



Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi
Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi
Republik Indonesia



MICROCREDENTIAL: ASSOCIATE DATA SCIENTIST

01 November – 10 Desember 2021

Pertemuan ke-2

Teknologi dan Aplikasi Artificial Intelligence



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- S1:
- S2:
- S3:

Riwayat/Pengalaman Pekerjaan:

- Dosen
- XXXX
- XXXX
- XXXX
- XXXX



SUMBER UTAMA MATERI

Sumber berupa slide materi:

1. Materi Kuliah Artificial Intelligence di Informatika ITB
2. Berbagai Pelatihan di Pusat AI ITB

Sumber berupa buku:

1. Stuart J Russell & Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice-Hall International, Inc, 2010
2. Ayu Purwarianti, Bambang Riyanto, Dessi Puji Lestari, Intan Muchtadi Alamsyah, Nugraha Priya Utama, Ridwan Sutriadi, Sapto Wahyu Indratno, Sophi Damayanti, "Artificial Intelligence di Masa Pandemi", ITB Press, 2021

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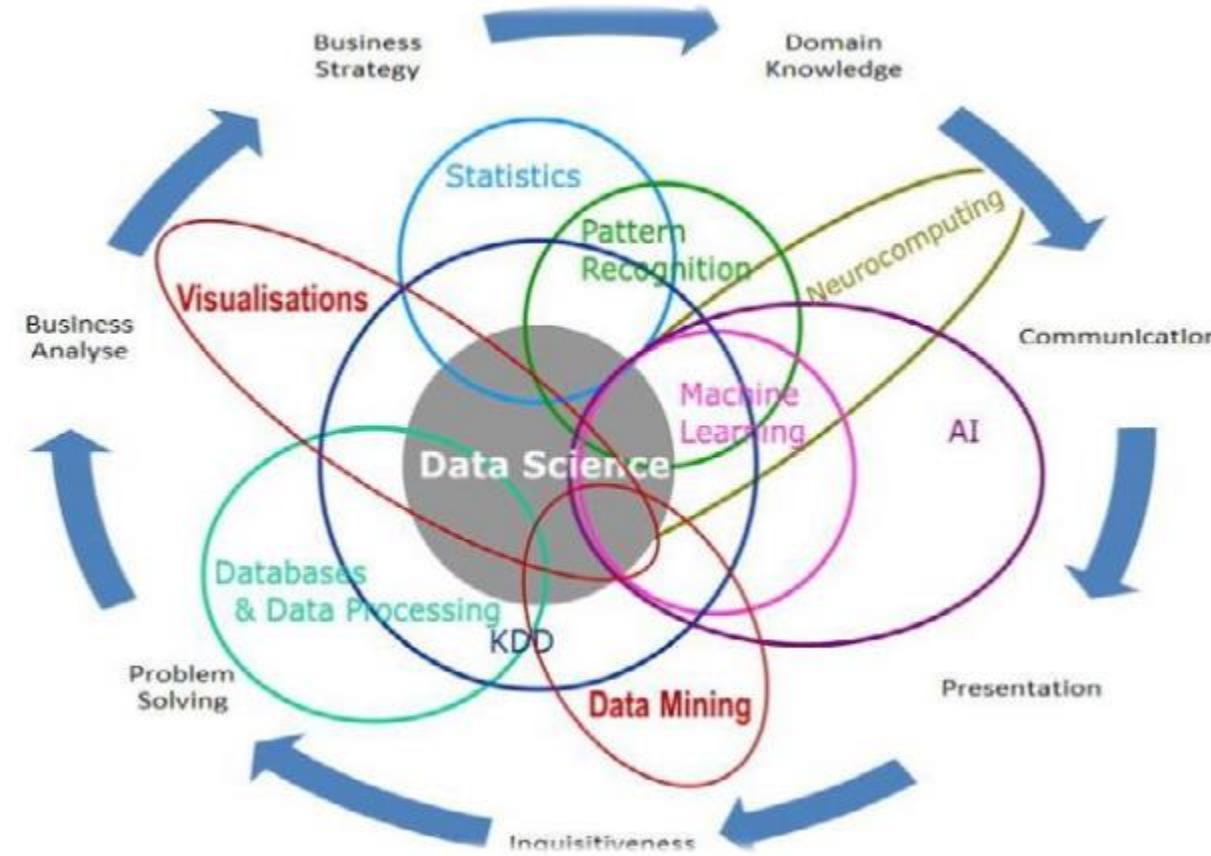
Learning Objective

Peserta mampu menjelaskan konsep dasar AI dengan benar dan mengidentifikasi pemanfaatan teknologi AI

Course SubTopics

- Definisi Artificial Intelligence
- Perancangan Intelligent Agent
- Jenis Teknologi Artificial Intelligence
- Perkembangan Teknologi Artificial Intelligence
- Penerapan Teknologi Artificial Intelligence
- Tantangan dalam Pengembangan Teknologi Artificial Intelligence

Data Science dan Artificial intelligence



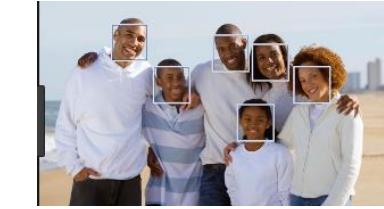


ARTIFICIAL INTELLIGENCE, IS IT A HYPE?

Text Processing

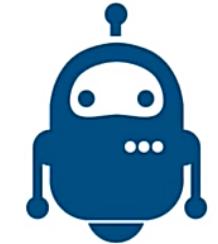


Image Processing



Facebook Face Recognition

Speech Processing

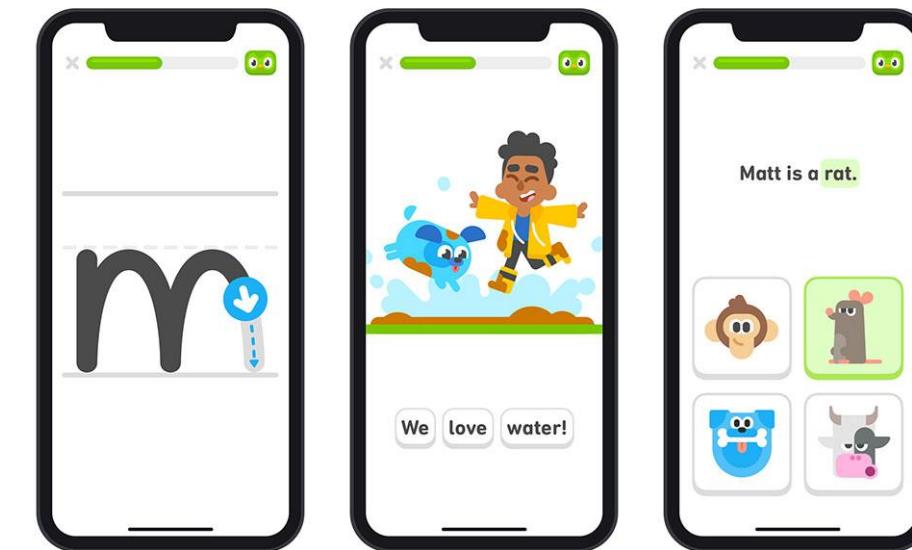


AI di Dunia Nyata: Belajar Bahasa Dunia Duolingo

Belajar Bahasa meningkat saat pandemik

300 juta pengguna, 30 juta pengguna aktif/bulan

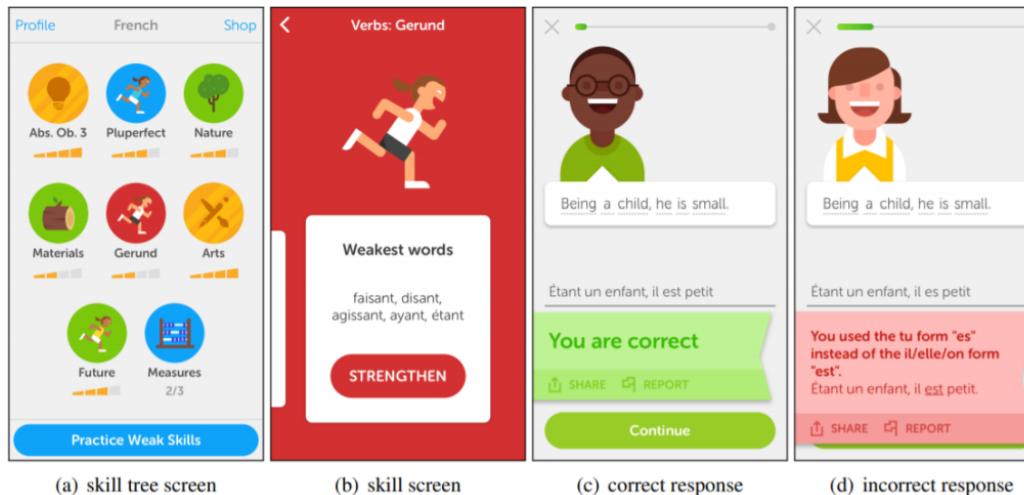
Belajar bahasa berbasis game



Ref: [How Duolingo uses AI in every part of its app \(venturebeat.com\)](https://venturebeat.com/how-duolingo-uses-ai-in-every-part-of-its-app/)

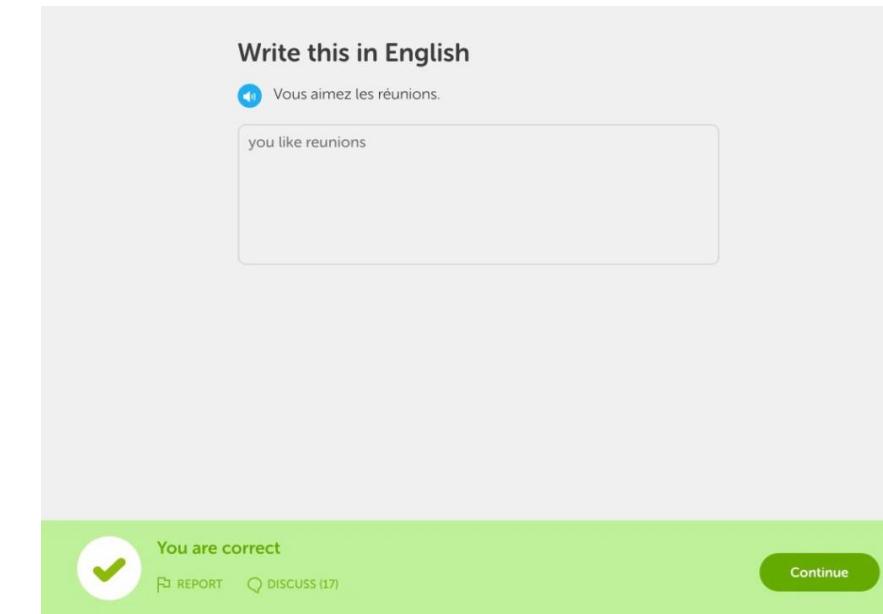
AI di Dunia Nyata: Belajar Bahasa Dunia Duolingo

Fitur Spaced Repetition



Membangun profil yang sangat rinci berdasarkan apa yang Anda ketahui dan apa yang tidak Anda ketahui

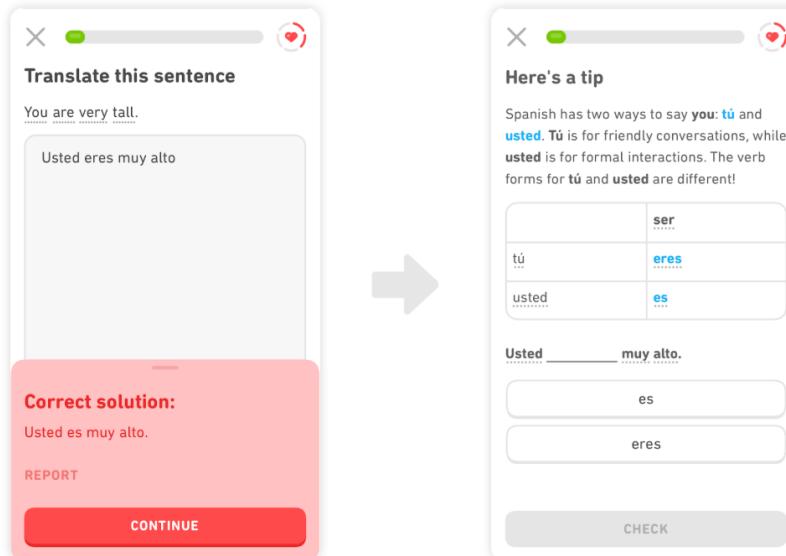
Fitur Birdbrain: Machine Learning based



Model ini dapat memprediksi kapan Anda lupa sesuatu karena Anda belum sering melihatnya, atau baru-baru saja melihatnya. Ini untuk membantu memilih tantangan mana yang akan dimasukkan ke dalam sesi latihan user.

