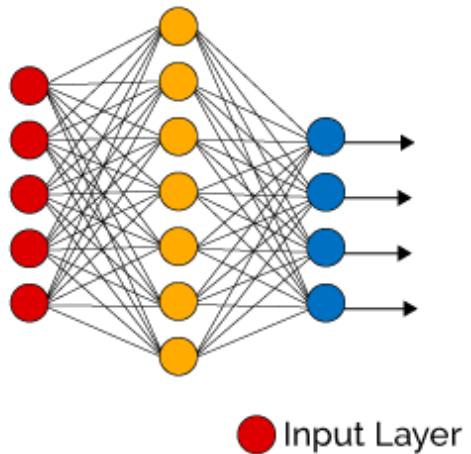
Machine learning and object detection



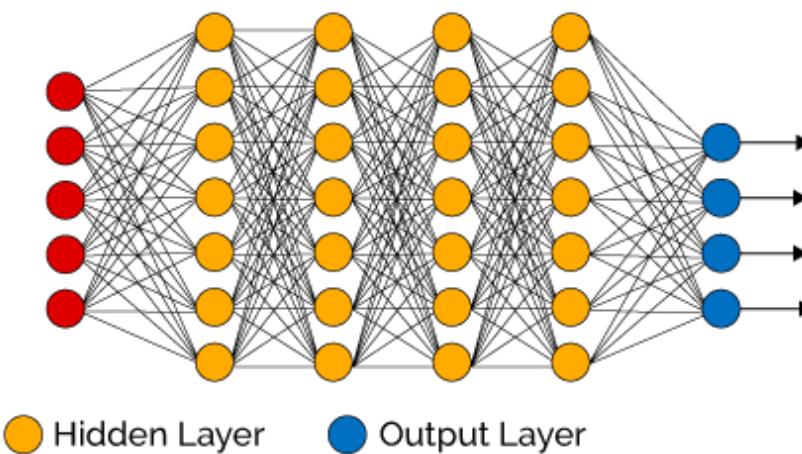


Deep learning

Simple Neural Network



Deep Learning Neural Network

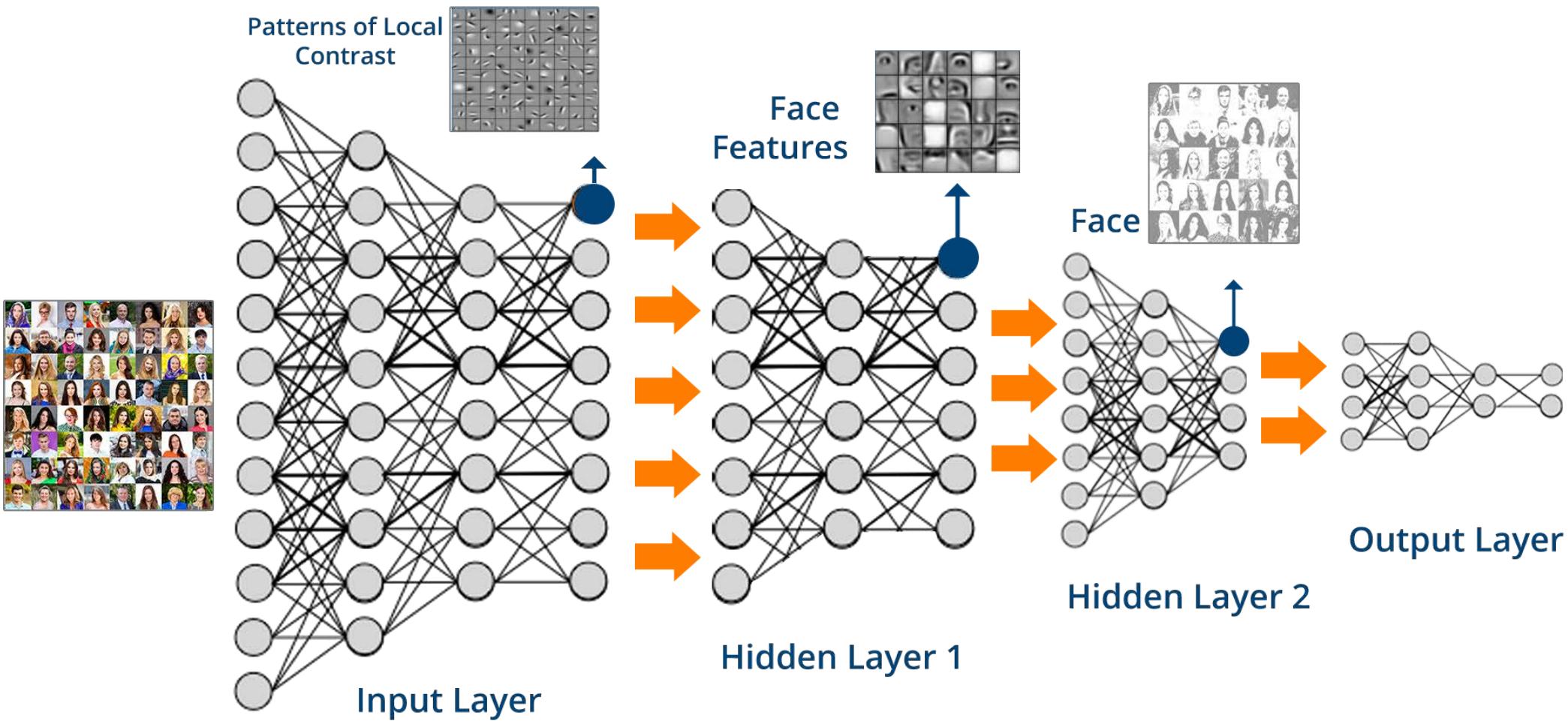


Deep learning merupakan metode yang memanfaatkan artificial neural networks yang berlapis-lapis (multi layer)

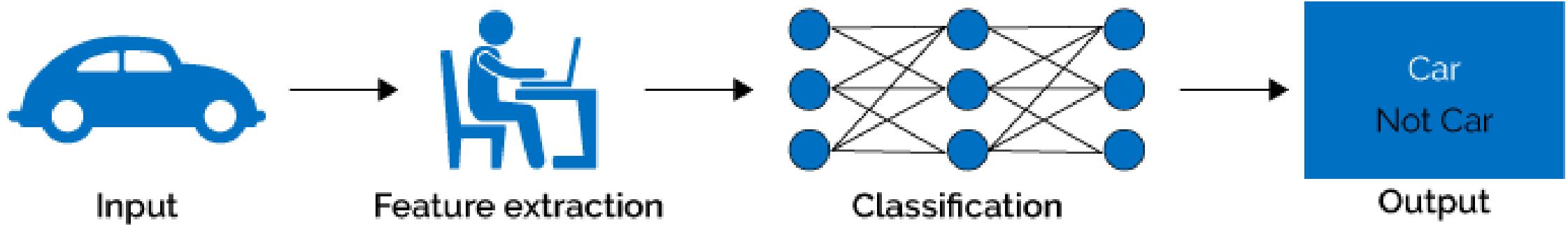
