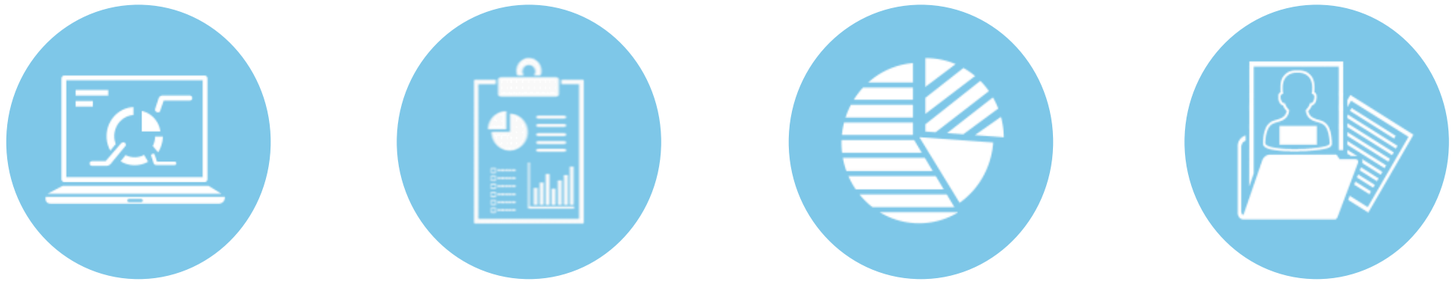
Introduction to Artificial Intelligence

Lesson 1: Decoding Artificial Intelligence



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Learning Objectives

- Discuss the meaning, scope, and stages of artificial intelligence
- Discover the applications of artificial intelligence
- Analyze the impact of artificial intelligence on society

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Decoding Artificial Intelligence

Topic 1: Meaning, Scope, and Stages of Artificial Intelligence

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The Future Is Here

Sophia, the social humanoid robot created by Dr. David Hanson (Hanson Robotics) was granted citizenship in October 2016.

Sophia uses artificial intelligence, visual data processing, and voice and facial recognition.

The algorithm stores and analyzes all the conversations and uses this data to improve the responses in future.

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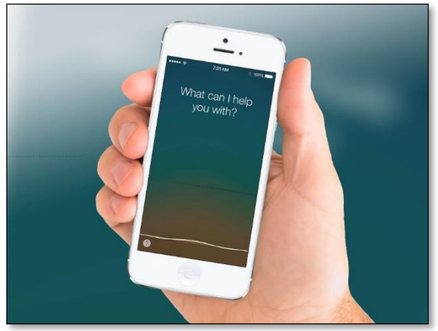
The Future Is Here

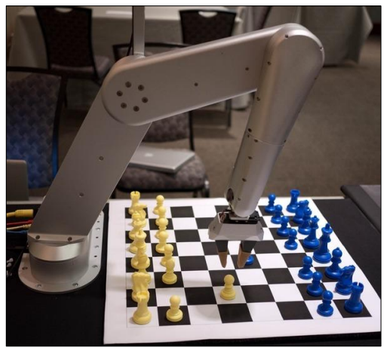


Virtual Assistants

Siri, Google Assistant, Microsoft's Cortana, Amazon Echo

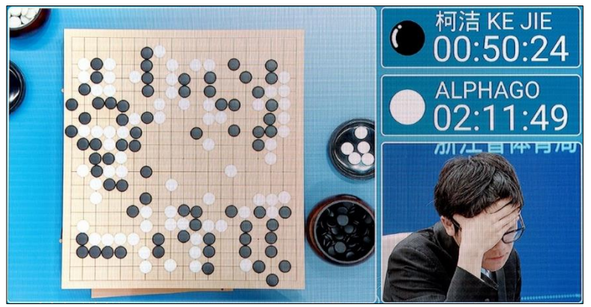
Intelligent Cars

Tesla Autopilot, Google Waymo, Ford's Argo AI



AI in Gaming

Google DeepMind's AlphaGo, AI in Chess



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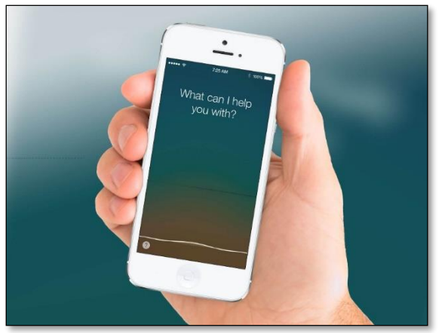
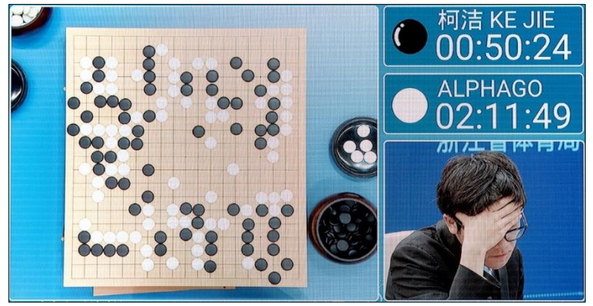
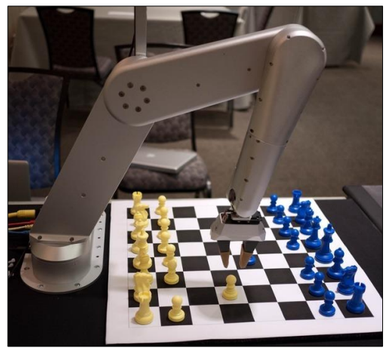
The Future Is Here

The technology enabling this revolution is artificial intelligence.







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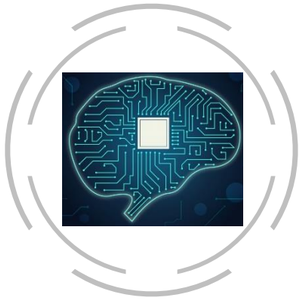
Meaning of Artificial Intelligence (AI)

Artificial intelligence is the intelligence exhibited by machines.

It is based on the premise that intelligence is not "real" or "human."



It mimics cognitive functions exhibited by humans such as problem-solving and learning.

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Definition of Artificial Intelligence

> According to the dictionary, artificial intelligence is the capability of a machine to imitate human behavior.

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Quiz Time

Did you use artificial intelligence today?

Which application or gadget was that?

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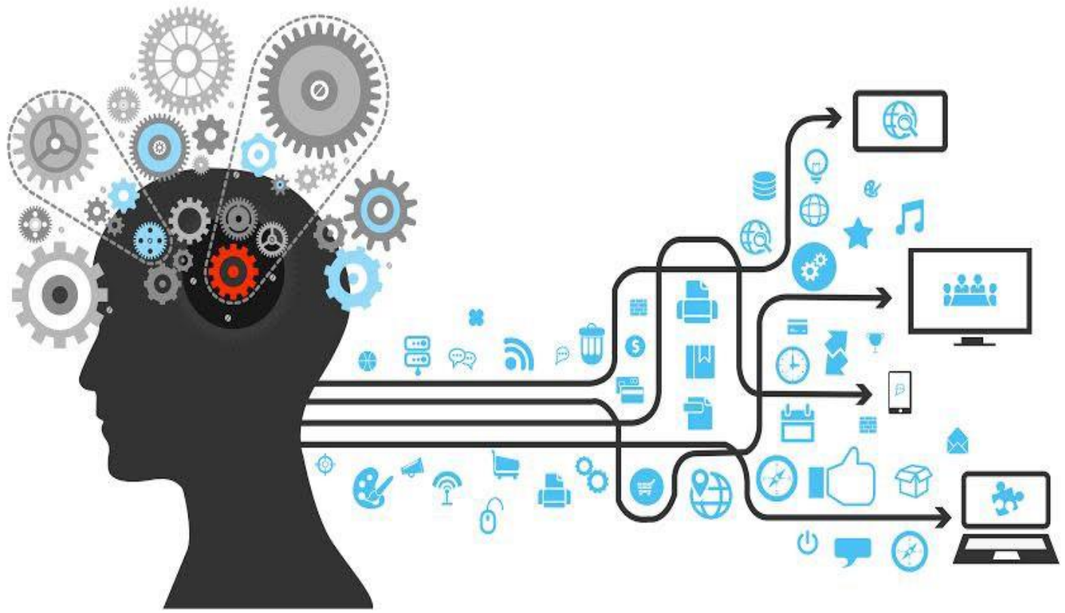
Scope of Artificial Intelligence



- The number of jobs that a machine can execute is ever increasing.
- Let’s take a look at the three stages of AI to understand this.