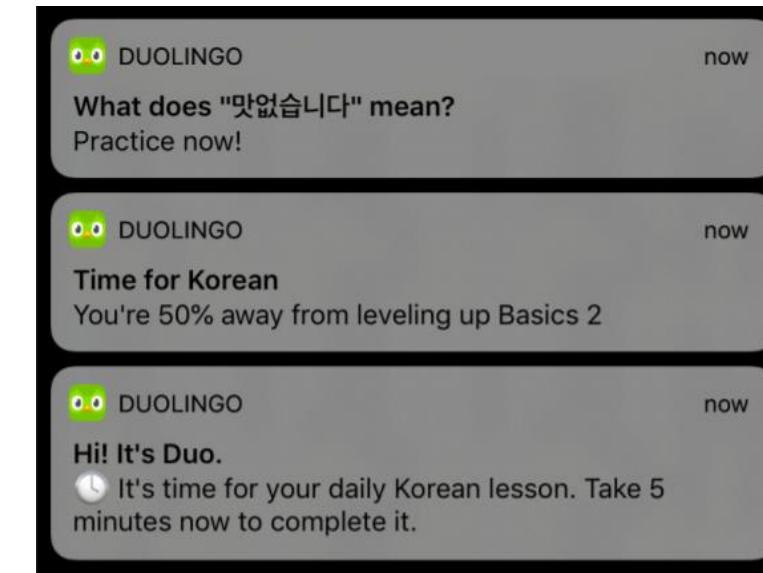
AI di Dunia Nyata: Belajar Bahasa Dunia Duolingo

Fitur Active Learning: NLP based



Misalnya, jika Duolingo memperhatikan bahwa Anda memasukkan kata-kata yang tepat tetapi dalam urutan yang salah, itu dapat memberi Anda tip tata bahasa korektif tepat setelah meludah bahwa input Anda salah.

Fitur Bandit Algorithm



Melatih seluruh sistem mencoba untuk mencari tahu kapan waktu terbaik untuk mengirim pemberitahuan berdasarkan aktivitas Anda sendiri

AI di Dunia Nyata: Belajar Bahasa Dunia Duolingo

Fitur Logistic Regression

别为成绩担心，你已经很努力了。

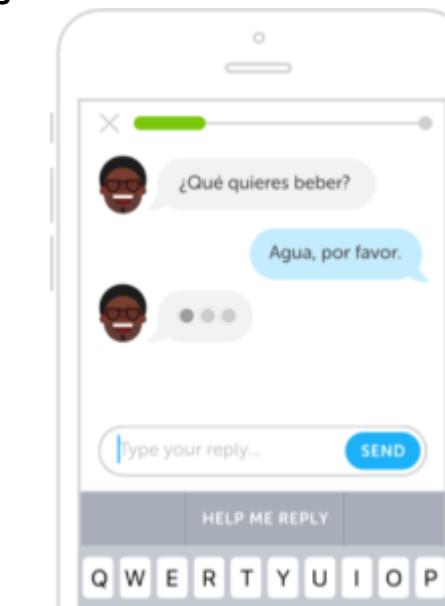
- 3 don't be worried about the grade you already worked hard  
- 5 my last name is li i'm pleased to meet you  
- 6 be quiet they are sleeping  
- 7 she will go to xian to work next month  

我也姓李，认识你很高兴！

安静！他们在睡觉。

她下个月去西安工作。

Fitur Chatbots

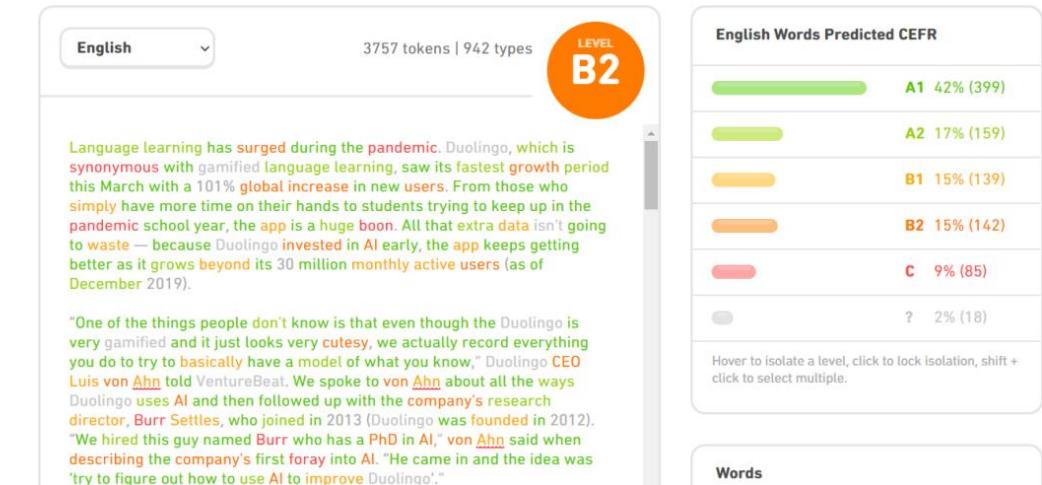
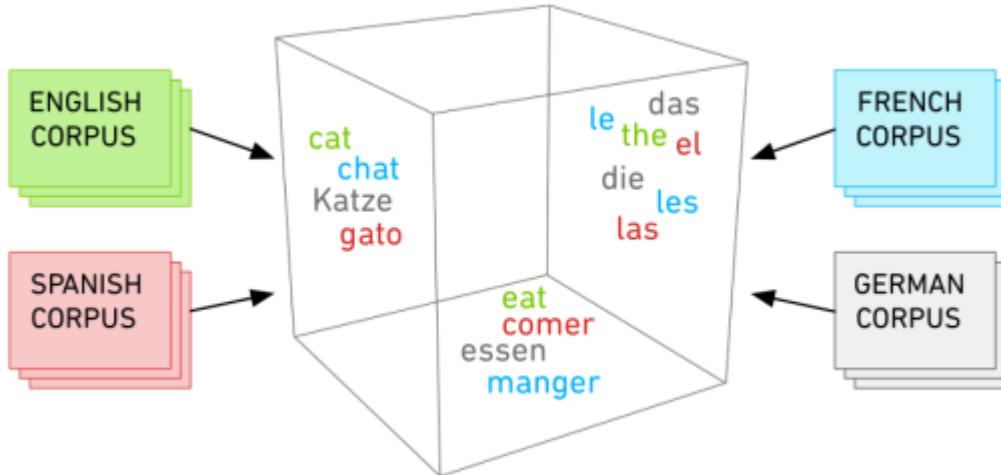


Setiap kali User mengirimkan jawaban atas tantangan dan Duolingo mengatakan user salah, dan memiliki opsi untuk menekan tombol Laporkan. Jika User berpikir melakukannya dengan benar, maka dapat mengajukan banding.

Menawarkan percakapan dalam skala besar hingga 300 juta pengguna dalam 94 bahasa yang berbeda? Gunakan chatbot basis AI

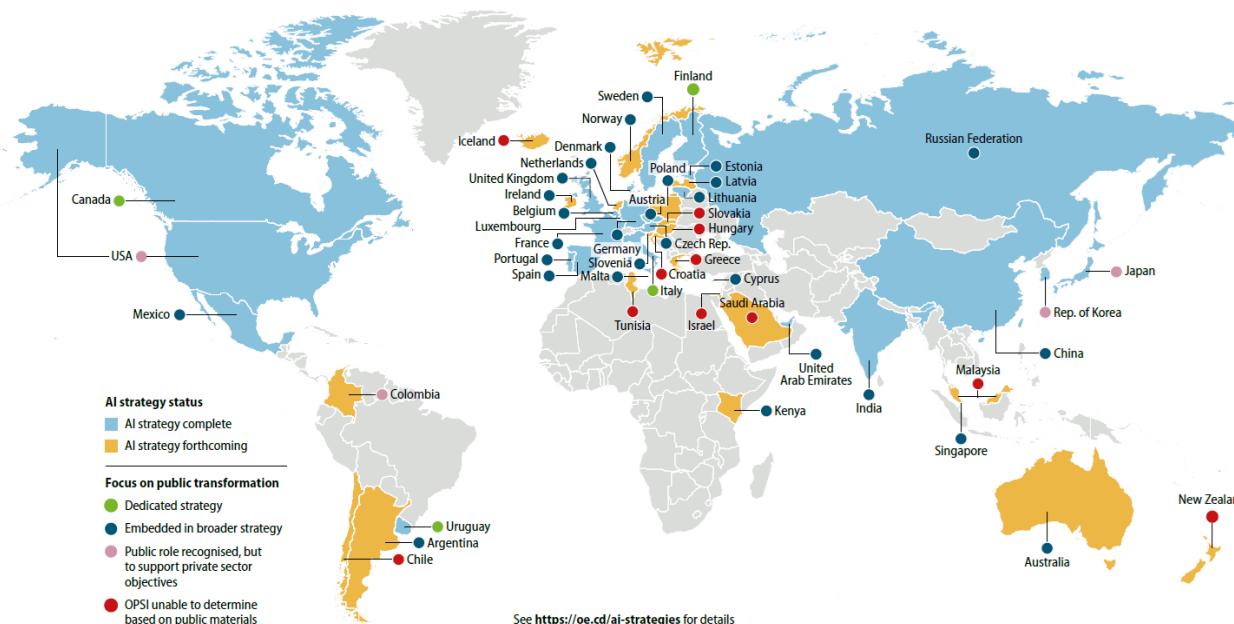
AI di Dunia Nyata: Belajar Bahasa Dunia Duolingo

Fitur CEFR checker



Duolingo menggunakan machine learning unsupervised untuk membangun alat untuk menentukan kesulitan teks apa pun untuk pelajar bahasa. Tim menggunakan Common European Framework of Reference (CEFR), yang memiliki skala enam tingkat: A1 dan A2 (pemula), B1 dan B2 (menengah), dan C1 dan C2 (lanjutan).

AI Di Berbagai Negara



HOLONIQ. GLOBAL INTELLIGENCE Global AI Strategy Landscape

50 National Artificial Intelligence Policies as at February 2020.

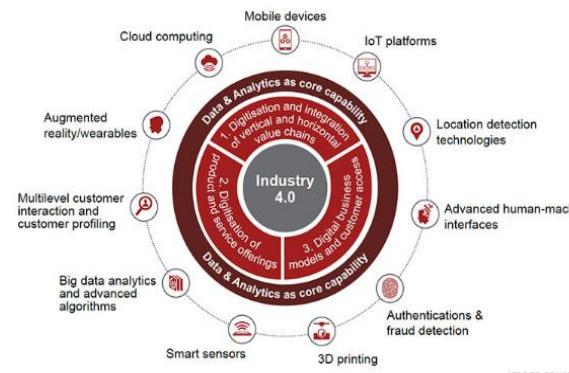
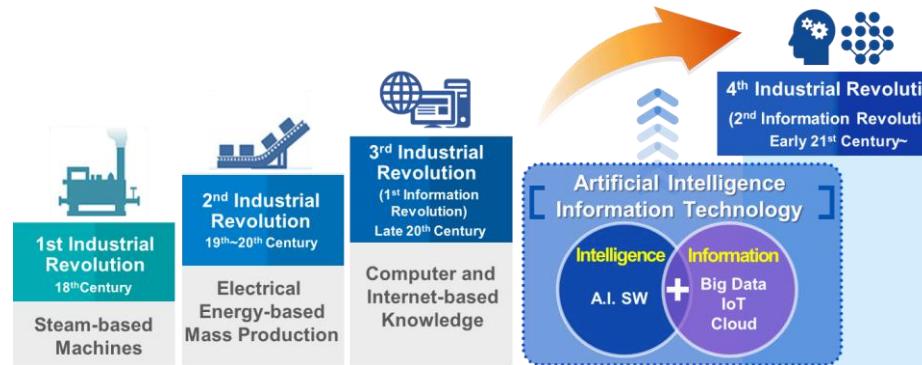
Argentina	Offering the "National Plan of Artificial Intelligence". Falls under the Innovative Argentina 2030 (IANI 2030) outlines seven fields for which AI will be critical.
Australia	November 2019, Artificial Intelligence Mission Australia 2030 (AIM AT 2030) outlines seven fields for which AI will be critical.
Belgium	March 2019, 'AI 4 Belgium' launched and includes seven major objectives.
Brazil	Consultation period ended January 2020. Building a network of eight research centers focused on artificial intelligence.
Canada	June 2019, Artificial Intelligence Mission Canada 2030 (AIM AT 2030) outlines seven fields for which AI will be critical.
China	May 2019, China launched the most comprehensive AI strategy globally with 2030 targets for its AI R&D industry.
Colombia	November 2019, first draft issued for the National Strategy for AI.
Czech Republic	May 2019, National Artificial Intelligence Strategy of the Czech Republic was launched.
Denmark	December 2019, AI Roadmap focused on specialization in health, infrastructure, energy and climate, research and talent focus. First National AI Strategy.
Finland	Expected April 2020, Ministry of Science, Education and Culture (MSD) created a committee of 10 experts to develop.
Iceland	March 2019, Denmark announced the National Strategy for Artificial Intelligence with four key objectives.
India	May 2019, 'Leading the Way into the Age of Artificial Intelligence' identified 11 key actions following May 2017 Steering Group endorsement.
Hungary	June 2019, Hungary announced an AI Action Plan, the first pillar of a national AI strategy, expected in 2020.
Italy	June 2018 working paper on using AI to ensure social growth, inclusion and positioning the country as a leader in AI.
Japan	July 2019, Japan's AI policy, the 'Artificial Intelligence Technology Strategy', was announced second only to China with 'Society 5.0'.
Kenya	June 2018, government announced task force to create a five-year strategy on national use of emerging technologies.
Malaysia	October 2019, 'A Strategy and Vision for Malaysia Intelligent Manufacturing and Big Data Analytics Framework'.
Netherlands	September 2019, Norway issued its National Strategy for Artificial Intelligence.
New Zealand	November 2019, AI Forum of New Zealand, 'Artificial Intelligence: Shaping a Future New Zealand'.
Poland	November 2019, Assumptions for the AI strategy in Poland as an action plan towards developing an AI strategy.
Portugal	February 2019, AI Portugal 2030, seeks to contribute to economic growth, scientific excellence, and human development using with AI.
Russia	October 2019, Royal Decree to align with the Kingdom's Vision 2030 program.
Saudi Arabia	May 2019, Royal Decree to align with the Kingdom's Vision 2030 program.
Singapore	May 2019, AI Singapore, a five-year national program planned in 2019 with aim to advancing Singapore's capabilities in AI.
South Africa	January 2019, South Africa's Future Production Technologies Strategy in 2019 with aim to advancing manufacturing sector.
Switzerland	February 2019, Swiss Intelligence AI expert group has published its recommendations for a Swiss AI strategy.
Thailand	February 2019, Digital Economy and Society (DES) Ministry has drafted the country's first artificial intelligence (AI) ethics guidelines.
United Arab Emirates	February 2019, Sector Deal announced \$1.24B funding as part of the UK's large industrial strategy.
United Kingdom	February 2019 by Executive Order to promote and protect AI technology, and to establish a National Council for the National Artificial Intelligence Research and Development Strategic Plan.

