

## About me

20 years experience in Tech

Last 10 years at Oi (Cheltenham)

Johnson & Johnson, Bayer, Pfizer

Innovation Director and Programming Lead

AI, Data Science, Machine Learning, Voice Technology

Graduated from Poznan University of Technology

5<sup>th</sup> time at WebX



Przemyslaw Jarzynski (PJ)  
Innovation Director  
Cheltenham

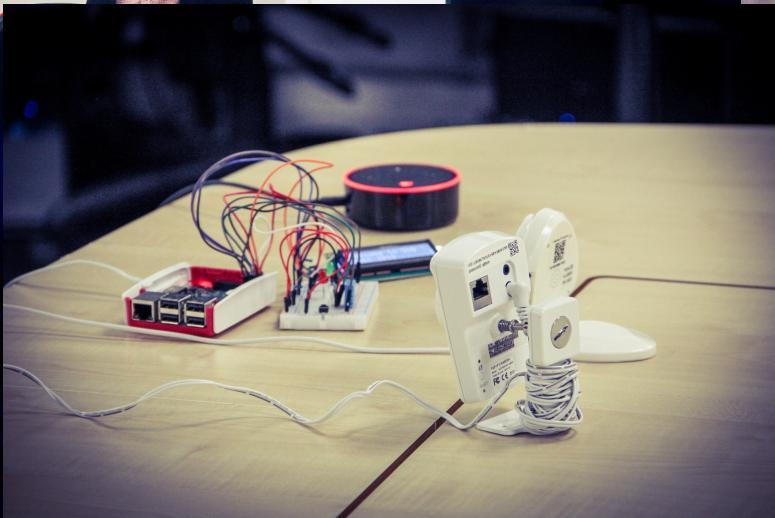
[www.oj.co.uk](http://www.oj.co.uk)



WebX, 26<sup>th</sup> February 2020



Source: <http://www.hermonqualitysolutions.com/an-overview-of-kaizen-principles/>



**How to become AI Expert  
and get the best job  
in the industry**



# Artificial Intelligence (AI)

## Data Science

## Machine Learning (ML)



## Agenda

What is AI, Data Science and ML

Examples of AI in real life

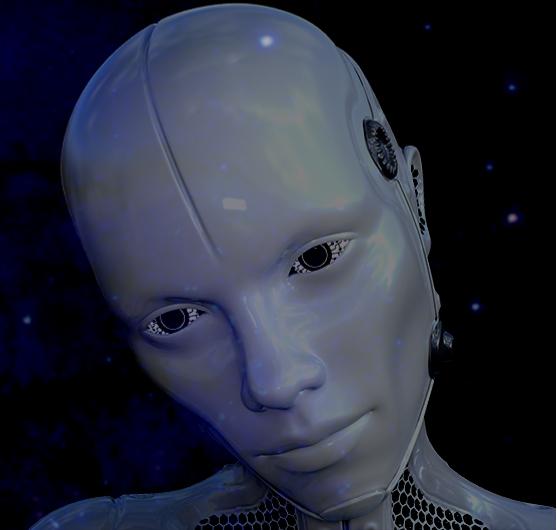
AI, Machine Learning and Data Science Tools

Code examples

Learning Resources

Bonus tips

Q&A and Experiment



DATA

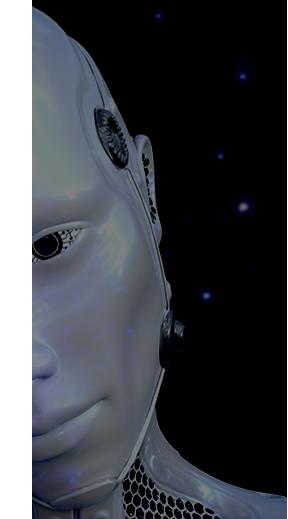
# Data Scientist: The Sexiest Job of the 21st Century

by Thomas H. Davenport and D.J. Patil

From the October 2012 Issue

 Summary  Save  Share  Comment  Print  \$8.95 Buy Copies

**W**hen Jonathan Goldman arrived for work in June 2006 at LinkedIn, the business networking site, the place still felt like a start-up. The company had just under 8 million accounts, and the number was growing quickly as existing members invited their friends and colleagues to join. But users weren't seeking out connections with the people who were already on the site at the rate executives had expected. Something was apparently missing in the social experience. As one LinkedIn manager put it, "It was like arriving at a conference reception and realizing you don't know anyone. So you just stand in the corner sipping your drink—and you probably leave early."