Artificial neural networks ini dibuat mirip dengan otak manusia, dimana neuron-neuron terkoneksi satu sama lain sehingga membentuk sebuah jaringan neuron yang sangat rumit

Deep learning algorithm

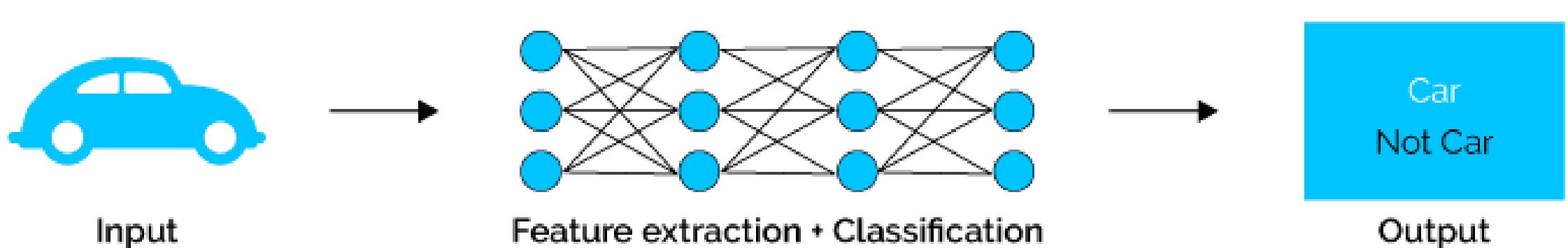
- Convolutional Network
- Restricted Boltzmann Machine (RBM)
- Deep Belief Network (DBN)
- Stacked Autoencoders
- dll