Source: HolonIQ and source government strategy and policy papers.

Holon IQ

www.holoniq.com

Arahan Teknologi Artificial Intelligence di Indonesia



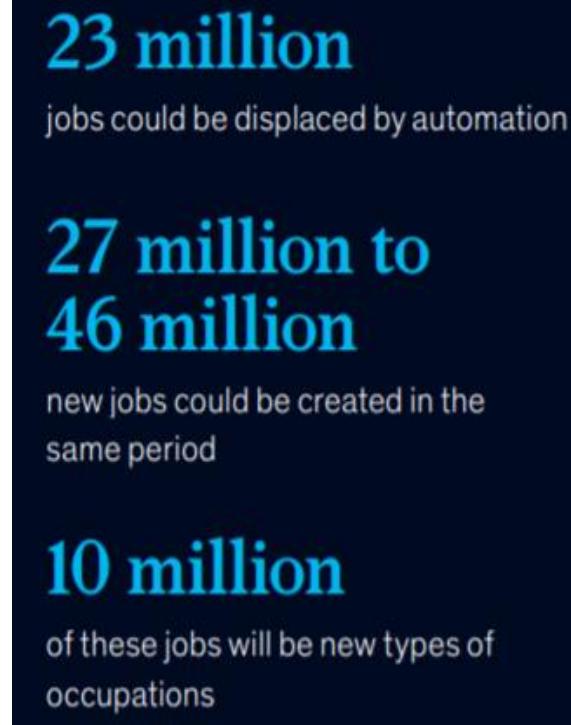
Strategi Nasional Kecerdasan Artifisial



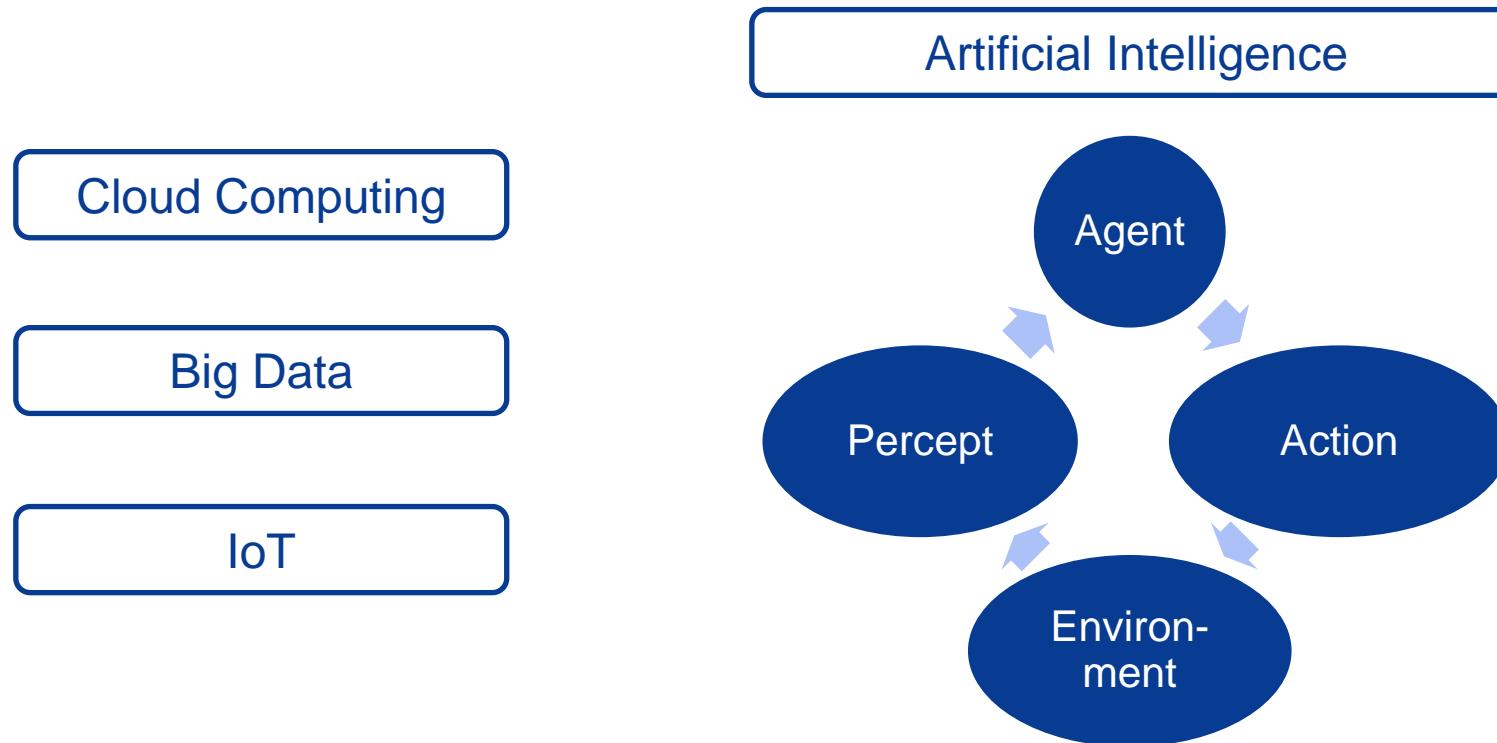
AI sebagai Disruptive Technology

- Pekerjaan yang digantikan oleh teknologi Kecerdasan Buatan adalah pekerjaan yang berulang dan dapat dengan mudah diprediksi. Sebagian besar Teknologi AI bertujuan untuk membantu pekerjaan manusia
- Industri di Indonesia sudah mulai menggunakan teknologi AI untuk menekan biaya, meningkatkan pendapatan, memberikan nilai tambah pada produk

McKinsey: Sept 2019
Automation Effect in
Indonesia:



Artificial Intelligence Agent



Internet of Things

Definisi:

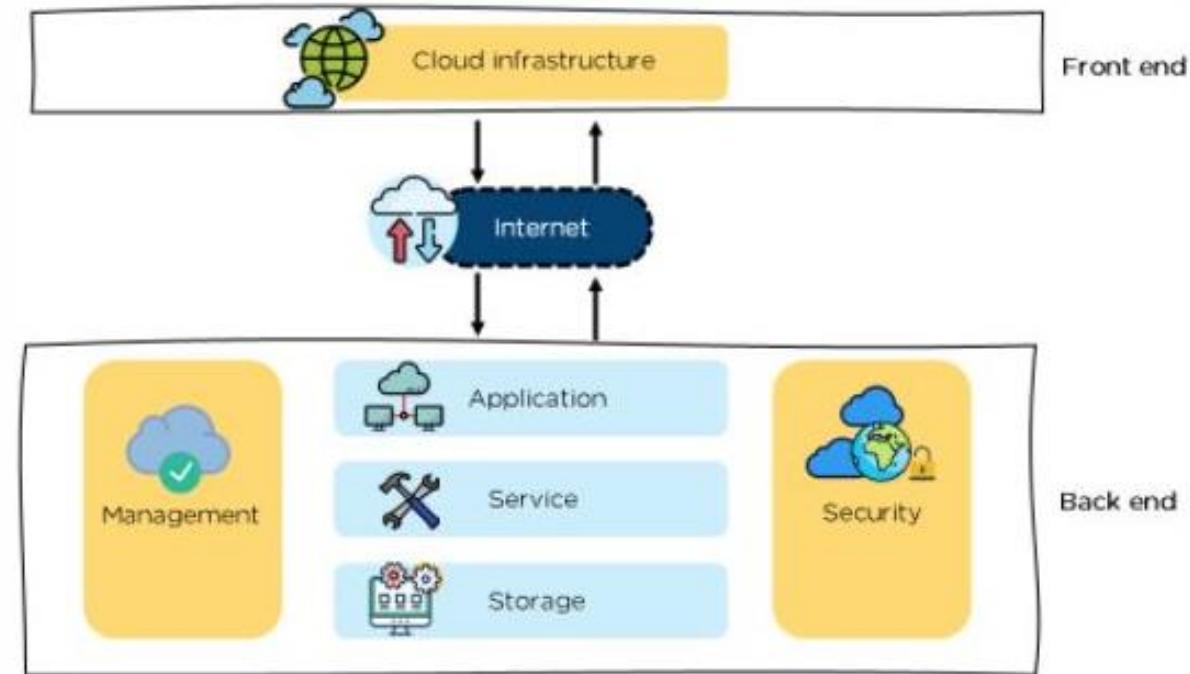
Peralatan/gadget sehari-hari atau objek yang terhubung dengan Internet dan memiliki kemampuan untuk mengumpulkan dan mengirimkan data

Contoh IoT pada keseharian/rumah dalam bentuk smart consumer goods: *smart bulb, smart light switch, smart doorlock, smart watch, smartphone, fitness tracker, smart tv, smart thermostat, smart toilet, smart bike lock* dll.



Cloud & Edge Computing

- o Menyimpan dan memproses data di komputer (*datacenter*) orang lain melalui jaringan Internet
- o Pemrosesan data di peralatan seperti smartphone (yang saat ini semakin powerful)
- o Sudah banyak dipakai di kehidupan sehari-hari
 - o Saat mengakses e-mail berbasis Web (misal Gmail)
 - o Saat upload foto/video di Facebook/Youtube/Google Drive
 - o Saat menggunakan Office 365, Google Doc
 - o Saat order gojek atau booking hotel lewat apps di smartphone
- o Untuk bisnis, platform untuk consumer services, inventory management, recruiting & HR, design, retail dan shipping (oleh cloud provider kebanyakan sudah disediakan sebagai “software-as-a-service”)



<https://www.simplilearn.com/tutorials/cloud-computing-tutorial/cloud-computing-architecture>

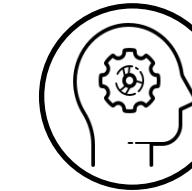
Big Data



Data Warehouse



Data Mining



AI - Machine Learning



Today

1900

1980

1990

2000



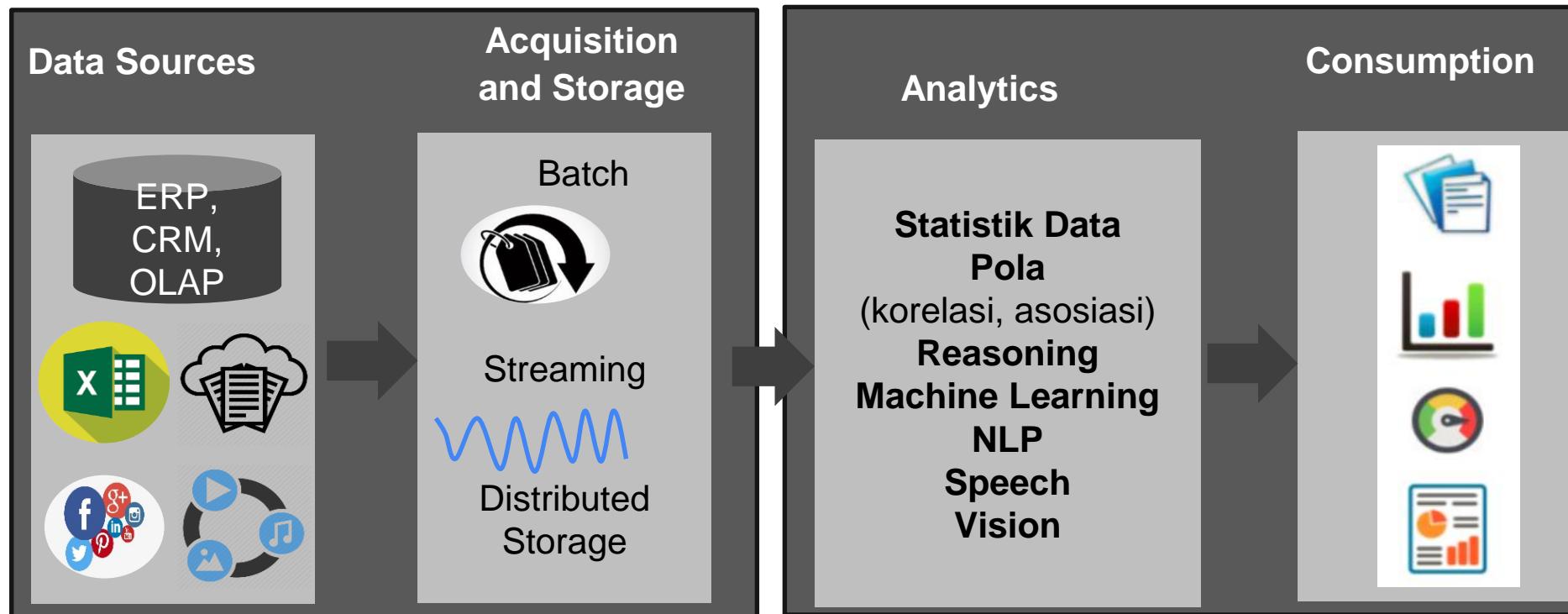
Big Data

- **High-volume, high-velocity, and/or high-variety information assets**
- Require new forms of processing: capture, curation, storage, search, sharing, transfer, analysis, visualization
- To enable:
 - enhanced decision making
 - insight discovery
 - and process optimization

Karakteristik Big Data

- **Velocity:** kecepatan data yang dihasilkan (per detik, per menit, per jam, per hari, dst).
- **Volume:** jumlah data yang diakumulasikan (terabyte, petabyte, exabyte, zettabyte, yottabyte dst)
- **Variety:** jenis/ragam data yang bermacam-macam: terstruktur, semi-terstruktur, tidak terstruktur (teks, suara, gambar, video dll)
- **Veracity:** kesesuaian dengan fakta dan akurasi (khususnya dari data tidak terstruktur)
- **Value:** kemampuan untuk mengubah data ke value (profit, manfaat medis & social, customer satisfaction)

Ekosistem Big Data



20



Analytics on Data

01

Descriptive:

Menjelaskan keadaan bisnis saat ini melalui data historis.