EDITION: UK ▾



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MUST READ: On data protection, the UK says it will go it alone. It probably won't.

# Data science dominates LinkedIn's emerging jobs ranking

Artificial intelligence has 74% hiring growth in the past four years. Other roles such as data scientist and robotics engineer are growing quickly.

December 10, 2019

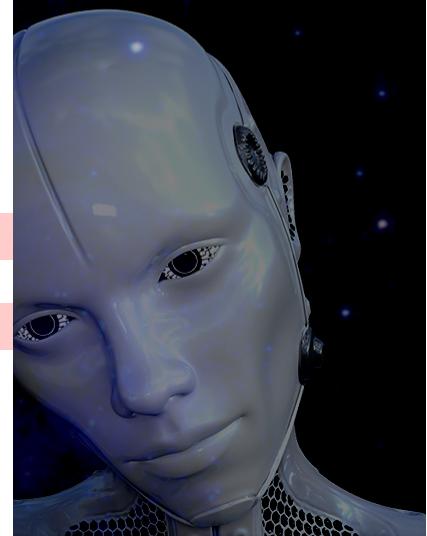


Here's a look at the top 5 emerging jobs.

1. Artificial intelligence specialist. LinkedIn data shows that hiring growth has grown 74% in the past four years. The job requires skills in machine learning, deep learning, TensorFlow, Python and natural language processing. Industries hiring include computer software, internet, IT, higher education and consumer electronics. **Primers:** [What is AI?](#) | [What is machine learning?](#) | [What is deep learning?](#) | [What is artificial general intelligence?](#)

2. Robotics engineer. This role has hiring growth of 40% over the last four years, according to LinkedIn. These roles vary based on software and hardware roles, but much of the skills in LinkedIn's report revolve around software skills such as robotics process automation. [Robotics in business: Everything humans need to know](#)

3. Data scientist. According to LinkedIn, data scientist jobs have 37% hiring growth over the last three years. LinkedIn noted that existing roles such as statisticians have evolved to more data. Skills include machine learning, data science, Python, R and Apache Spark. [Data scientists: Earn the highest salary in these 5 cities](#) | [Data scientists: Here's how to avoid 3 common mistakes](#) | [The data scientist job interview: Questions to expect and questions to ask \(free PDF\)](#)



# 50 Best Jobs in America for 2019

Best Jobs ▾    2019 ▾    United States ▾

Share



Job Title	Median Base Salary	Job Satisfaction	Job Openings	
#1 Data Scientist	\$108,000	4.3/5	6,510	<a href="#">View Jobs</a>
#2 Nursing Manager	\$83,000	4/5	13,931	<a href="#">View Jobs</a>
#3 Marketing Manager	\$82,000	4.2/5	7,395	<a href="#">View Jobs</a>
#4 Occupational Therapist	\$74,000	4/5	17,701	<a href="#">View Jobs</a>
#5 Product Manager	\$115,000	3.8/5	11,884	<a href="#">View Jobs</a>

# 25 Best Jobs in the UK for 2019

Best Jobs

2019

United Kingdom

Share



	Job Title	Median Base Salary	Job Satisfaction	Job Openings	
#3	Marketing Manager	£42,500	3.9/5	1,966	<a href="#">View Jobs</a>
#4	Product Manager	£52,500	3.8/5	1,697	<a href="#">View Jobs</a>
#5	Sales Manager	£42,000	3.8/5	2,795	<a href="#">View Jobs</a>
#6	Risk Manager	£60,000	3.9/5	1,111	<a href="#">View Jobs</a>
#7	Data Scientist	£46,000	4/5	995	<a href="#">View Jobs</a>



News and perspectives › Future ready › Future Ready: Data is the new gold

# Future Ready: Data is the new gold

By Kristen Morgan

For the 21st Century Enterprise, data is the most significant intangible asset, powering new technologies and an ecosystem of third-parties providing everything-as-a-service.

But these approaches are only as strong as the underlying data feeding them.