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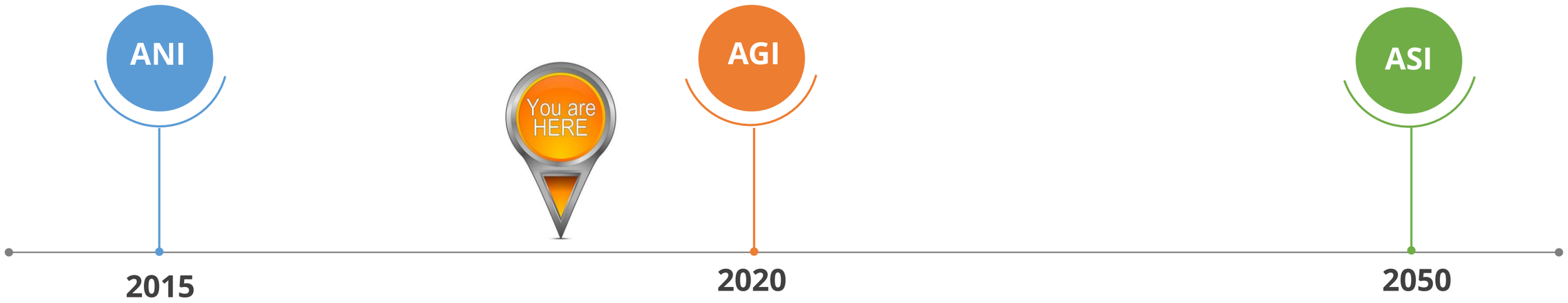
Three Stages of AI

Artificial Narrow Intelligence

Artificial General Intelligence

Artificial Super Intelligence



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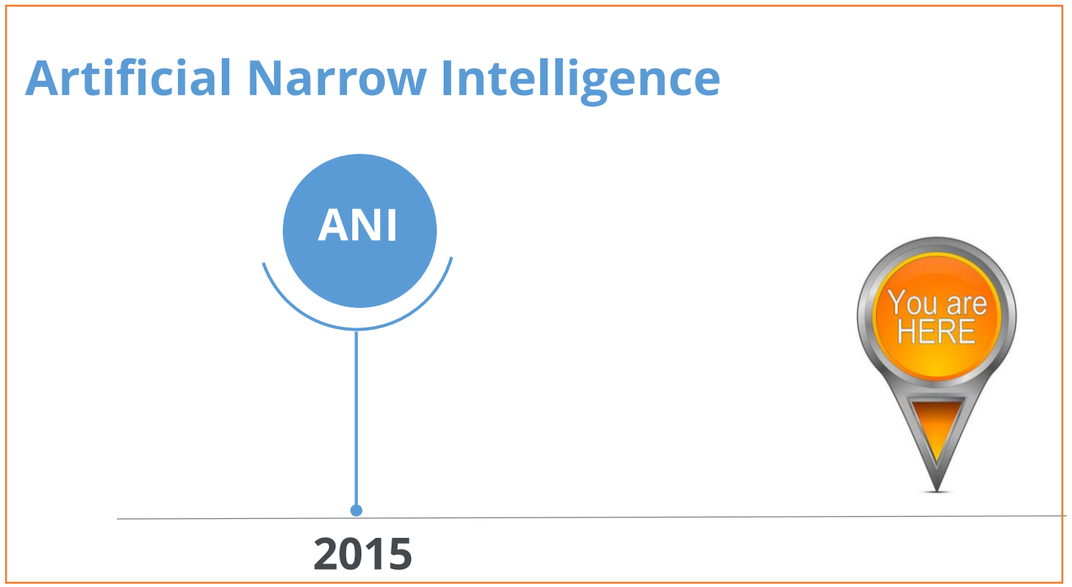
Artificial Narrow Intelligence (ANI)



- The systems implemented today are a form of Artificial Narrow Intelligence (ANI).
- They are limited to one or two functional areas like recognizing objects and gestures.
- These systems are not self-aware and do not portray any self-consciousness.
- Although they appear to be making decisions, it is just the statistics or math in action in the background.

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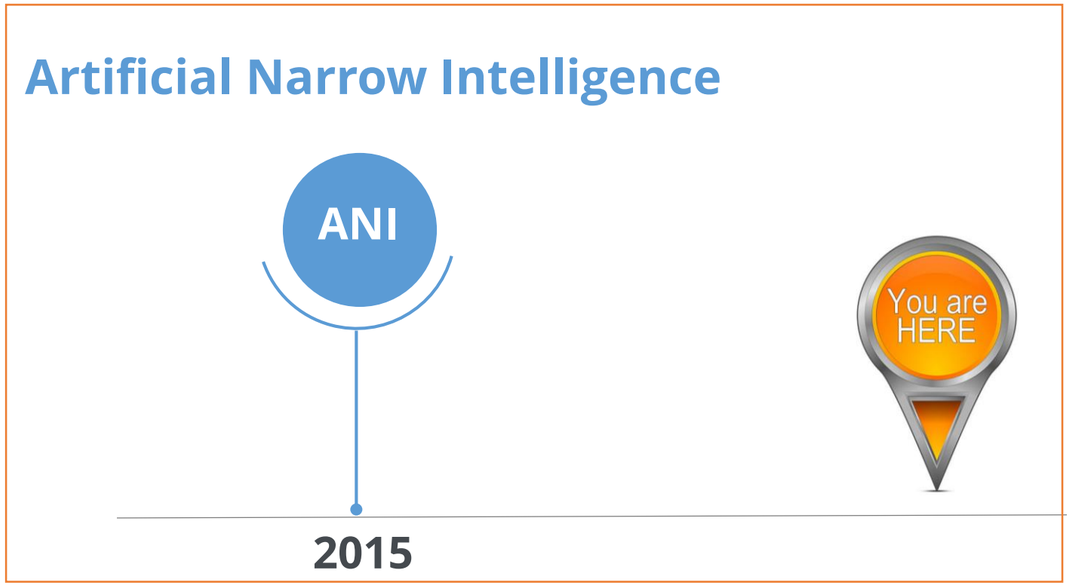
Examples of ANI



- Smartphone apps
- Chess and AlphaGo
- Image identification tools
- Speech recognition tools
- Self-driving systems
- Google Translate
- Spam filters

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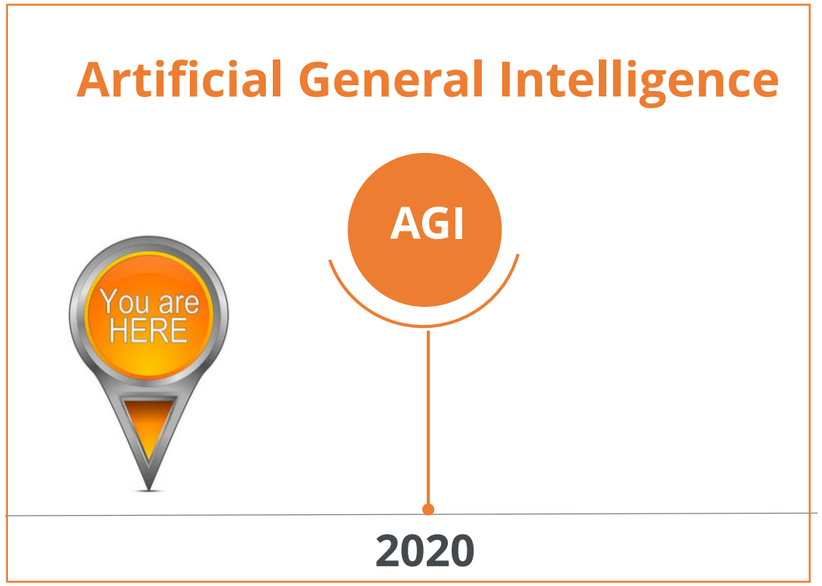
Artificial General Intelligence (AGI)

- Systems using Artificial General Intelligence (AGI) cover more than one functional areas like reasoning, problem-solving, and abstract thinking.



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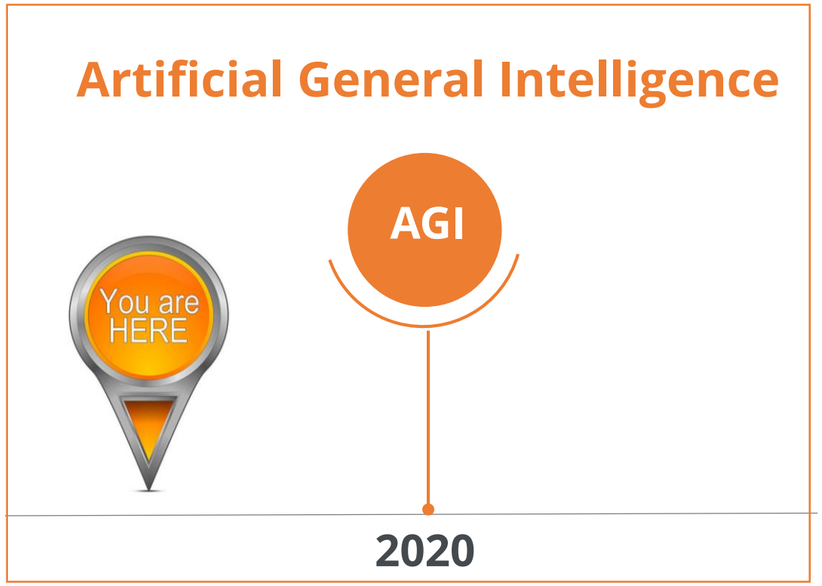
Examples of AGI



- Multipurpose systems
- Systems with human-level intelligence, reasoning, thinking, and decision-making
- Systems with an ability to synthesize diverse information and decide actions

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Quiz Time

What according to you would be the capabilities of systems with Artificial Super Intelligence (ASI)?