02

Diagnostic:

Menjelaskan mengapa suatu masalah terjadi dengan melihat data historis.

03

Predictive:

Memproyeksikan atau memprediksi hasil masa depan berdasarkan data historis.

04

Prescriptive:

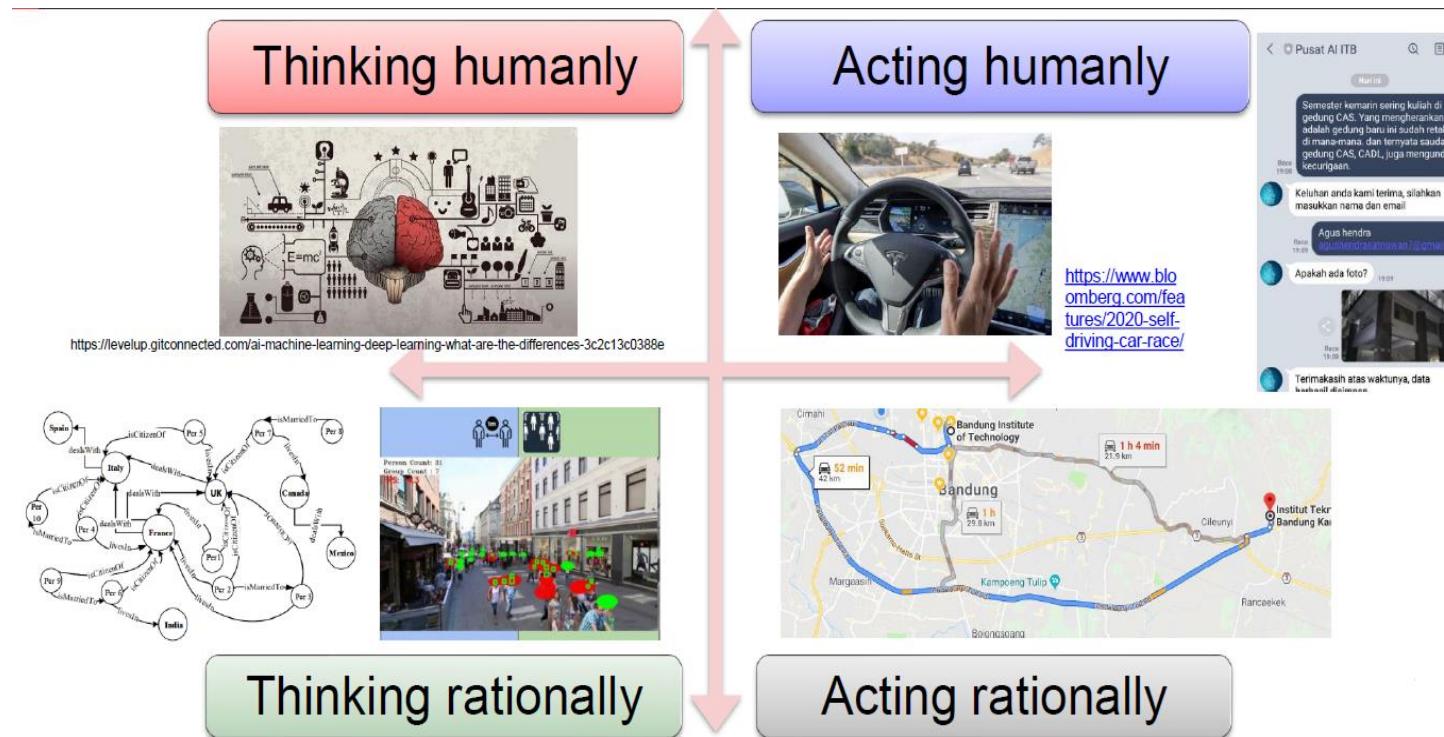
Menggunakan hasil analitik prediktif dan pengetahuan lain dengan menyarankan upaya terbaik di masa depan.



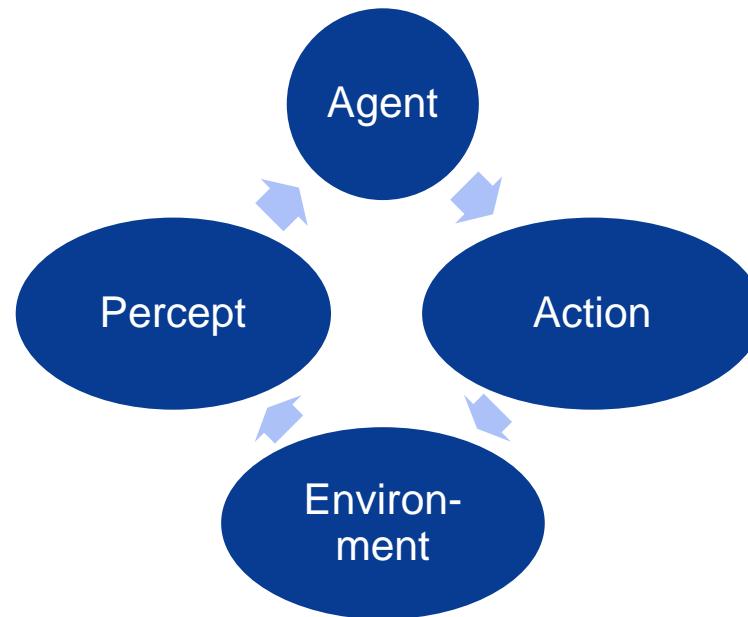
Definisi Artificial Intelligence

Thinking Humanly “The exciting new effort to make computers think.. Machines with minds, in the full and literal sense” (Haugeland, 1985) “[The automation of] activities that we associate with human thinking, activities such as decision making, problem solving, learning ...” (Bellman, 1978)	Thinking Rationally “The study of mental faculties through the use of computational models.” (Charniak and McDermott, 1985) “The study of the computations that make it possible to perceive, reason, and act.” (Winston, 1992)
Acting Humanly “The art of creating machines that perform functions that require intelligence when performed by people.” (Kurzweil, 1990) “The study of how to make computers do things at which, at the moment, people are better.” (Rich and Knight, 1991)	Acting Rationally “Computational Intelligence is the study of the design of intelligent agents.” (poole et al., 1998) “AI .. Is concerned with intelligent behavior in artifacts.” (Nilsson, 1998)

Definisi Artificial Intelligence (2)



Intelligent Agent



Merancang PEAS:

- **Performance/Pengukuran performansi:** aman, cepat, tidak melanggar aturan lalu lintas, kenyamanan penumpang
- **Environment/Lingkungan:** jalan, rambu-rambu lalu lintas, kendaraan lain, penumpang
- **Actuator:** kemudi, gas, rem, klakson
- **Sensor:** kamera, sonar, speedometer, GPS



Environment Type

Fully observable (vs. partially observable)	An agent's sensors give it access to the complete state of the environment at each point in time.
Deterministic(vs. stochastic)	The next state of the environment is completely determined by the current state and the action executed by the agent. (If the environment is deterministic except for the actions of other agents, then the environment is strategic)
Episodic (vs. sequential)	The agent's experience is divided into atomic "episodes" (each episode consists of the agent perceiving and then performing a single action), and the choice of action in each episode depends only on the episode itself



Environment Type (2)

Static (vs. dynamic)	The environment is unchanged while an agent is deliberating.
Discrete(vs. continuous)	A limited number of distinct, clearly defined percepts and actions.
Single agent(vs. multiagent)	An agent operating by itself in an environment
Known(vs Unknown)	This distinction refers not to the environment itself but to the agent's (or designer's) state of knowledge about the “laws of physics” of the environment



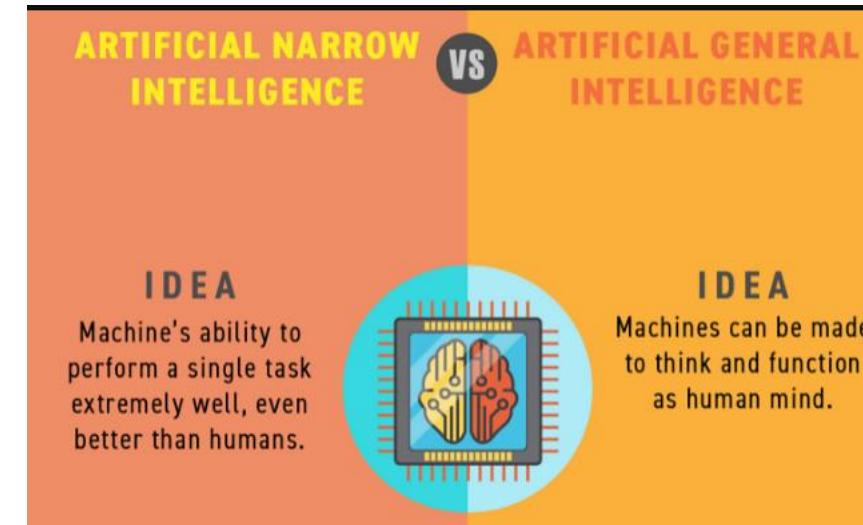
Example on Environment Type

	Chess with a clock	Chess without a clock	Taxi driving
Fully Observable	Yes	Yes	No
Deterministic	Deterministic	Deterministic	No
Episodic	No	No	No
Static	Semi	Yes	No
Discrete	Yes	Yes	No
Single agent	No	No	No

- The environment type largely determines the agent design
- The real world is (of course) partially observable, stochastic, sequential, dynamic, continuous, multi-agent

Pembagian Jenis Teknologi Artificial Intelligence (1)

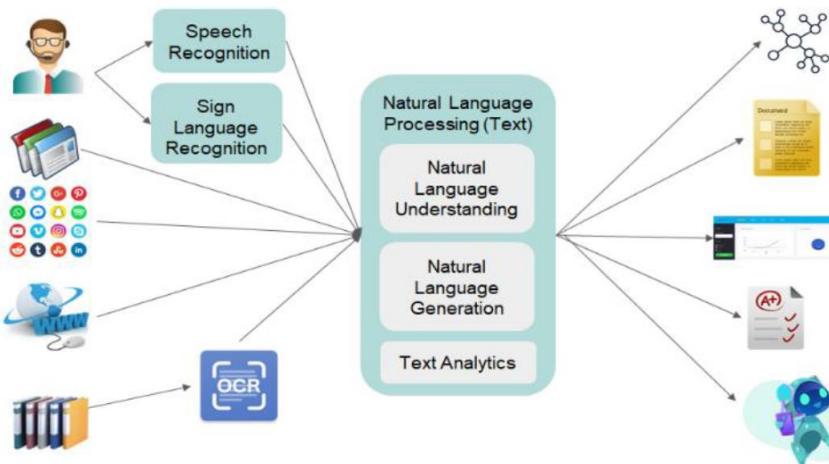
- Berdasar **task scope**:
 - Artificial Narrow Intelligence (ANI) – weak AI: teknologi AI yang ditujukan untuk melakukan satu task khusus
 - Contoh: chatbot pemesanan tiket pesawat, klasifikasi jenis penyakit kulit
 - Artificial General Intelligence (AGI) – strong AI: teknologi AI yang bisa menangani semua task yang dilakukan manusia



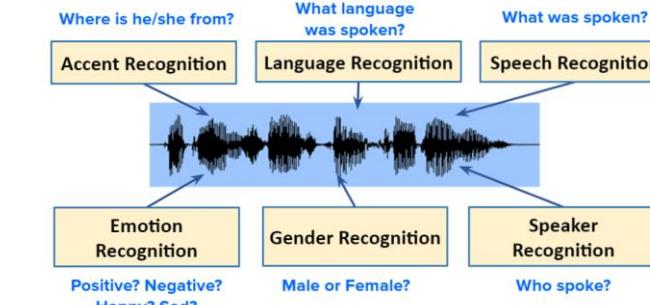
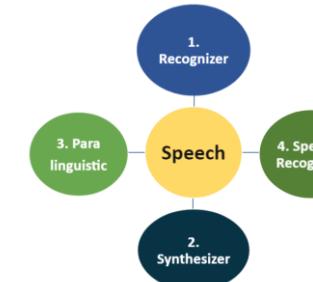
Sumber gambar: analyticsindiamag.com