According to **Traci Gusher-Thomas**, Innovation & Enterprise Solutions principal, “any given organization has 80 percent or more of its data locked up as unstructured or ‘dark’ data,” making it difficult to analyze and gain insights.

“The amount of value sitting in that dark data is tremendous. Data is the new gold and our clients are struggling with how to mine it,” says **Jorge Blanco**, Advisory principal.

That is especially true when considering new business models that allow any company – regardless of size or industry – to be more nimble and scale infinitely faster. By accessing services rather than growing internal functions and infrastructure, and by capitalizing on emerging technologies such as artificial intelligence, 21st Century Enterprises can generate insights from massive amounts of data to improve business operations and transform



**Kristen Morgan**

Director, Corporate Communications, KPMG US

+1 410-949-2668



## Why this demand?

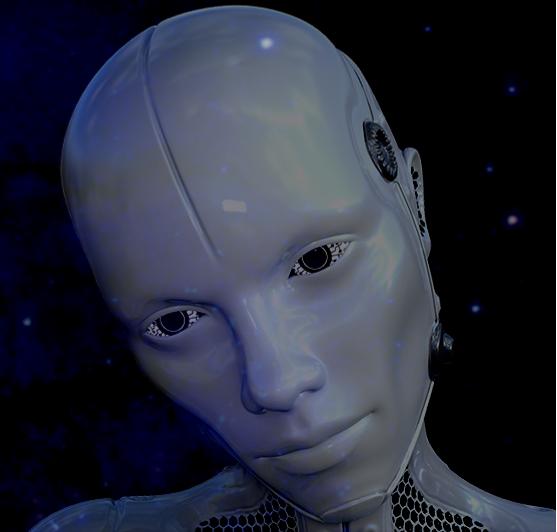
Digital World.

Internet of Things.

Increased computational power.

Better tools.

Business benefits.



## What are the benefits?

Making better decisions.

Identifying opportunities.

Developing better products.

Delivering relevant products.

Optimising operational efficiencies.



# What is AI, Machine Learning and Data Science



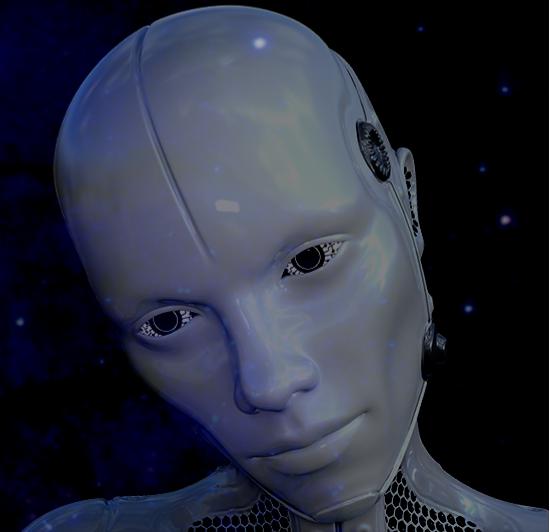
## What is Artificial Intelligence?

**Artificial Intelligence** is any system that displays behaviour that can be interpreted as human intelligence.



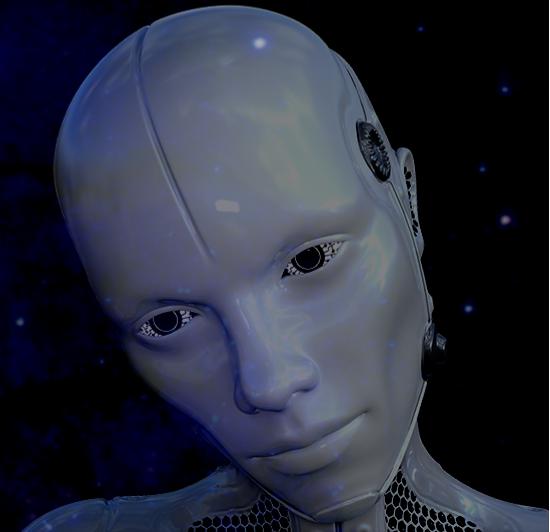
## What is Artificial Narrow Intelligence?

**Artificial Narrow Intelligence (ANI)** is a system that specialises in one particular area (smart speakers, self-driving cars).