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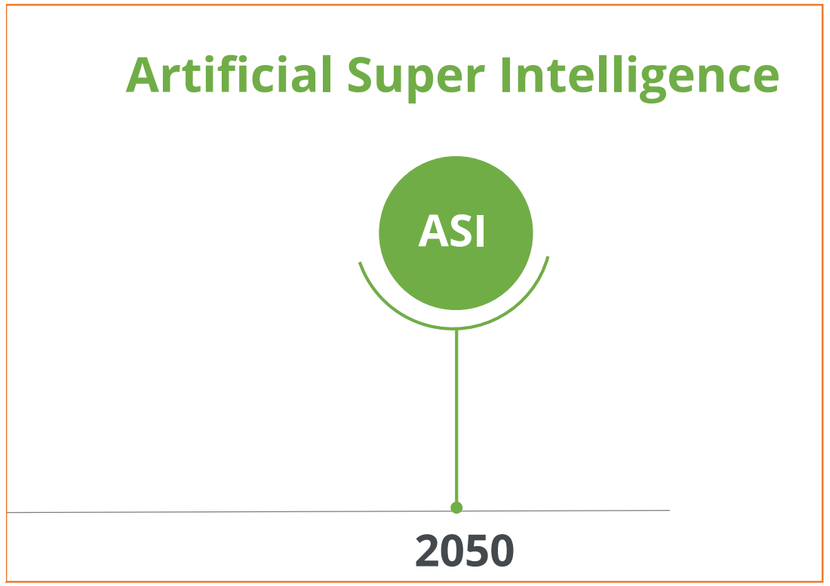
Artificial Super Intelligence (ASI)

Artificial Super Intelligence (ASI) surpasses human intelligence.

Examples of ASI:

- Super intelligent AI agents
- Systems that are masters at every skill, subject, or discipline and are faster than the smartest humans.



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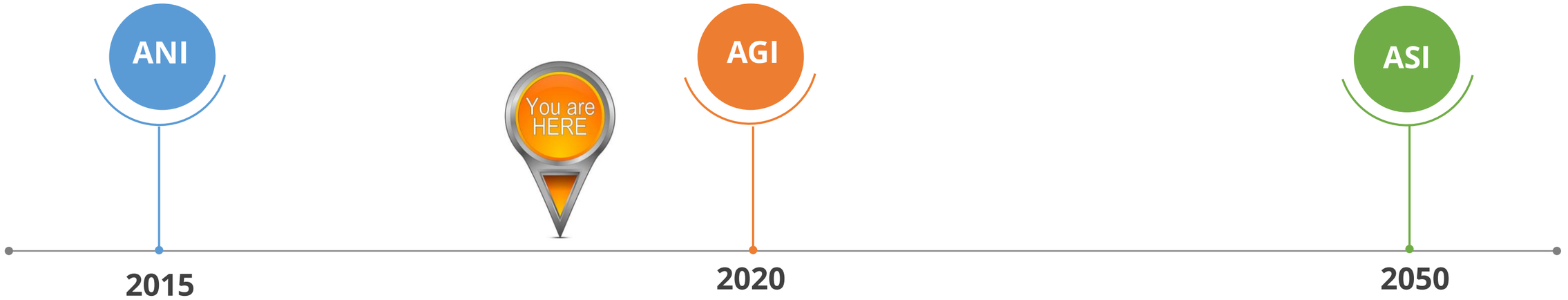
Three Stages of AI: At a Glance

Artificial Narrow Intelligence

Artificial General Intelligence

Artificial Super Intelligence



Machine Learning

User-driven big data systems for machine learning

Machine Intelligence

Advanced networks trained to build ad-hoc systems and improve themselves using data

Machine Consciousness

Systems characterizing cognitive self-learning

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Decoding Artificial Intelligence

Topic 2: Applications of Artificial Intelligence

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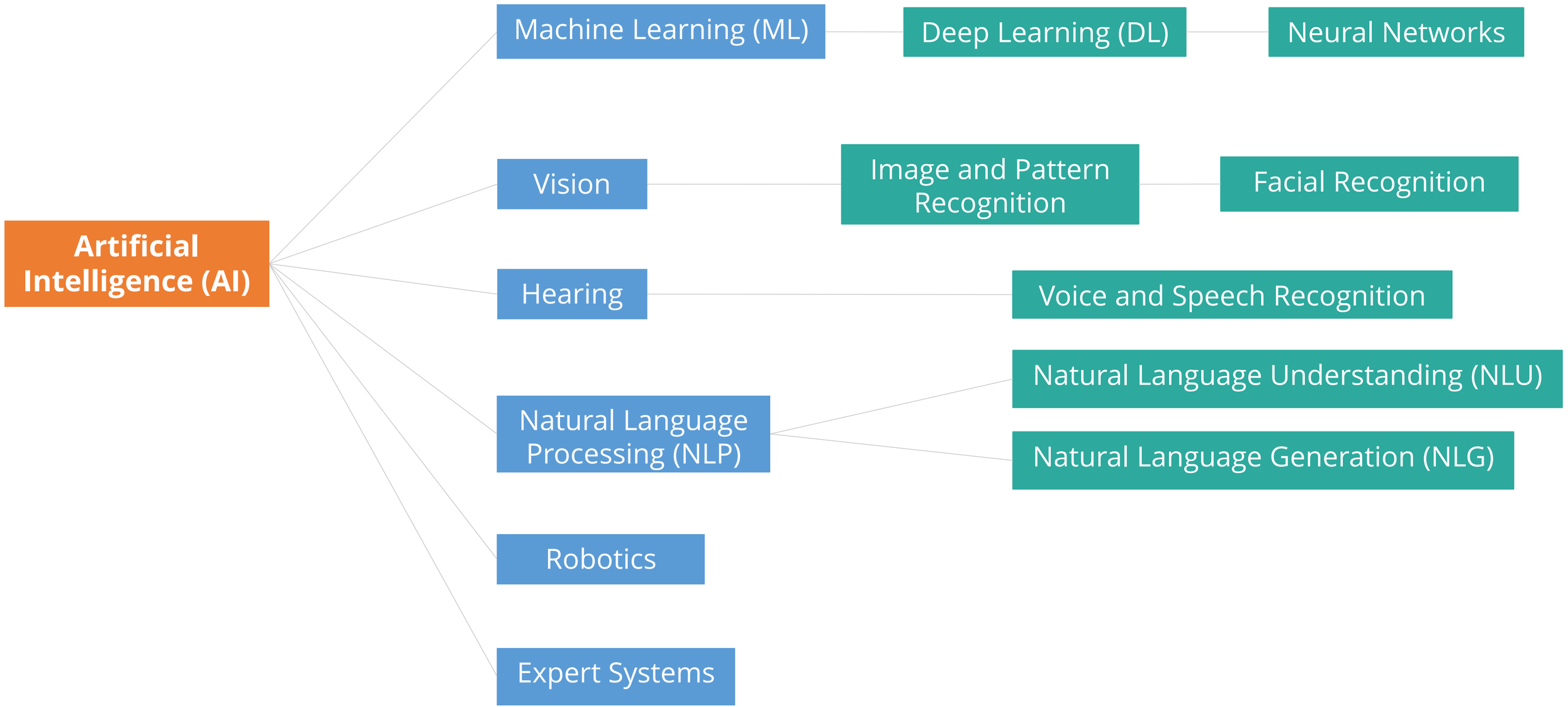
Applications of Artificial Intelligence



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Applications of AI: Examples

- Siri is a popular personal assistant offered by Apple for all its devices.
- It uses machine learning and voice recognition to respond to users' requests and queries.

- Cogito is a behavioral version to improve the intelligence of customer support representatives.
- It analyzes the human voice and provides real-time guidance to enhance the behavior.

- Netflix uses predictive technology to offer recommendations based on customers' reactions, interests, choices, history, and behavior.

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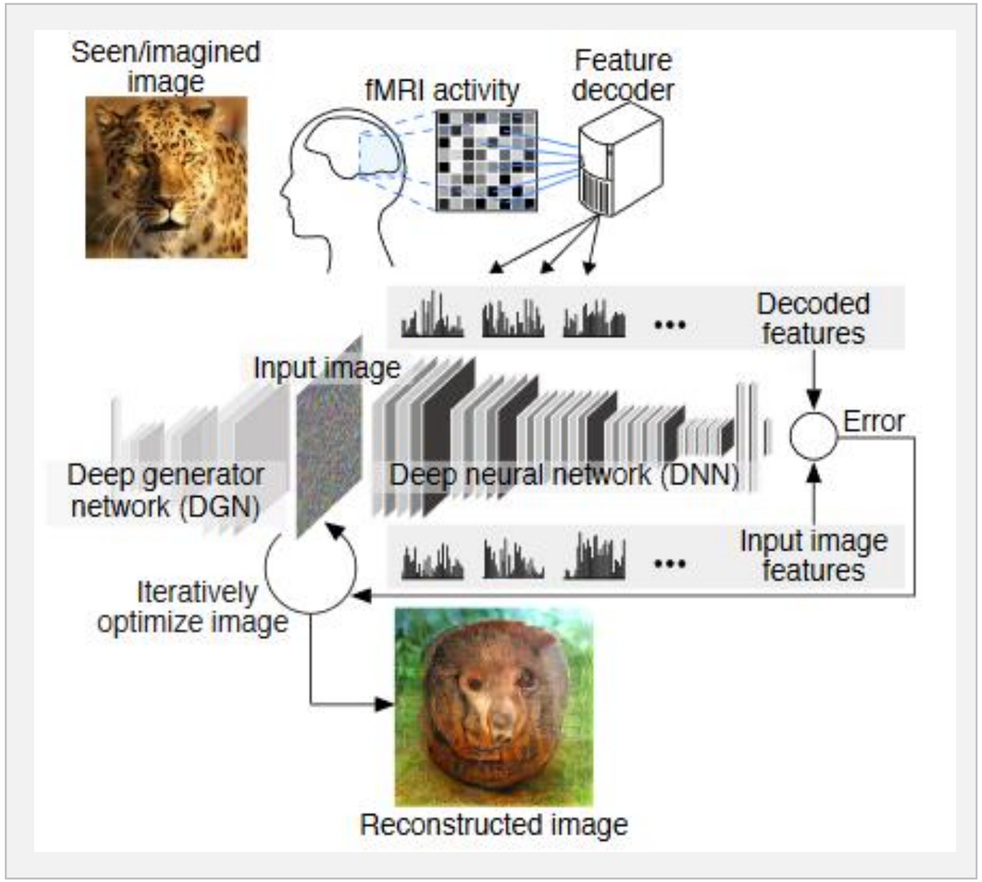
Image Recognition



- Image recognition is the ability of a software to recognize the objects, places, people, and actions in an image.