Pembagian Jenis Teknologi Artificial Intelligence (2)

- Berdasar **domain persoalan**:
 - Teknologi AI juga dapat dibagi menjadi cabang-cabang domain persoalan yang diselesaikan, contohnya: Natural language processing (input/output berupa Bahasa), Speech Processing (input/output berupa sinyal suara), Image Processing/Computer Vision (input/output berupa gambar), dst



Gambar Lingkup Teknologi Natural Language Processing (Text)





Pembagian Jenis Teknologi Artificial Intelligence (3)

Berdasarkan prinsip kerja dalam teknologi AI:

Problem solving agent

Solution state space sudah terdefinisi, agent bertugas mencari solusi terbaik dari solution state space tersebut

Diselesaikan menggunakan searching algorithm

Knowledge based agent

Solution state space belum terdefinisi (non deterministic)

Agent mencari solusi berdasar knowledge yang dimiliki dimana knowledge dapat berasal dari expert/sumber informasi atau berdasar knowledge yang dipelajari (learning agent) dari data

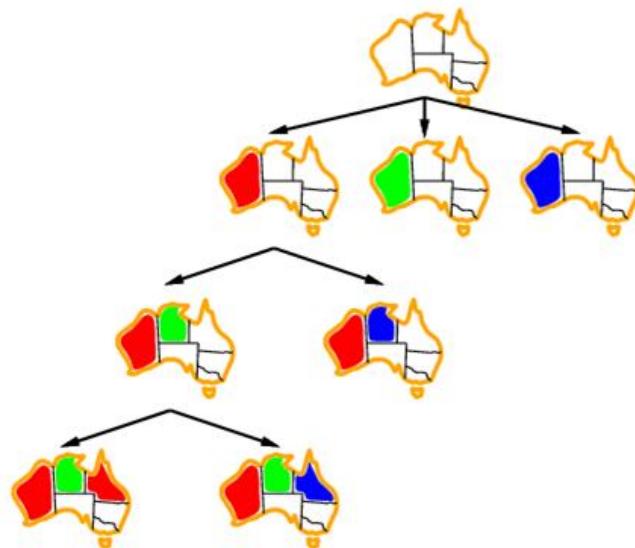


Problem Solving Agent

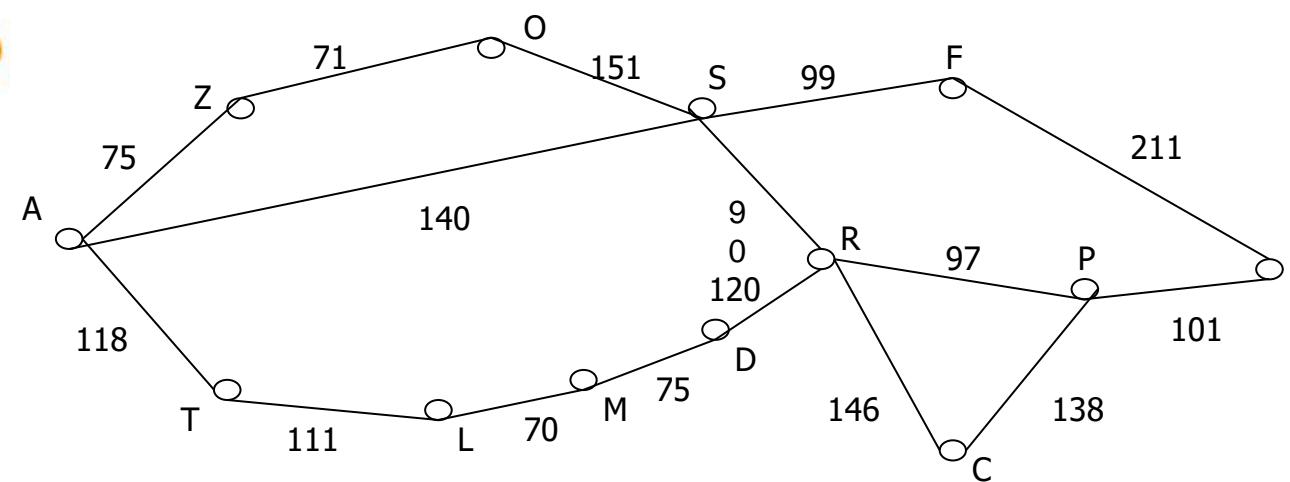
- o Agent design:
 - o formulate problem → search solution → execute
 - o Task Environment: Remember PEAS
- o Problem: satisfy goal (goal state)
 - o Agent task: find out which sequence of actions will get it to a goal state
 - o 4 components of a **problem**: initial state, operator/successor function, goal test, path cost
- o Searching: process of looking for sequence of action
- o Solution: sequence of action to goal state

Agent knows world dynamics
World states, actions
[when agent doesn't know → learning]
World state is finite, small enough to enumerate
[when state is infinite → logic]
World is deterministic
[when non-deterministic → uncertainty]
Agent knows current state
[when agent doesn't know → logic, uncertainty]
Utility for a sequence of states is a sum over path

Contoh Persoalan pada Problem Solving Agent



Map Coloring



Route Planning

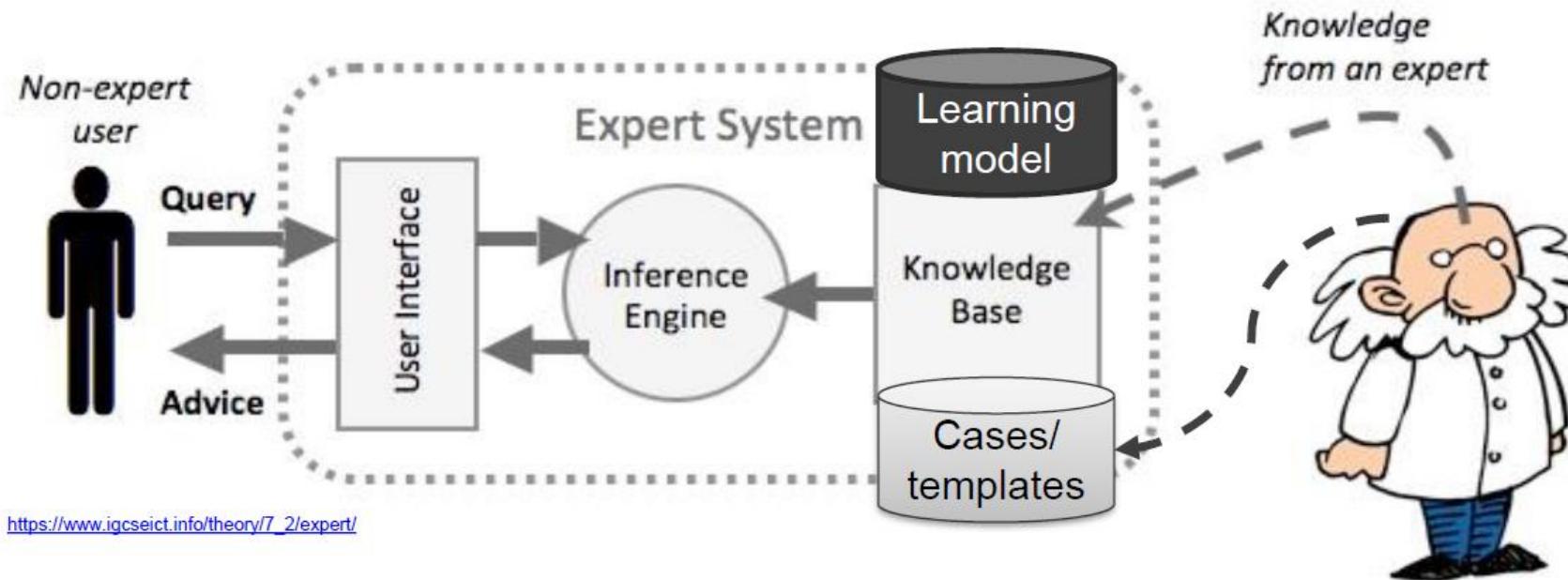




Searching Algorithm pada Problem Solving Agent

- **UnInformed/Blind Search**
 - Look around, don't know where to find the right answer
 - No additional information beyond that provided in problem definitional
 - Example: DFS, BFS, IDS, UCS , DLS
- **Informed Search**
 - Heuristic Search
 - Know some information that sometimes helpful
 - Know whether one non-goal state is “more promising” than another
 - Example: Best FS, A*,
- **Local Search (for Optimization Problem) → Beyond Classical Search**
 - Path to goal is irrelevant
 - Use very little memory
 - Can find reasonable solutions in large or infinite state spaces for which systematic algorithms are suitable
 - Example: Hill-climbing search, simulated annealing search, GA

Knowledge based Agent





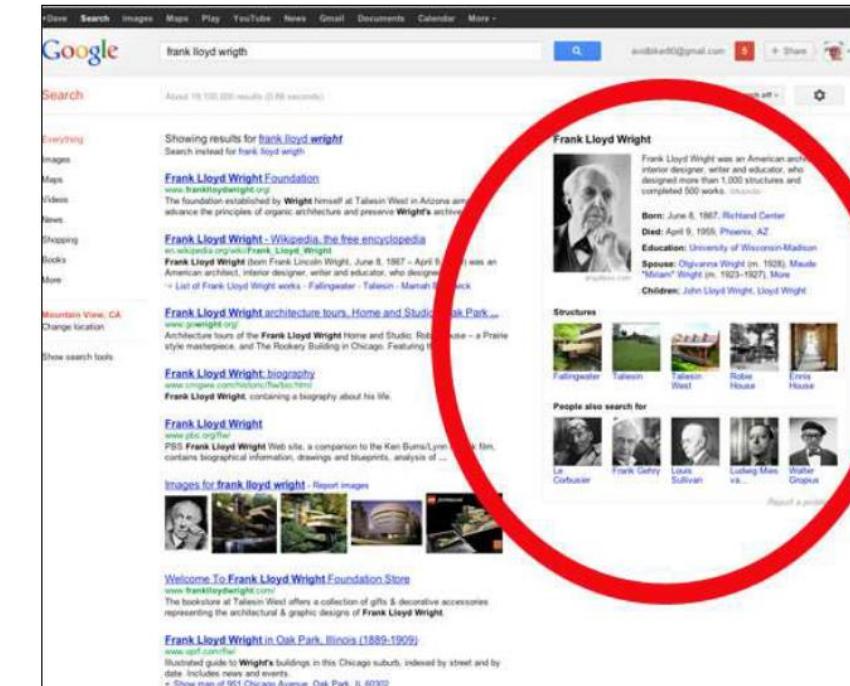
KBS vs Conventional Program

KBS	Conventional Program
ill structured problem (uncertain solution, undefined goal, unknown operator)	well structured problem (exact/certain solution, explicit goal, explicit operator)
expert determine actions, but execution order by interpreter	programmer determines actions and execution order
problem solving method + domain knowledge + data	algorithm + data

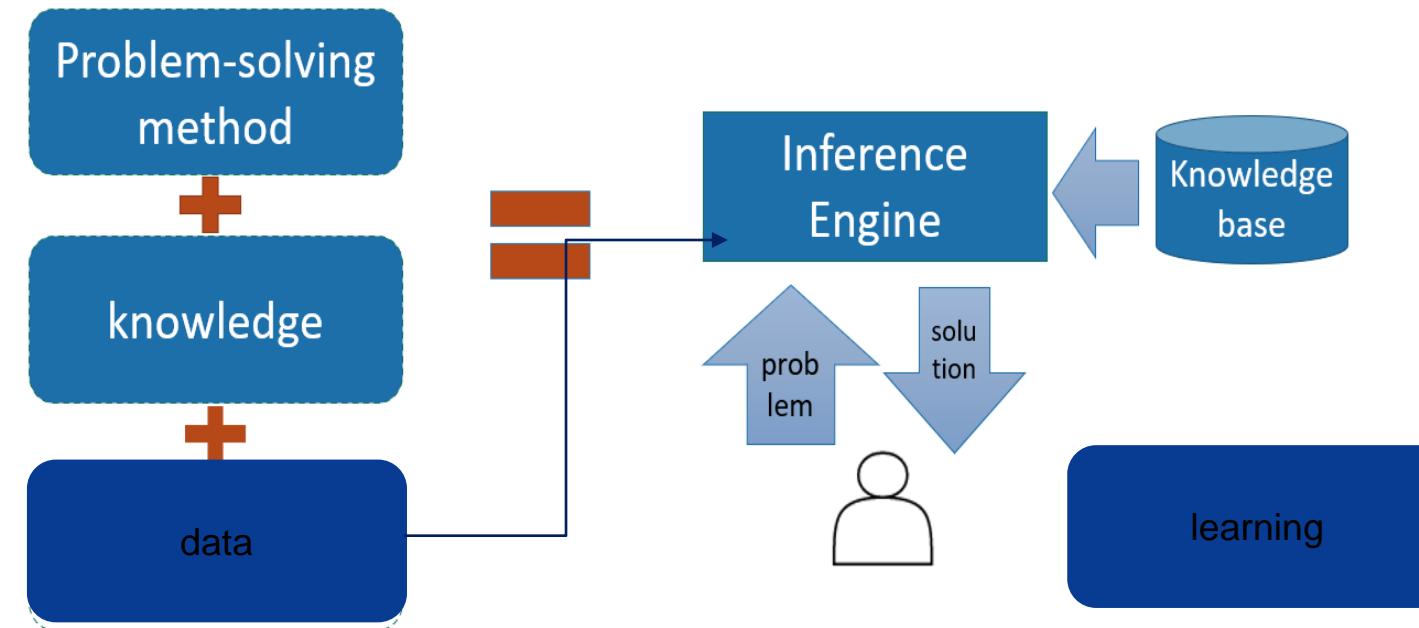
Pendekatan pada KBS

- Symbolic vs Statistical
- Statistical speech recognition, vision
- Why symbolic still needed?
 - Explanation
 - Planning
 - Diagnosis
- Many AI systems are hybrid:
 - Watson
 - SIRI