Machine Learning

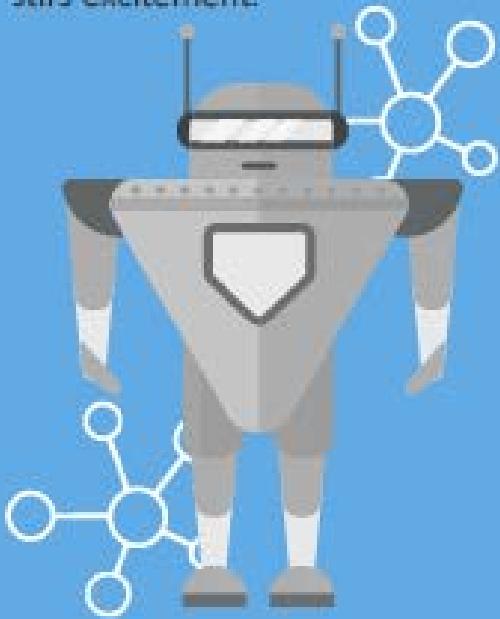


Deep Learning



ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



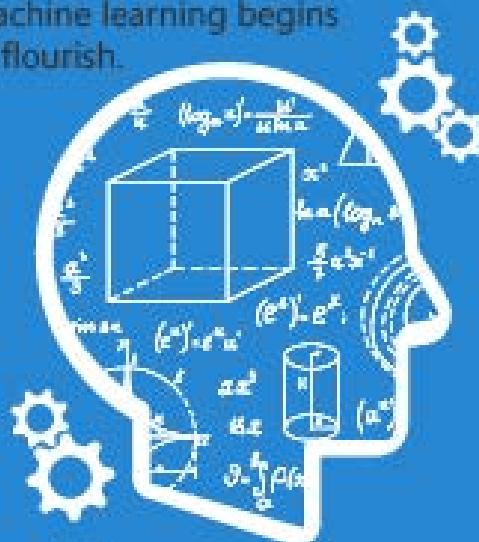
1950's

1960's

1970's

MACHINE LEARNING

Machine learning begins to flourish.