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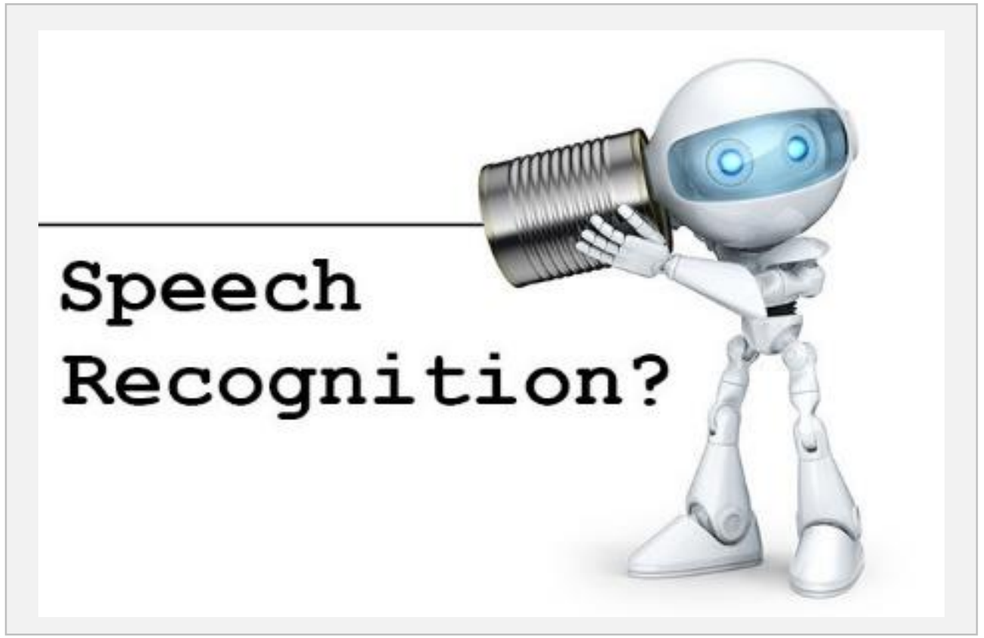
Speech Recognition



- Speech recognition is the ability of a machine or program to allow humans to use their voice to communicate with the software.

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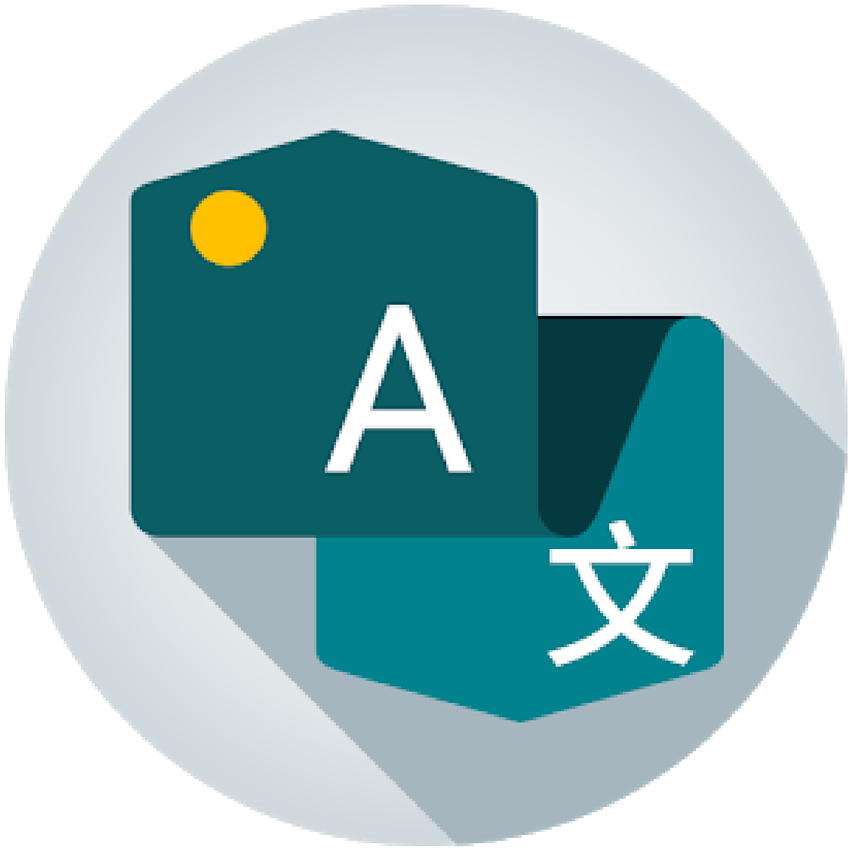
Language Translation



- Language translation is the process of translating a word or sentence from one language into another.
- It also ensures that the translated word is culturally and linguistically correct.

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Product Analytics

- Product analytics enables companies to leverage data to reveal user engagement with their products or services.
- It can be used to track the activities, likes, and dislikes of users.

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A/B Testing

- A/B testing, also called split testing, is the process of comparing two versions.
- It is used to see which version of a web page delivers a better performance.

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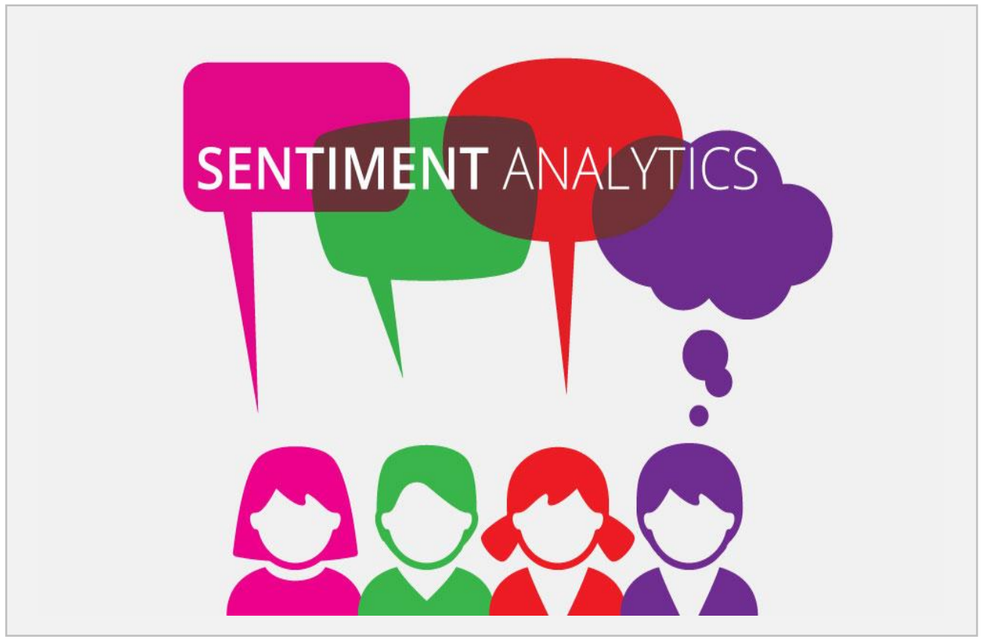
Sentiment Analysis



- Sentiment analysis is the process of analyzing a piece of text to determine the writer's attitude.
- It can be categorized as positive, negative, or neutral.

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Quiz Time

What do you think is the underlying technology of Amazon Echo?

- Natural Language Understanding (NLU)
- Robotics
- Automated Speech Recognition (ASR)
- Image Recognition

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Quiz Time

What do you think is the underlying technology of Amazon Echo?

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Decoding Artificial Intelligence

Topic 3: Effects of Artificial Intelligence on Society

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Enhances Throughput and Efficiency

datmo

Anand Sampat from Datmo says,

"Artificial intelligence is a huge benefit to society because it enhances the efficiency and throughput, while creating new opportunities for revenue generation, cost savings, and job creation."

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Enhances Throughput and Efficiency

- Self-driving cars have a combination of sensors, cameras, radar, and artificial intelligence technology.
- They are capable of sensing the environment and navigating without any human intervention.