Google knowledge graph



Alur Proses dalam KBS



Symbolic based KBS: Knowledge Type



- Declarative knowledge
 - Know about something: concepts, facts, objects
 - Also called descriptive knowledge
- Procedural knowledge
 - Knowing how to do something: rule, strategy, procedure, agenda
 - Also known as imperative knowledge
- Meta knowledge
 - Knowledge about other type of knowledge
- Heuristic knowledge
 - Representing knowledge in a field/subject
 - Rules of thumb based on previous experience, good to work but not guaranteed
- Structural knowledge
 - Describe relationship between concepts such as kind-of, part-of, group of something



Symbolic based KBS: Knowledge Representation Technique

Production Rules

- rule as condition and action pair
- forward & backward chaining

Logical Representation

- propositional logic, first order logic, default logic, etc

Semantic Networks

- knowledge as a form of graphical networks

Frame Representation

- As structure consists of collection of attributes and its values to describe an entity in the world



Statistical based Knowledge Based System

- **Learning Agent**
 - Changes in the system that are adaptive in the sense that they enable the system to do the task or tasks drawn from the same population more efficiently and more effectively the next time
- **Why need learning?**
 - Learning is essential for unknown environment
 - i.e., when designer lacks omniscience, agent doesn't know world dynamic
 - Learning is useful as a system construction method
 - i.e., expose the agent to reality rather than trying to write it down
 - Learning modifies the agent's decision mechanism to improve performance
 - Learning from observations, feedback for improving the agent's ability to act in the future

Taxi Driver as Learning Agent



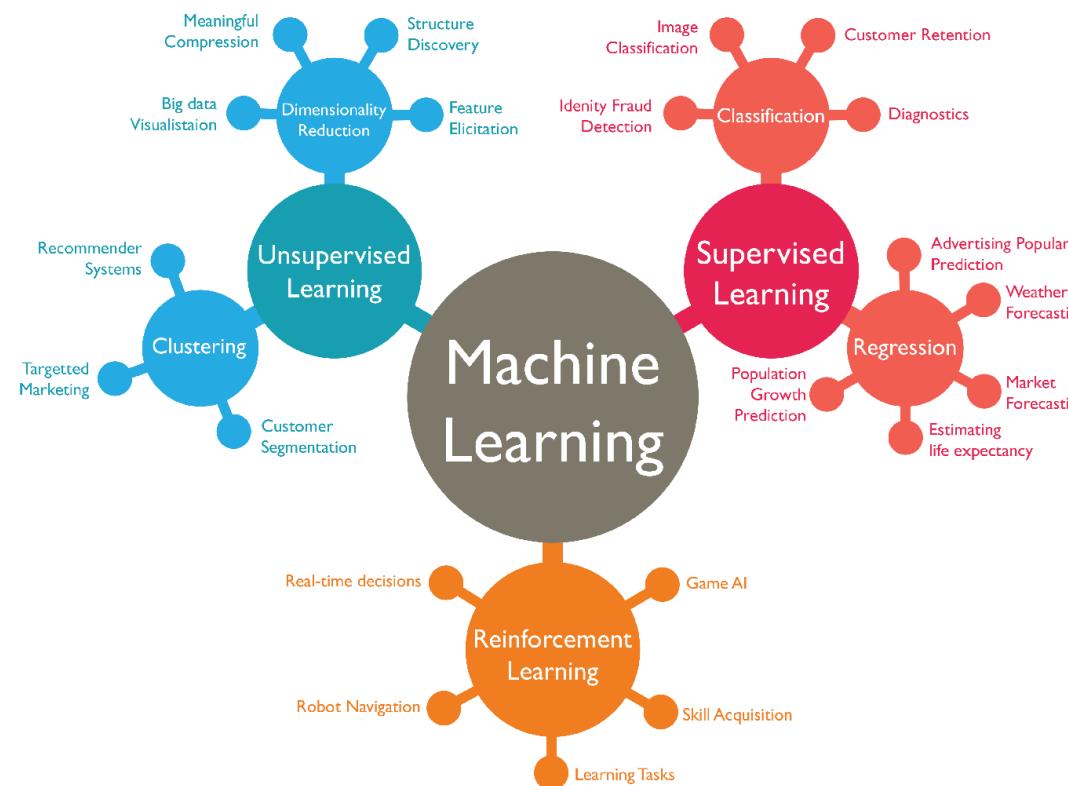
<http://www.gettyimages.com/detail/83988175/Stone>

- **Brake decision**
 - Whether to push the **brake** or not based on the **current state**
 - Feedback: instructor shouts
- **Buses recognition**
 - Input: image from camera
 - Output: whether it is a bus or not
 - Feedback: labeling bus images

[http://www.
stahle.com/](http://www.stahle.com/)



Learning Type



Unsupervised Learning (no feedback)

- Given set of examples without label, detect potentially useful clusters of input examples, e.g: customer clustering

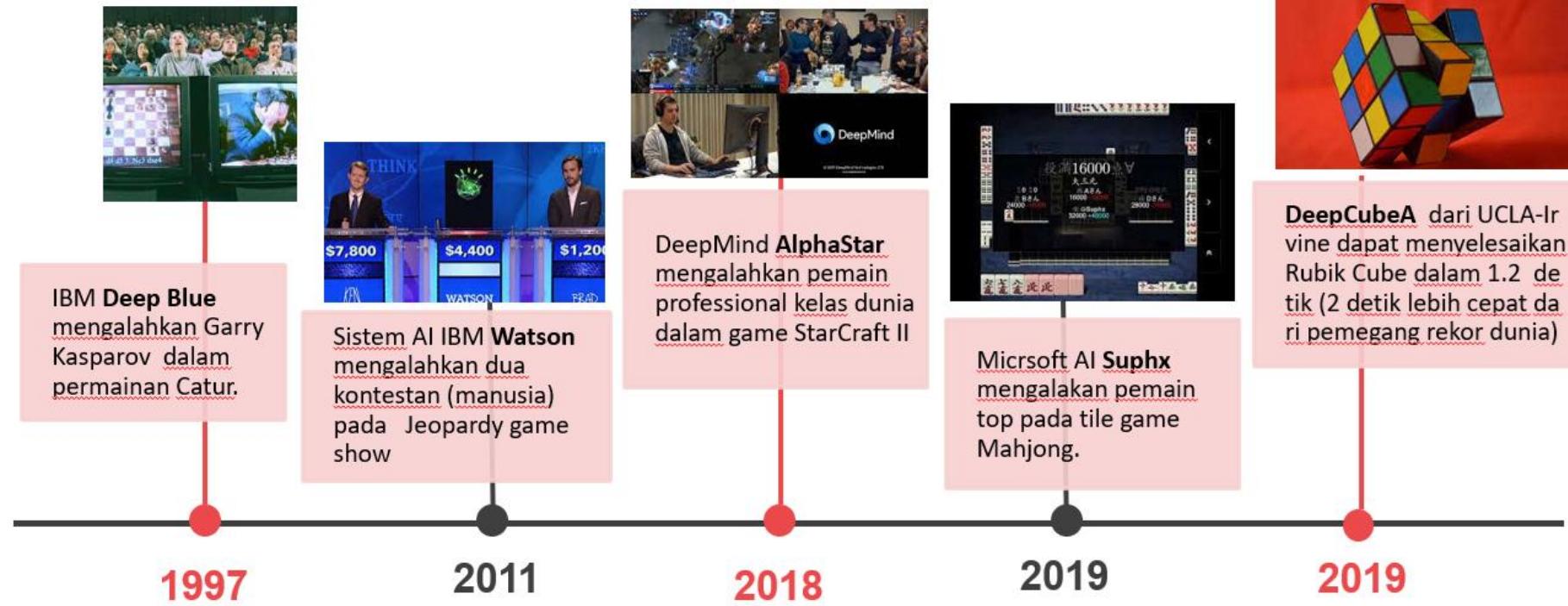
Supervised Learning

- Given set of examples (input-output pairs), learns a function that maps from input to output, e.g: object classification

Reinforcement Learning

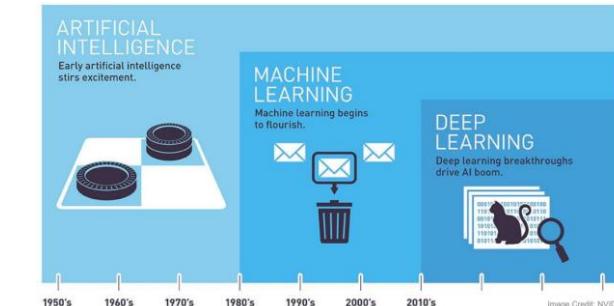
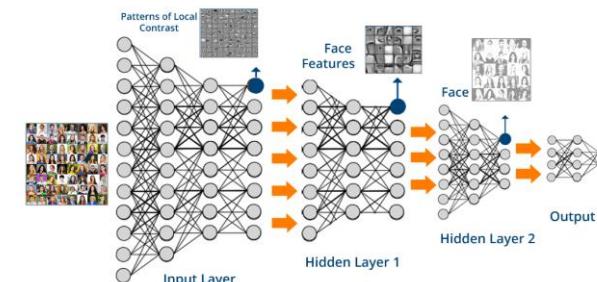
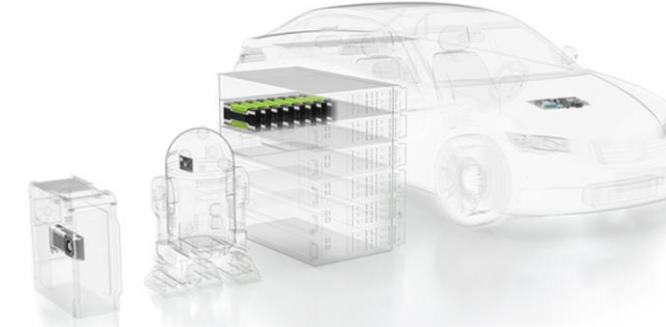
- Agent learns from a series of reinforcements (rewards or punishments)

Perkembangan Teknologi AI

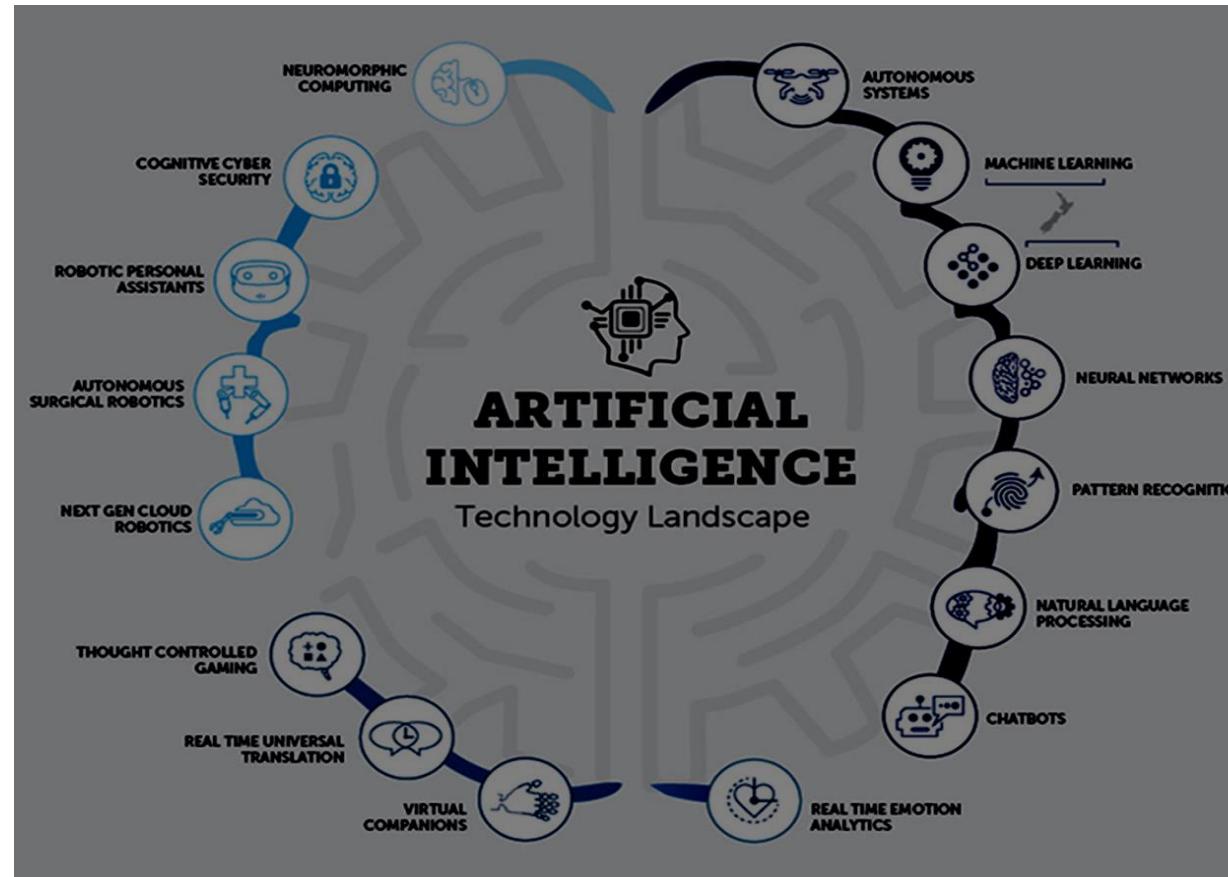


Why Now?