1980's

1990's

2000's

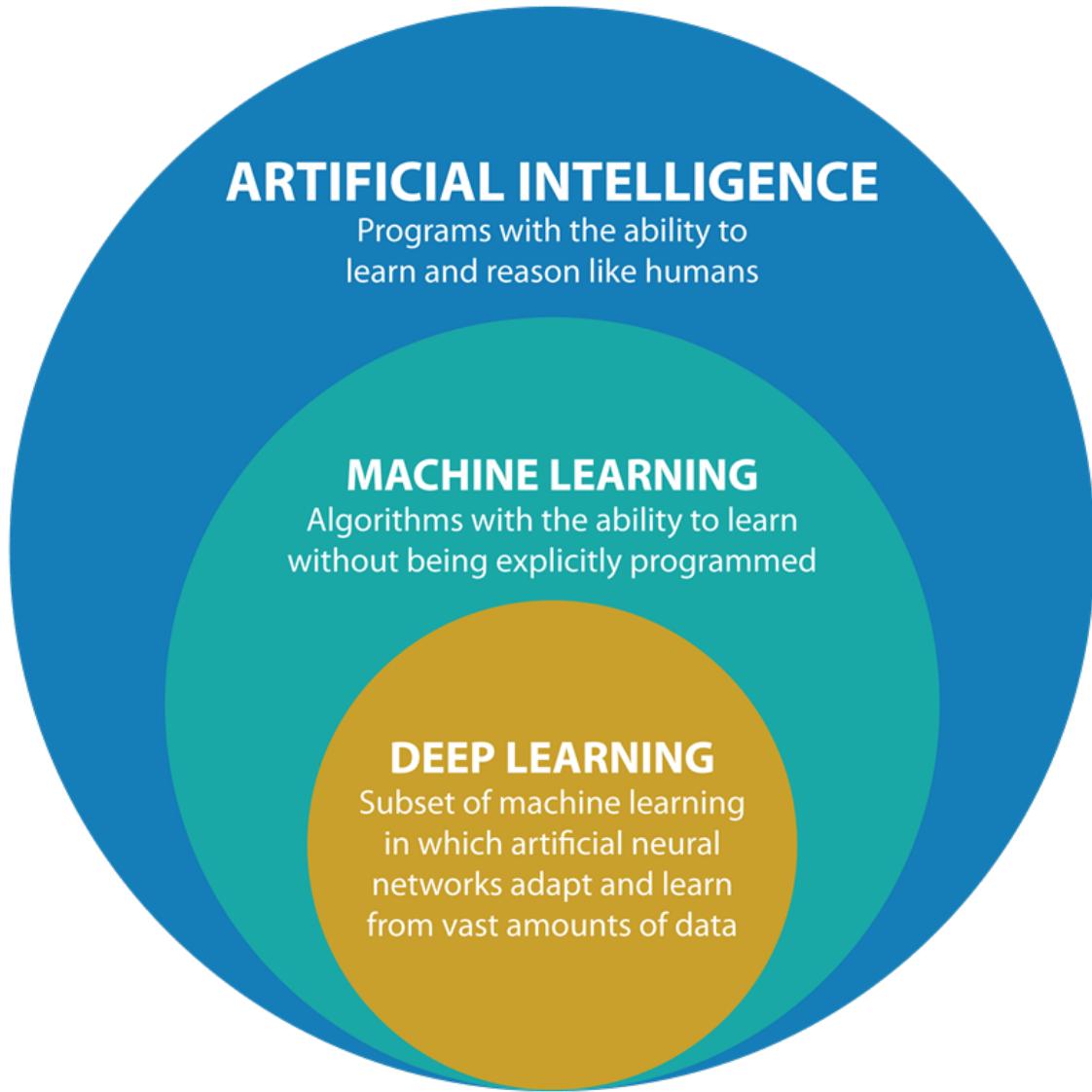
2010's

DEEP LEARNING

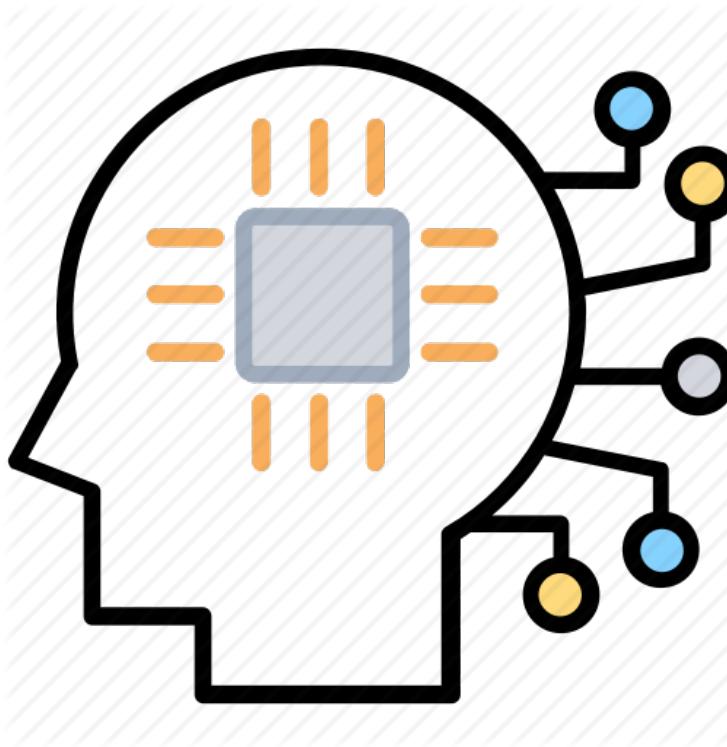
Deep learning breakthroughs drive AI boom.



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.



Conclusion



Questions?



</THANKS>

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<http://script.id>

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