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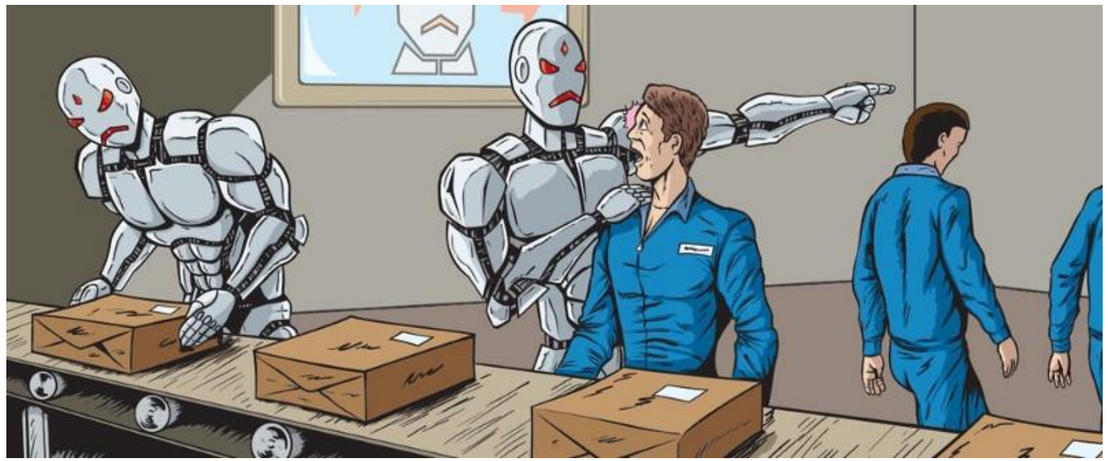
Adds Jobs and Strengthens the Economy



- You see headlines like “Robots and AI will destroy jobs.” This is fiction rather than a fact.
- AI encourages a gradual evolution in the job market which, with the right preparation, will be positive.
- People will work better with the help of AI.

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Adds Jobs and Strengthens the Economy

Matthew Lieberman from PwC says,

"The unparalleled combination of human and machine will become the new normal in the workforce of the future."

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Adds Jobs and Strengthens the Economy

- Artificial intelligence improves overall productivity and economic growth.
- It addresses changing market demands, which include an increased need for advanced technical skills.

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Increases Human Efficiency

DUE COMPANY

Chalmers Brown from Due says,

"Machines allow humans to do the more interpersonal and creative aspects of work."

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Increases Human Efficiency

Microsoft is a pioneering AI designed to monitor specific areas and situations. The system alerts relevant personnel to potential hazards or safety incidents that can be controlled by immediate human intervention.

This technology is built using Microsoft Azure Stack, Azure functions, Cognitive services, and commodity cameras.

It has the potential to revolutionize occupational safety and incident prevention worldwide.

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Enhances Lifestyle

Naresh Soni from Tsunami ARVR says,

"Smart homes will reduce the energy usage and provide better security for humans. Marketing will be more targeted and health care will become more effective with smart devices."

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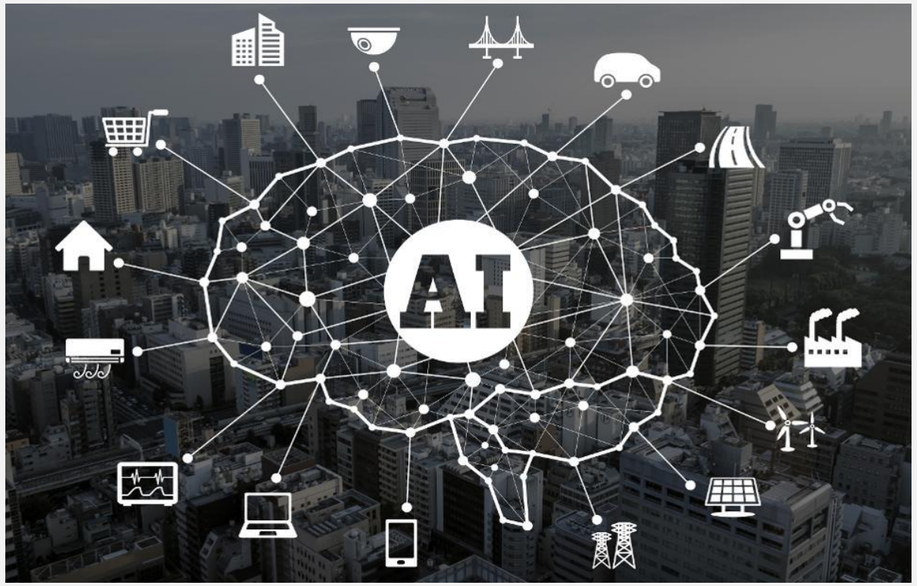
Enhances Lifestyle



- The artificial intelligence platform provides real-time insights, combined with the explosion of computing power.
- Healthcare professionals can diagnose patients faster and more accurately after machines interpret the required data.
- Smart homes provide improved comfort, convenience, efficiency, and security.

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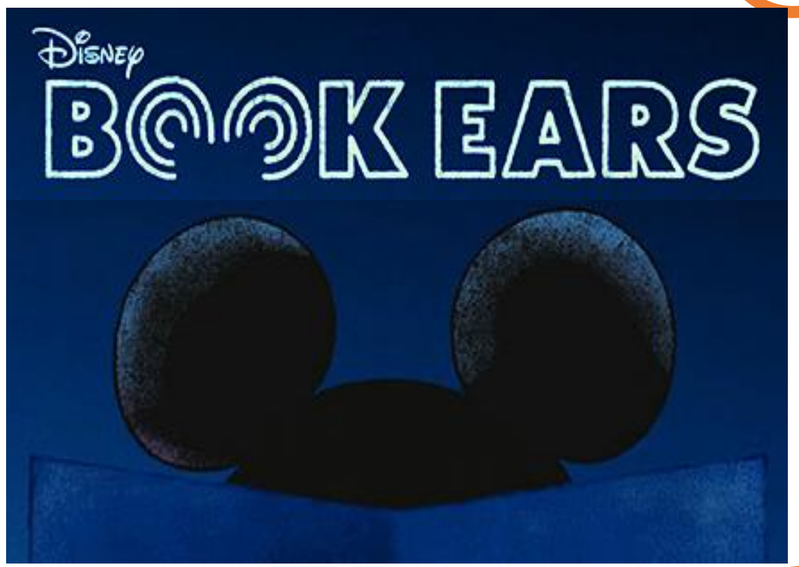
AI at Home: Disney Book Ears



Disney Book Ears is an application that augments the experience of reading books by playing sounds for specific cues.

It is powered by Google's Cloud Speech API. The app listens for specific words and phrases. It then triggers sounds from a database of sound effects that play through the phone's speakers.

The app is designed to understand different accents, intonations, and expressions.

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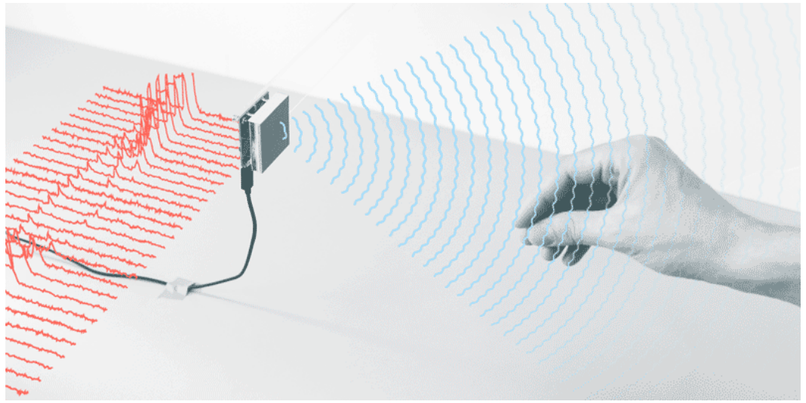
AI at Home: Soli



Soli is a small chip developed by Google that can be embedded into wearables, phones, computers, cars, IoT devices. It is a miniature radar that detects touchless gesture interactions.

The Soli chip incorporates the entire sensor and antenna array into a compact 8mm x 10mm package. Soli uses the concept of virtual tools, which are gestures that mimic physical interactions with devices.

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Supervises Learning for Telemedicine

cooper | perkins

Harald Quintus-Bosz, Cooper Perkins Inc. says,

"Artificial intelligence has the potential to extend knowledge and understanding to a broader population. Image-based AI diagnoses of medical conditions could allow for a more comprehensive deployment of telemedicine."

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AI in Healthcare: Google DeepMind

- The machine learning algorithm that Google uses to label web images can diagnose diabetic retinopathy as well as a highly trained ophthalmologist.
- With retinal images, clinicians can diagnose, monitor, and treat diabetic retinopathy remotely via telemedicine.