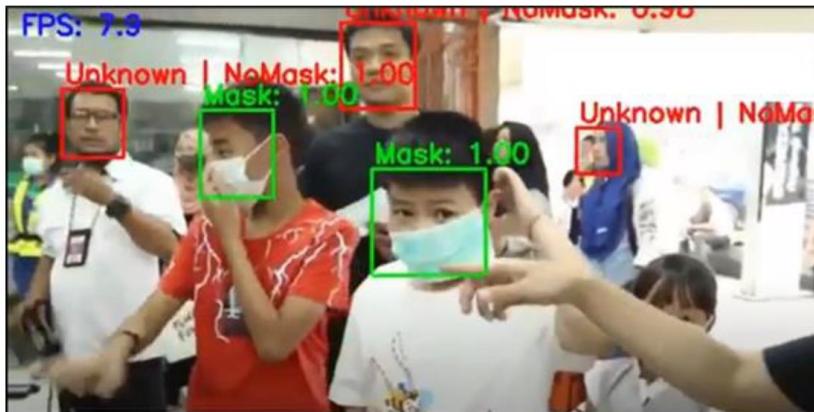
- **Computing Hardware**
 - GPU, TPU, etc
 - Cloud
- **Algorithm**
 - Deep Learning
- **Data availability**
 - IoT device, Social Media



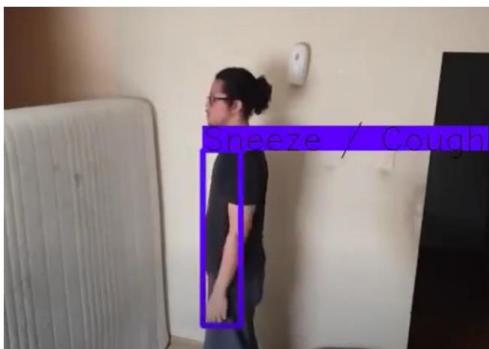
Teknologi AI



Penerapan AI: Monitoring



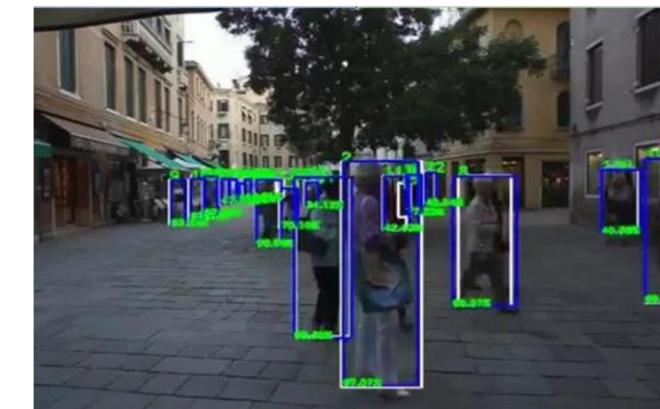
Contoh hasil inferensi model-AI deteksi penggunaan masker-wajah



Gambar . Contoh hasil inferensi model-AI untuk deteksi aktivitas manusia

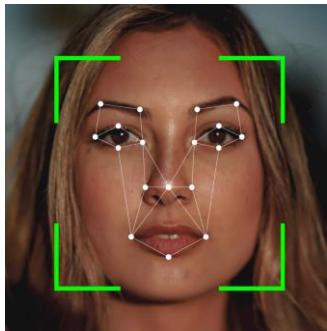


Contoh hasil inferensi model-AI estimasi jarak sosial aman dan kerumunan.



Gambar . Hasil inferensi model-AI pelacakan dan penelusuran manusia

Penerapan AI: Verification & Identification



BENEFITS

- Better User Experience (UX)
Personalized; Greater Accuracy; Convenient; Frictionless; Fast; Automated
- Improved Security
- Reduce Cost
Accessibility: Disabled person (blind, can't type)

USE CASE SCENARIOS

- Electronic-Know Your Customer (eKYC)
- "Kependudukan & Pencatatan Sipil" ("Dukcapil")
- Verify Login
- Verify Transactions
- Customer Service Conversational Analytics



Faster Authentication

Up to 10 times faster than traditional authentication methods*



Accurate & Secure

Using state-of-the-art AI technology to achieve real-time result with guaranteed high accuracy

Sumber: prosa.ai



Voice Biometrics



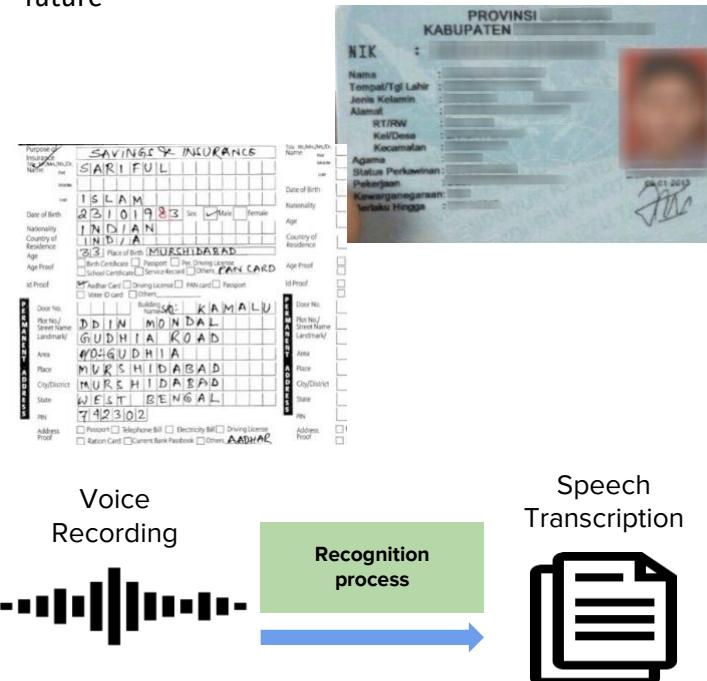
Wide Application

Applicable to banking, financial services, insurance & healthcare, and other industries

47

Penerapan AI: Document Digitization

Go paperless. Digitize and secure your past, present and future



BENEFITS

- Reduce Clerical Work
- Faster and Accurate Data Input
- Reduce Operational Costs
- Convenience
- Automated
- Improve User Experience
- Save time
- Save money

USE CASE SCENARIOS

- Electronic-Know Your Customer (eKYC)
eKTP, NPWP, Passport, ITAS, ITAP
- Digitize Invoice and Purchase Orders
- Credit Card, Birth Certificate, etc
- Digitize Documents and Forms
- Digitize Name Cards
- Digitize Video/Speech Recording

Penerapan AI: Meeting analytics



Meeting Details (Completed)

Info **Attendance**

Title: Coba offline **Start Time:** 2:45 **Agenda:** 1. agenda 1 **Keyword:** #ada **Edit Info**

Location: Ruang Meeting **End Time:** None **References:** ReferencesFiles1.ppt, ReferencesFiles2.doc, ReferencesFiles3.txt **Recording:** Audio is available

Meeting Date: April 30, 2019 **Last Edited:** April 29, 2019, 7:45 p.m. by Dominic Keller

Minutes of Meeting **Export I**

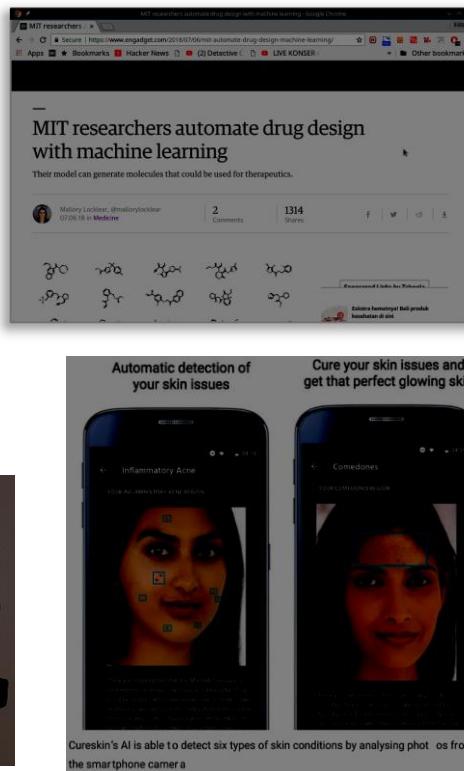
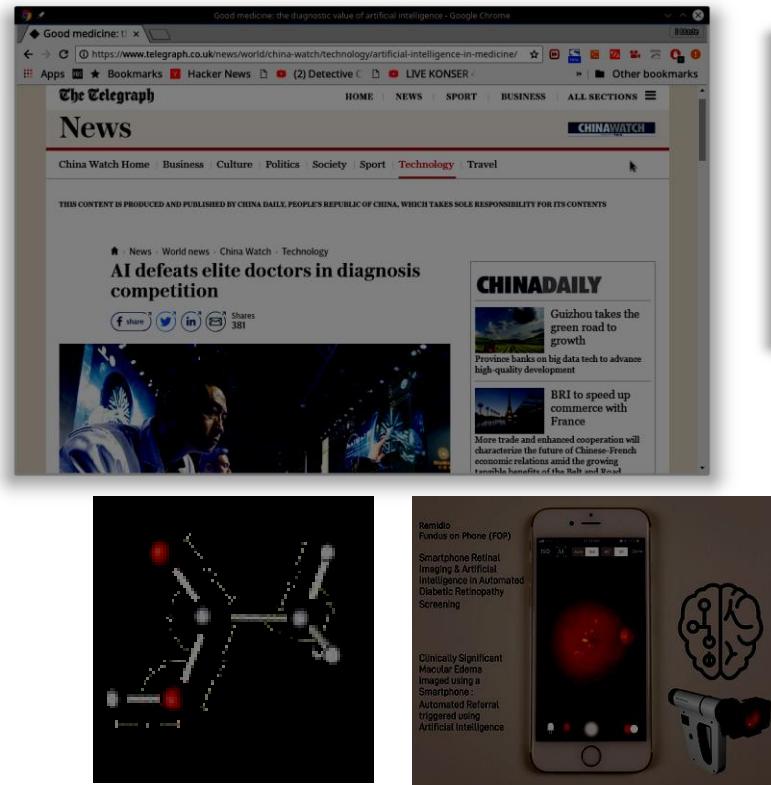
Original Transcript **Revised Transcript** **Notes**

Rahmi: oh baik selamat pagi terima kasih atas kehadiran rekan-rekan semua pada rapat haryanti data kita tidak berlama-lama nya langsung saja masing-masing diperlukan melaporkan progres kerjanya beserta kendala yang dihadapi dan penanganannya.
oh baik selamat pagi terima kasih atas kehadiran rekan-rekan semua pada rapat haryanti data kita tidak berlama-lama nya langsung saja masing-masing diperlukan melaporkan progres kerjanya beserta kendala yang dihadapi dan penanganannya.

Trisa: kalo hari ini saya berhasil mawar lir transcript tau gitu banyak solo percakapan dengan durasi sekitar 30 menit dan sejauh ini sih aman yang belum ada kendala yang dihadapi.
kalo hari ini saya berhasil mawar lir transcript tau gitu banyak solo percakapan dengan durasi sekitar 30 menit dan sejauh ini sih aman yang belum ada kendala yang dihadapi.

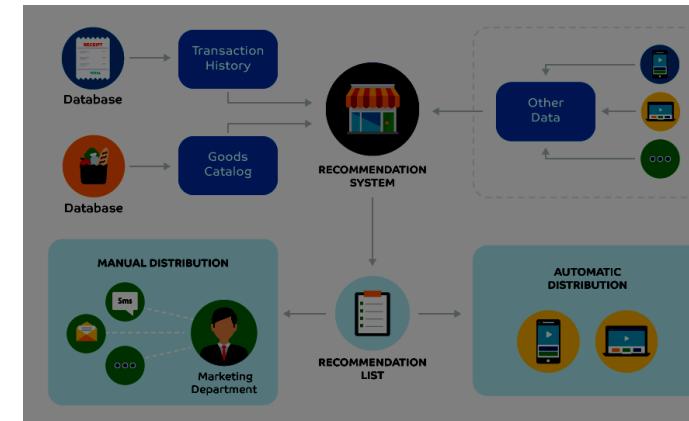
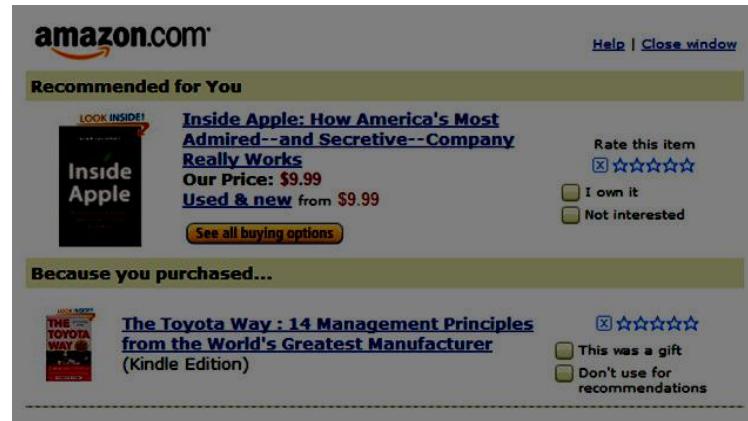
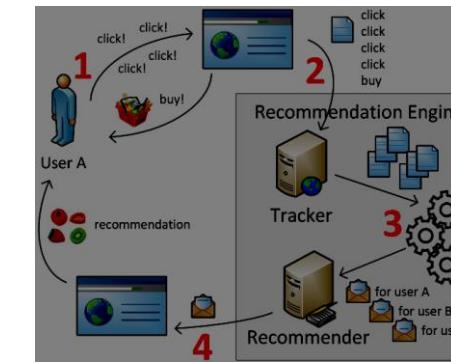
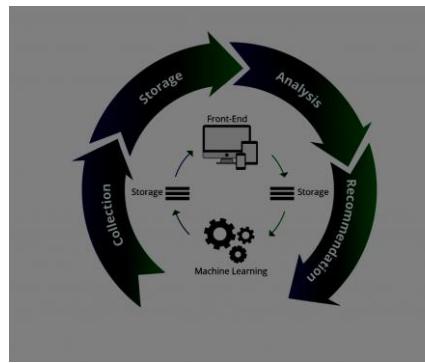


Penerapan AI: Kesehatan

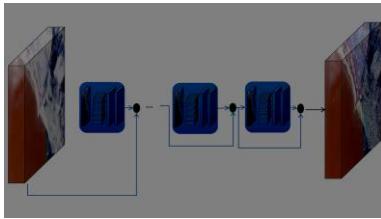


- Kombinasi AI dengan image processing, mampu membantu dokter mendeteksi penyakit kulit
- BioMind dikembangkan peneliti dari AI Research Centre for Neurological Disorders and Capital Medical University
- Mendeteksi dengan ketepatan 87% untuk 225 kasus dalam waktu 15 menit
- Tim dokter yang terdiri dari 15 dokter dari RS ternama di China mendapatkan akurasi 66% dalam waktu 30 menit.
- Untuk kasus brain ematoma expansion AI 83 % dan dokter 63%

Penerapan AI: eCommerce



Penerapan AI: GeoAI

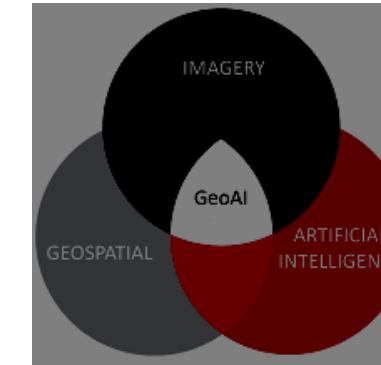
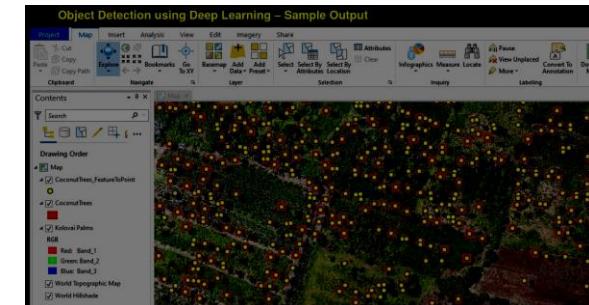


Super resolution dengan Deep Learning



Blurred

Hi Res



- Kombinasi antara Artificial Intelligence (AI) dan Geographic Information System (GIS), pemanfaatan data mining, komputasi berkinerja tinggi digunakan untuk mengekstraksi knowledge dari spatial big data. Meningkatkan pendekatan seleksi pada pola spatial
- Banyak digunakan pada kesehatan, lokasi merupakan data terintegrasi dari populasi. Dengan pemanfaatan Internet of Things (IoT) maka memiliki potensi besar di dalam memonitor kesehatan publik
- Penggunaan sumber data lain yang dikombinasikan merupakan ciri aplikasi ini, misal aplikasi dari media sosial, electronic health record, remote sensing, sensor perorangan dan perangkat lainnya.
- Menilai akurasi prediktif dan kesesuaian teknik permodelan spatial secara independen dan suatu model terintegrasi dari berbagai dataset
- Mendapatkan pemahaman dari fungsi spatial yang penting dan memproses sesuai aturan ekstraksi dan penujian faktor sensitifitas

Penerapan AI: Keamanan dan Forensik

Social Interconnection

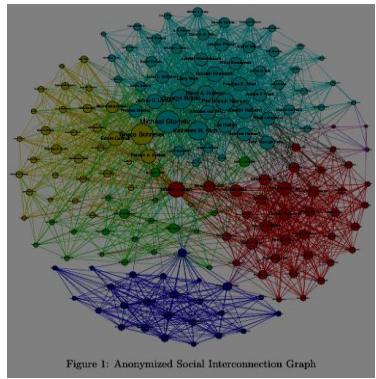
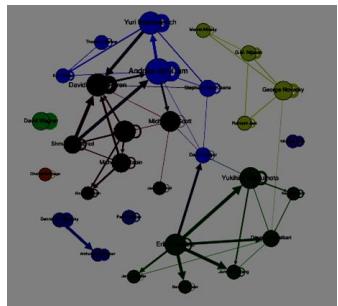
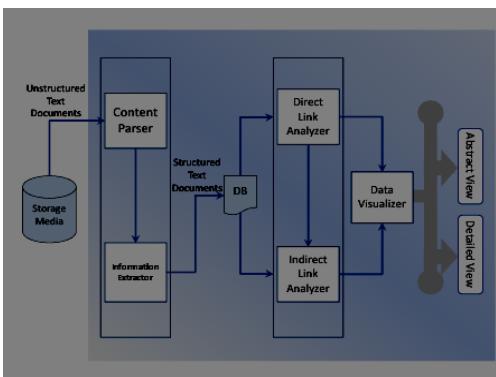


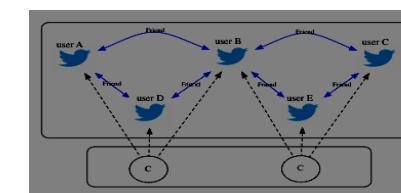
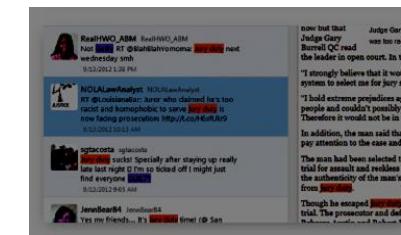
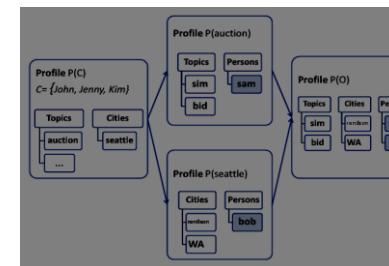
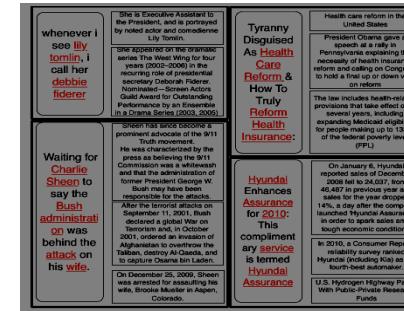
Figure 1: Anonymized Social Interconnection Graph



Criminal Miner

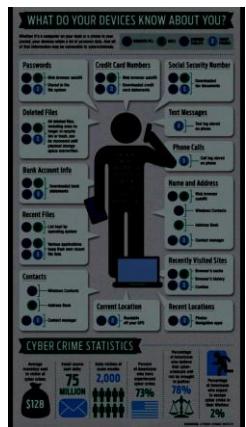
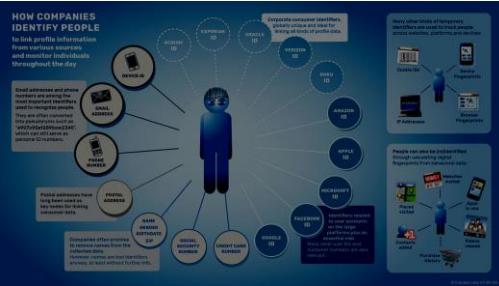


Semantic Link

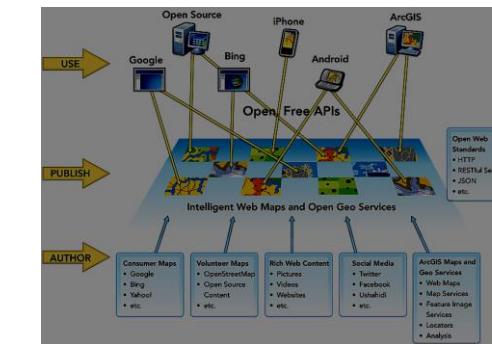


- Complete Time Line
- Location Visualization
- Event tracking
- Timeline matching
- Differential Snapshot

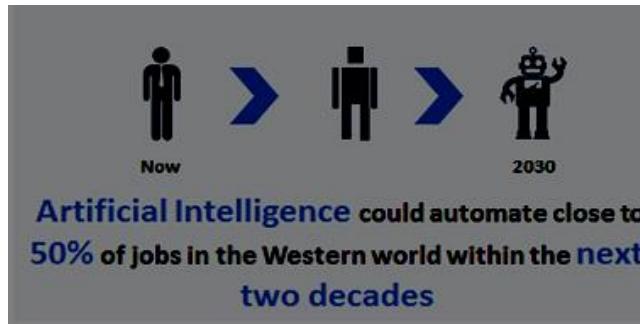
Resiko AI : Kesalahan AI



- Mobile tak berawak menggunakan beragam sensor, dan data dari berbagai sumber
- Tetapi trend mobil tak berawak (driveless car) memiliki risiko
- Kesalahan data mengakibatkan dapat mobil berasksi salah. Beberapa kasus sudah terjadi
- Kurangnya training set terkait data untuk melatih AI.
- Bila ada kecelakaan SALAH siapa?
- Pada saat kondisi macet dan diluar “training set” mobil akan stuck. Bagaimana dengan kondisi kemacetan luar biasa, kondisi perubahan jalanan
- AI mulai banyak digunakan untuk menseleksi pegawai, bagaimana bila dari data-training menjadikan AI “rasis”
- Bagaimana bila dengan melakukan profiling dapat mengungkapkan beberapa profil “personal” dan dapat digunakan secara tidak benar
- **Data Ethics** dan Ethics pada AI menjadi perlu pertimbangan



Resiko AI : Hilangnya Pekerjaan



“Will a machine take away my job?”

Data driven application
AI based Decision Support
Smart Cyber-Physics



Tantangan dalam Perkembangan AI

- **Regulasi**
 - Pengaturan etika dan pemakaian AI yang lebih bertanggung-jawab
- **Privasi**
 - Terkait dengan penggunaan data yang dipakai untuk pembangunan model AI
- **Kurangnya penjelasan**
 - Bagaimana model AI sampai pada suatu keputusan/kesimpulan tertentu (terkait dengan akuntabilitas dan trust)
- **Ketersediaan data**
 - Sejauh mana data yang dipakai cukup representative dan tidak bias
- **Kurangnya Talenta**

Fasilitas AI dan Data Science

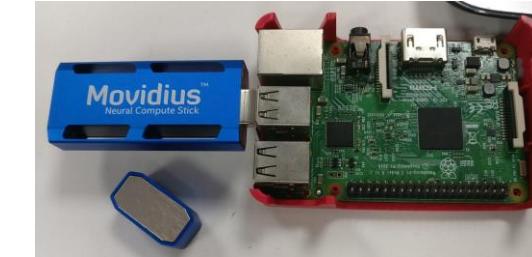
Collab Lab



Super Computer



EdgeAI



Salah satu tantangan dalam perkembangan AI adalah: ketersediaan talenta SDM, Langkah yang dapat dilakukan dengan mengadakan pelatihan terkait data science, praktikum yang diikuti oleh mahasiswa.



Referensi Video

- **Introduction to AI**

- <https://www.youtube.com/watch?v=s9vDgPotU-4>
- <https://www.youtube.com/watch?v=wfmM5-d0Zh0>
- <https://www.youtube.com/watch?v=eUpRwSrwbHY>
- <https://www.youtube.com/watch?v=XfEOoAIArXw>
- <https://www.youtube.com/watch?v=uyWHthN3Q9c>

- **Intelligent Agent**

- https://www.youtube.com/watch?v=XqAUPrLu8_s
- https://www.youtube.com/watch?v=ehXgvsl8i_I
- <https://www.youtube.com/watch?v=NqeVTW4DUuU>
- <https://www.youtube.com/watch?v=btffOHgYsBc>
- <https://www.youtube.com/watch?v=d2608-UCcR8>
- <https://www.youtube.com/watch?v=Spia43l493c>

- **Introduction to Knowledge based Agent**

- <https://www.youtube.com/watch?v=P2DVmc4Zf7I>
- <https://www.youtube.com/watch?v=VhKPNCtwlnw&t=338s>
- https://www.youtube.com/watch?v=7iZWC_NtegM
- <https://www.youtube.com/watch?v=o2alb-eJNqc>



Quiz / Tugas

- Quiz dapat diakses melalui <https://spadadikti.id/>



Terima kasih