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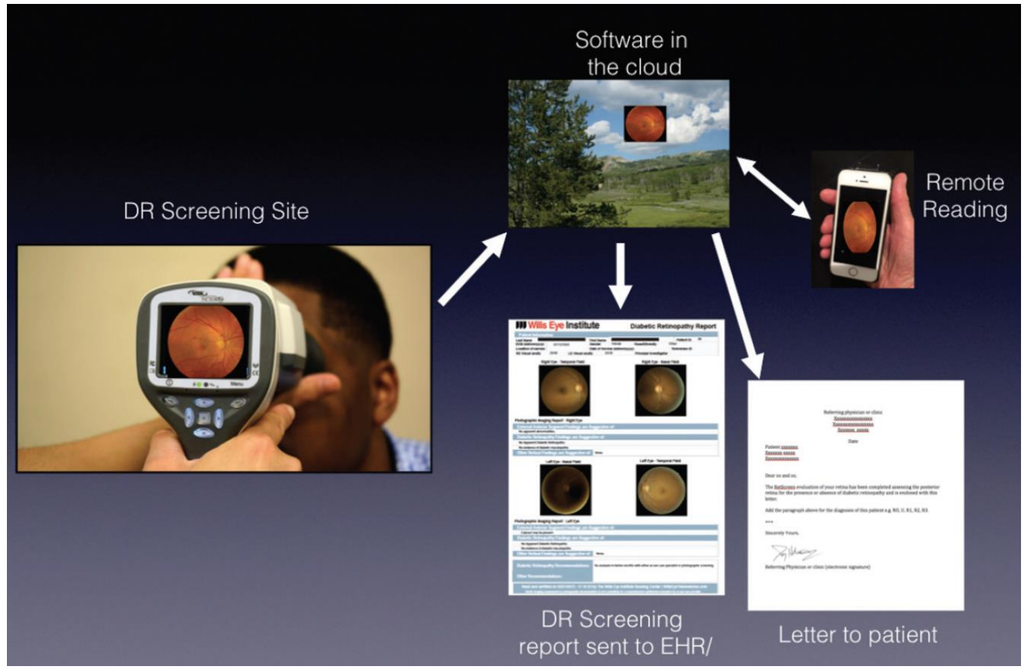
AI in Healthcare: DR Screening Software



- DR or Diabetic Retinopathy can be diagnosed using AI.
- DR screening software uses a portable fundus camera, which is deployed to the screening site.
- The captured images are securely transmitted to the cloud software platform for analysis.
- The software automatically generates a report for the referral source and, in some cases, for the patient. This facilitates compliance with follow-up examinations.

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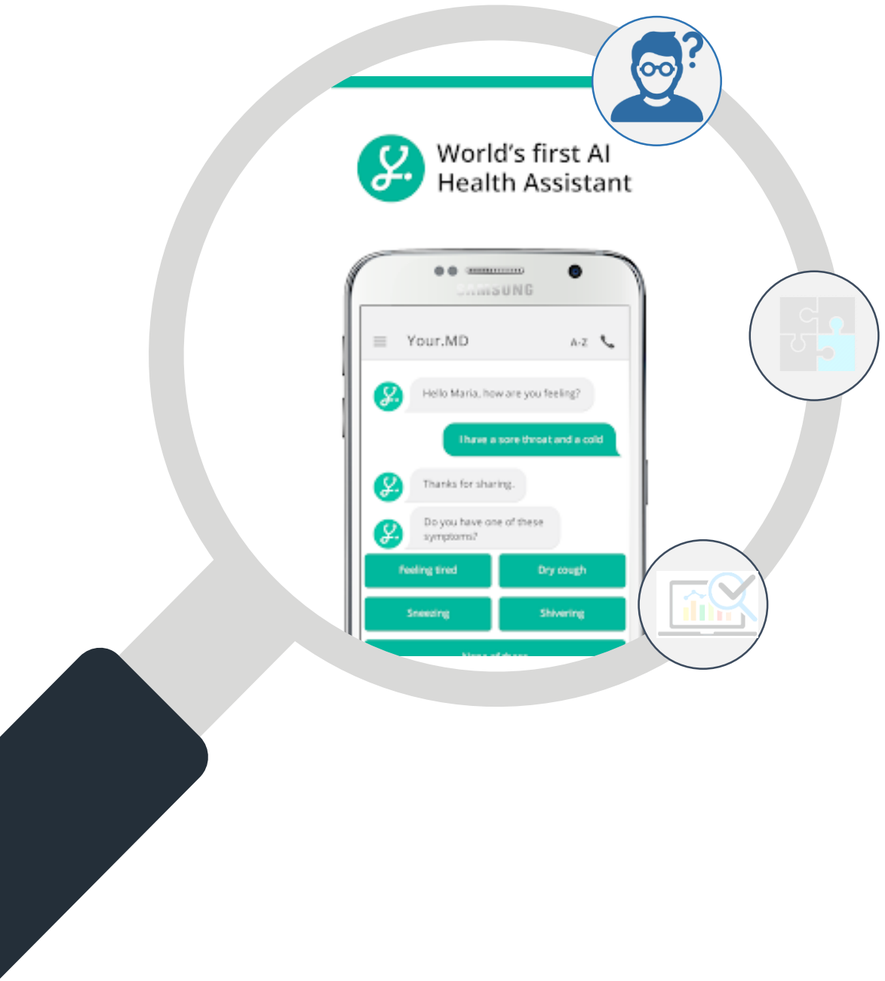
Case Study: Your.MD

Problem



- In UK, the general practitioners and primary care surgeons are always overburdened. This is a common complaint of the patients.
- The waiting times for their appointments are too long.

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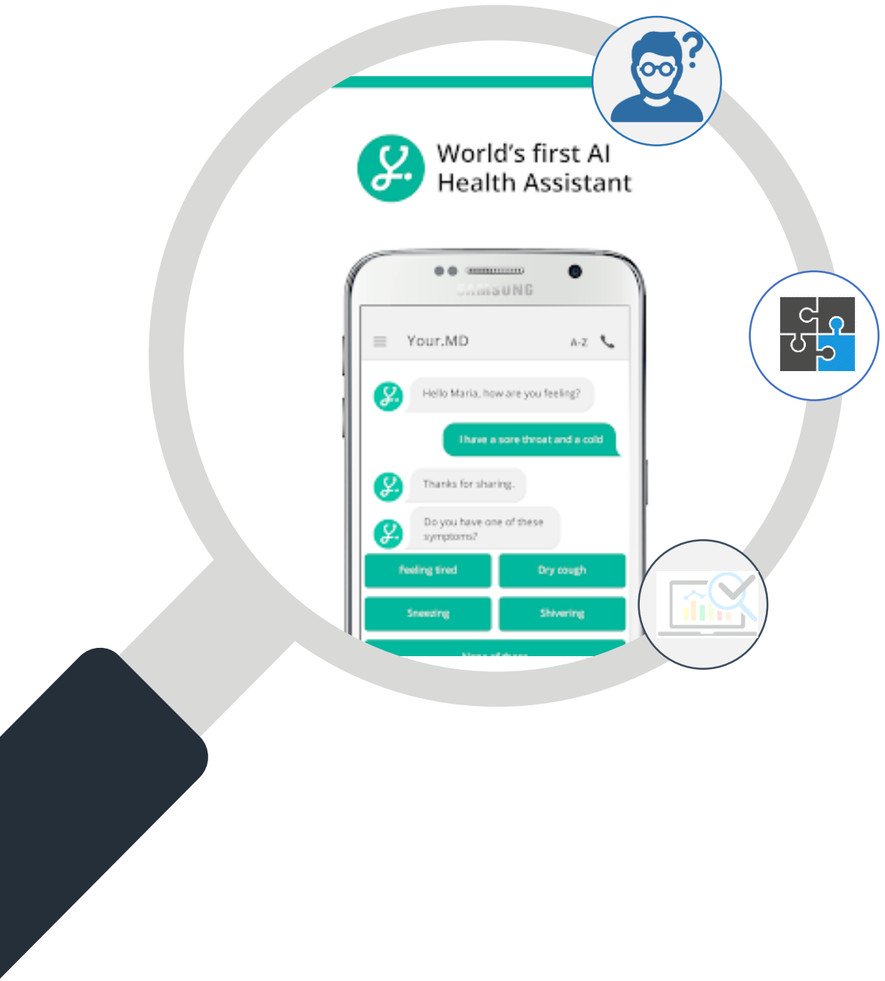
Case Study: Your.MD

Solution



- Your.MD is a free service that uses AI techniques to provide users' with personalized advice about their medical complaints.
- The app records users' symptoms and matches these with a map of clinical data about illnesses. This is compiled from public sources with the help of contributing doctors.
- Your.MD engages about 30 doctors to conduct research on illnesses and to input data in the AI system.

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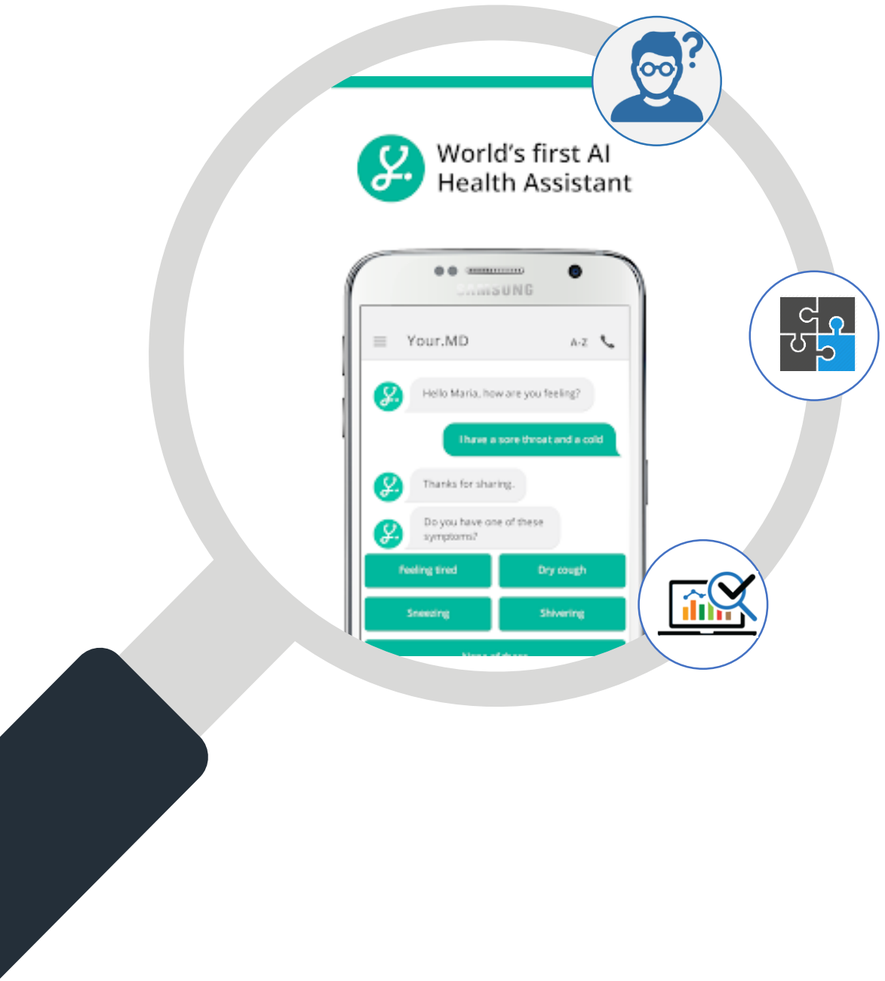
Case Study: Your.MD

Results



- Your.MD has created a preprimary care market.
- It eases the burdens of medical staff and helps improve their work since initial screening of non-acute conditions could be done digitally.
- Users of the service benefit from the information and suggestions they receive from the app.

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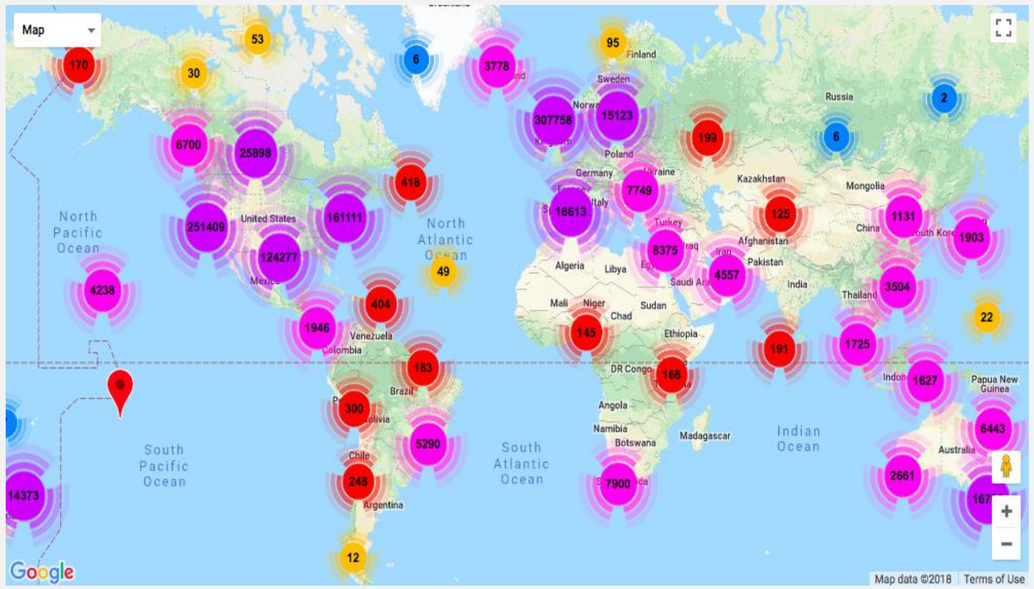
Solves Complex Social Problems

Litterati



- Litterati is building a global database for litter.
- They have crowdsourced litter clean-up app that identifies litter type, distribution, and location.
- This information is important to cities, NGOs, and schools all over the world.
- They have been featured on CNN, BBC, National Geographic, and TED.

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Improves Demand Side Management

CLEAResult®

Greg Sarich from CLEAResult says,

“From an energy standpoint, artificial intelligence can be used to analyze and research historical data to determine how to most efficiently distribute energy loads from a grid perspective.”

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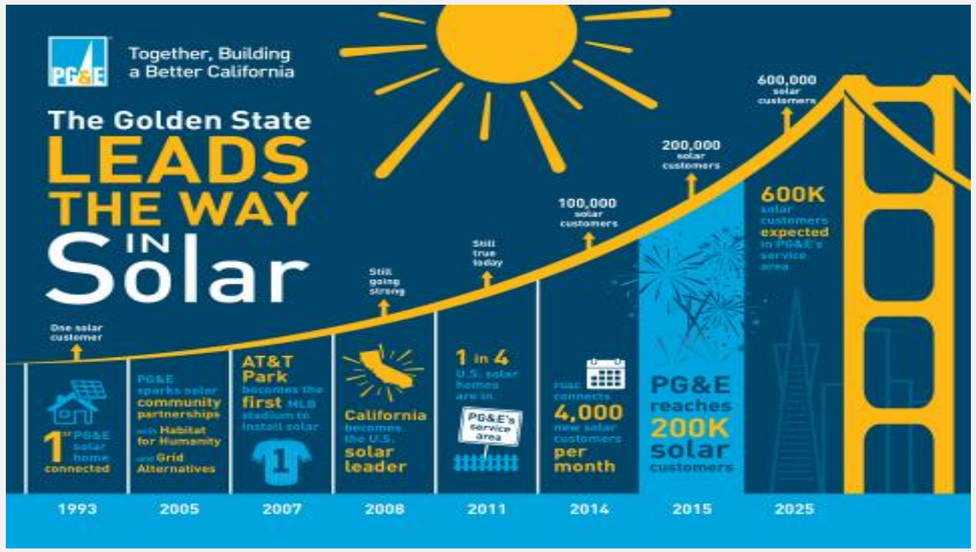
Improves Demand Side Management

PG & E



- Pacific Gas and Electric Company (PG&E) announced that it has connected 200,000 solar customers, accounting for one in every four rooftop solar households in America.
- It is among the fastest in the nation at connecting solar customers to the grid with an average of a five-day turnaround time.

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Extends and Expands Creativity

Ganesh Padmanabhan from CognitiveScale Inc. says,

"AI intelligence is the biggest opportunity of our lifetime to extend and expand human creativity and ingenuity."

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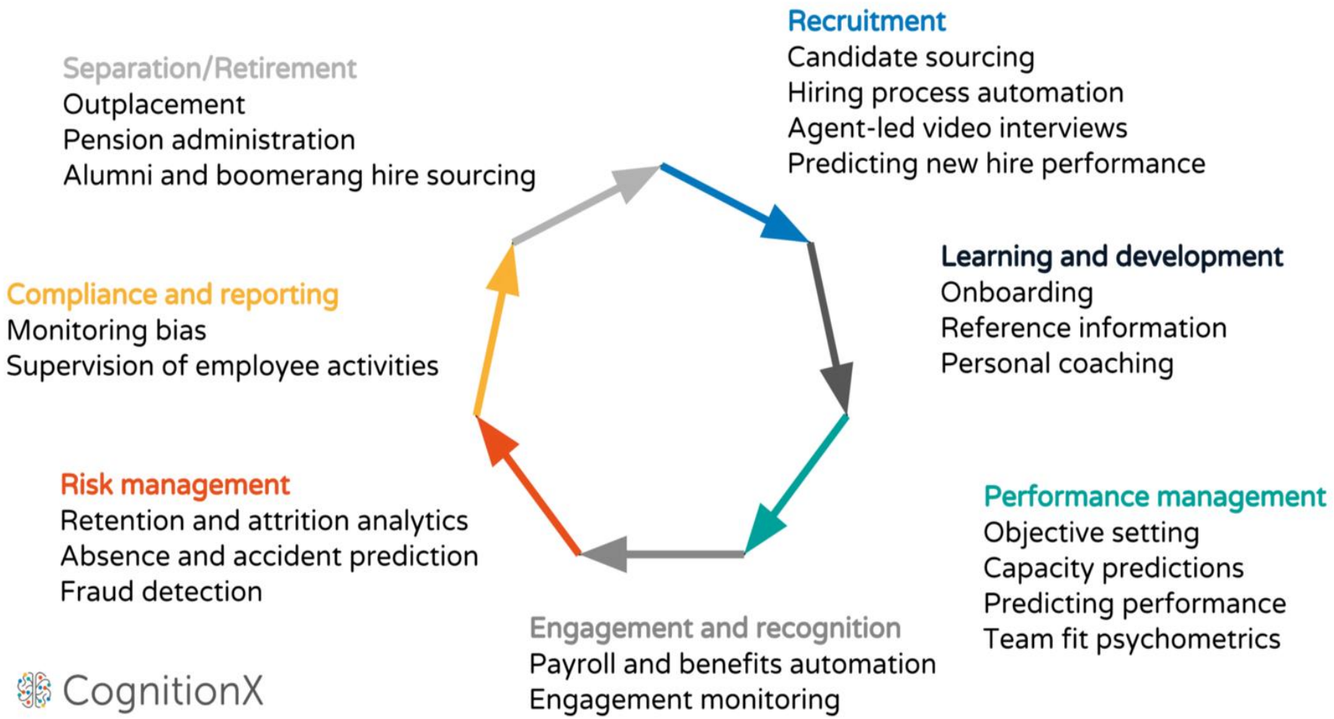
Extends and Expands Creativity



- The two main concerns that the fearmongers raise:
  - AI will lead to job losses in the society
  - AI will take control of the human race
- This can be proved wrong by how AI is being leveraged in Human Resources and recruitment.

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Benefits Multiple Industries

Mark Butler from qualys.com says,

AI risks are real if we don't understand the quality of the incoming data and set AI rules which are making granular trade-off decisions at increasing computing speeds.

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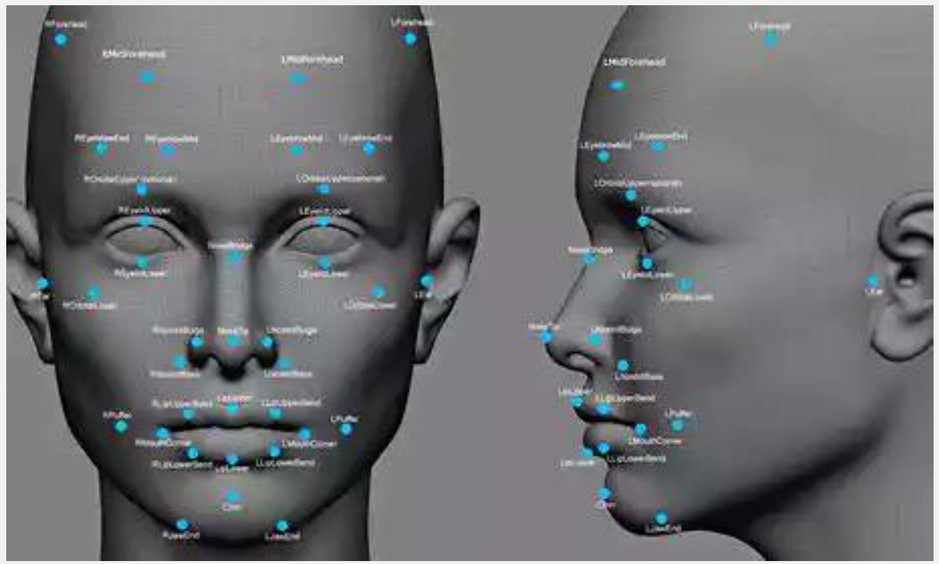
Benefits Multiple Industries

Facial Recognition



- Facial recognition is a biometric technology used to identify human faces.
- It is used in the security systems and is popular as a commercial identification and marketing tool.

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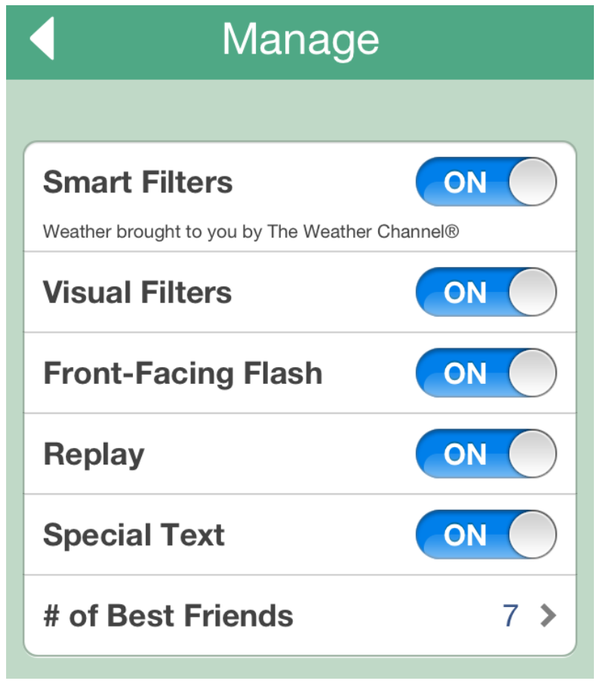
Image Recognition: Snapchat



Snapchat's smart filters can differentiate between the images of objects, pets, sports, and food. It can suggest relevant borders and stickers. Geofilters identify your location and suggest location-based filters.

Snapchat filters use machine learning and an image classification technique called Convolutional Neural Networks (CNN).

These filters also generate revenue from brands that sponsor them based on users' locations.

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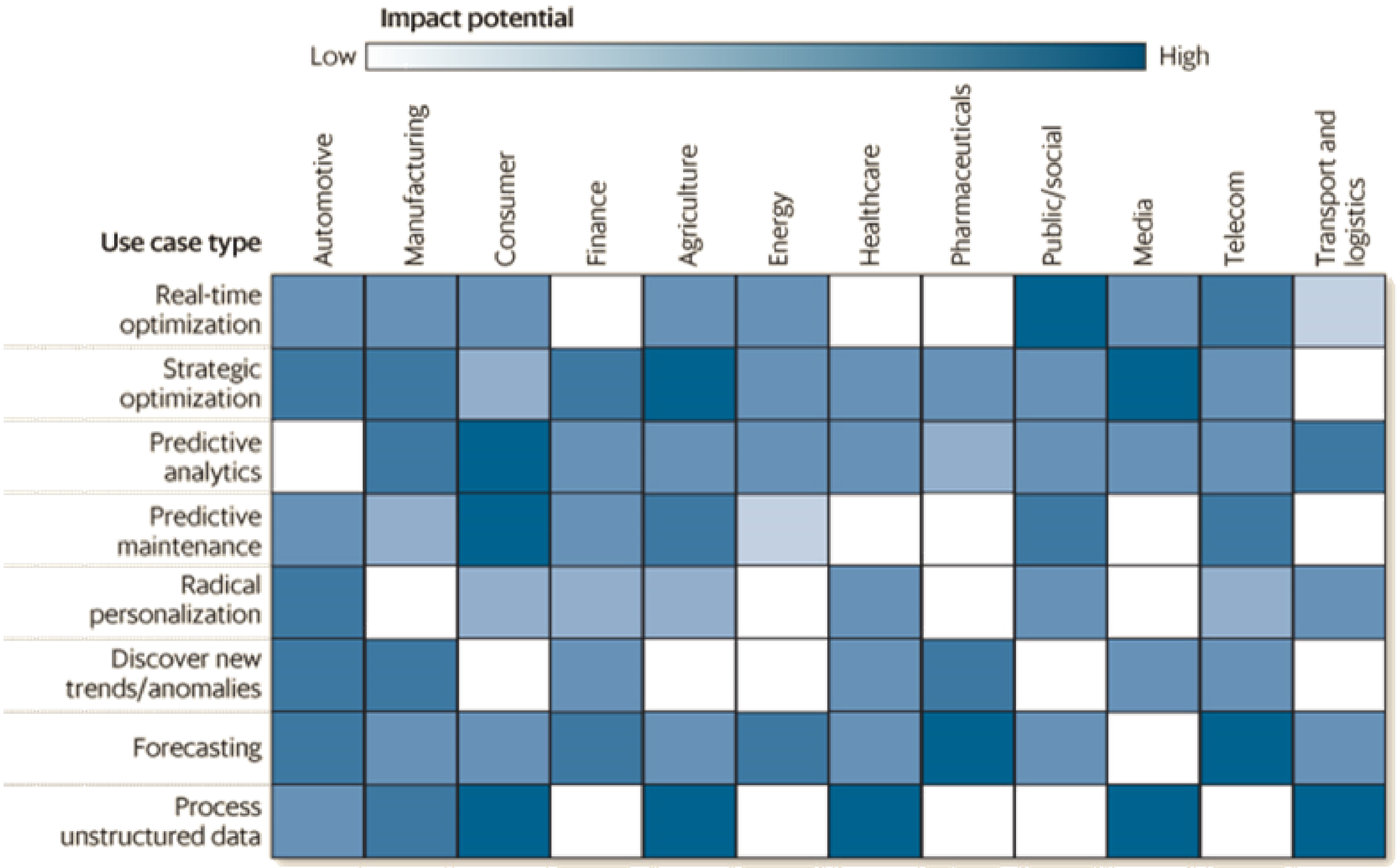
Industry-Wise Impact of AI and Use Cases



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Source: McKinsey

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Key Takeaways

- Artificial intelligence is the intelligence exhibited by machines and is the capability of a machine to imitate human behavior.
- The three stages of AI include Artificial Narrow Intelligence, Artificial General Intelligence, and Artificial Super Intelligence.
- Various applications of AI include image recognition, speech recognition, natural language processing, translation, product analytics, A/B testing, and sentiment analysis.
- AI enhances throughput and efficiency, adds jobs, strengthens economy, increases human efficiency, enhances lifestyle, solves complex social problems, and benefits multiple industries.

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Quiz

QUIZ 1

How does Google, Amazon, and LinkedIn use artificial intelligence in their ecosystems?

a. Google, Amazon, LinkedIn do not use artificial intelligence.

b. Google and LinkedIn use AI through their offerings, but Amazon does not use AI.

c. Google and Amazon use AI, and LinkedIn is in the process of incorporating AI.

d. Amazon uses AI in Alexa and AI Everywhere, Google uses AI in Vision API and Google Translate, whereas LinkedIn uses AI in the entire job application process.

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The correct answer is **D**

In case of LinkedIn, machine learning helps the platform and enhances the reach of jobs to the right people. Also, it helps in keeping track of the talent pool. Google uses AI in Vision API and Google Translate. Amazon uses AI in Alexa, Brainier Cloud, and AI Everywhere.

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This concludes “Decoding Artificial Intelligence.”

The next lesson is “Fundamentals of Machine Learning and Deep Learning.”

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