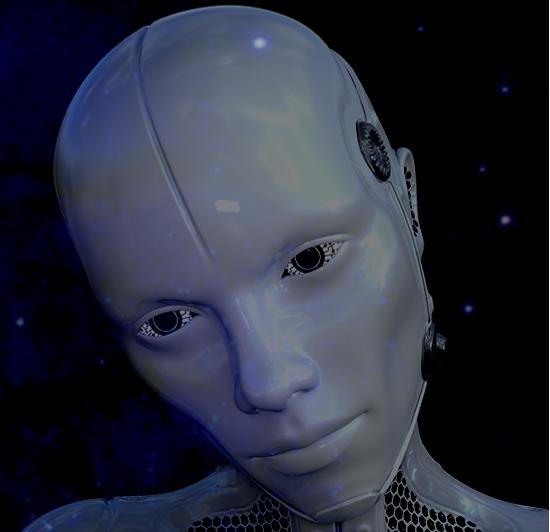
## What is Artificial General Intelligence?

**Artificial General Intelligence (AGI)** is a system that can do anything that human can do and more (this is still sci-fi).



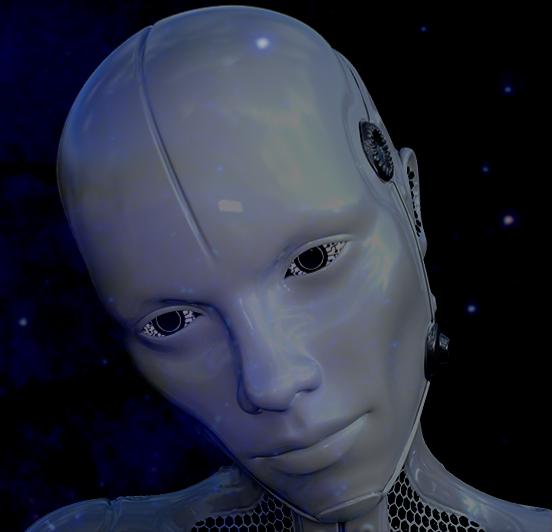
## What is Machine Learning?

**Machine learning** is an application of AI that provides systems the ability to learn and improve **without being explicitly programmed**.



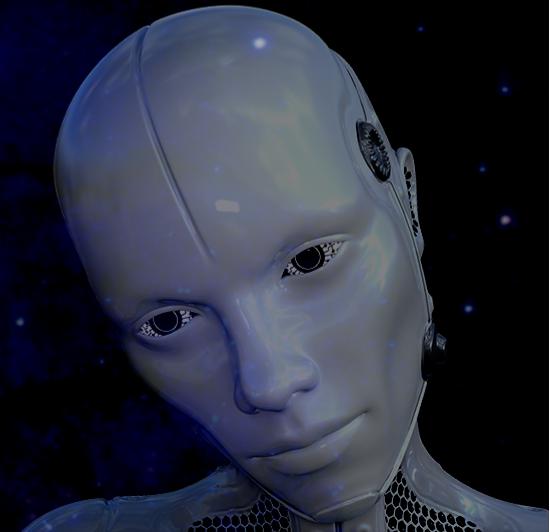
## What is Data Science?

**Data science** is a field that uses scientific methods, algorithms and systems to **extract knowledge and insights from structured and unstructured data**.



## Structured Data

**Structured Data** has a predefined structure. Typical examples are relational databases, Excel spreadsheets, CSV files.

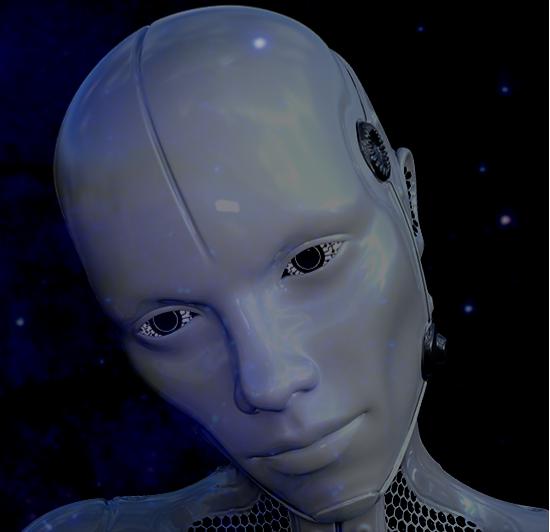


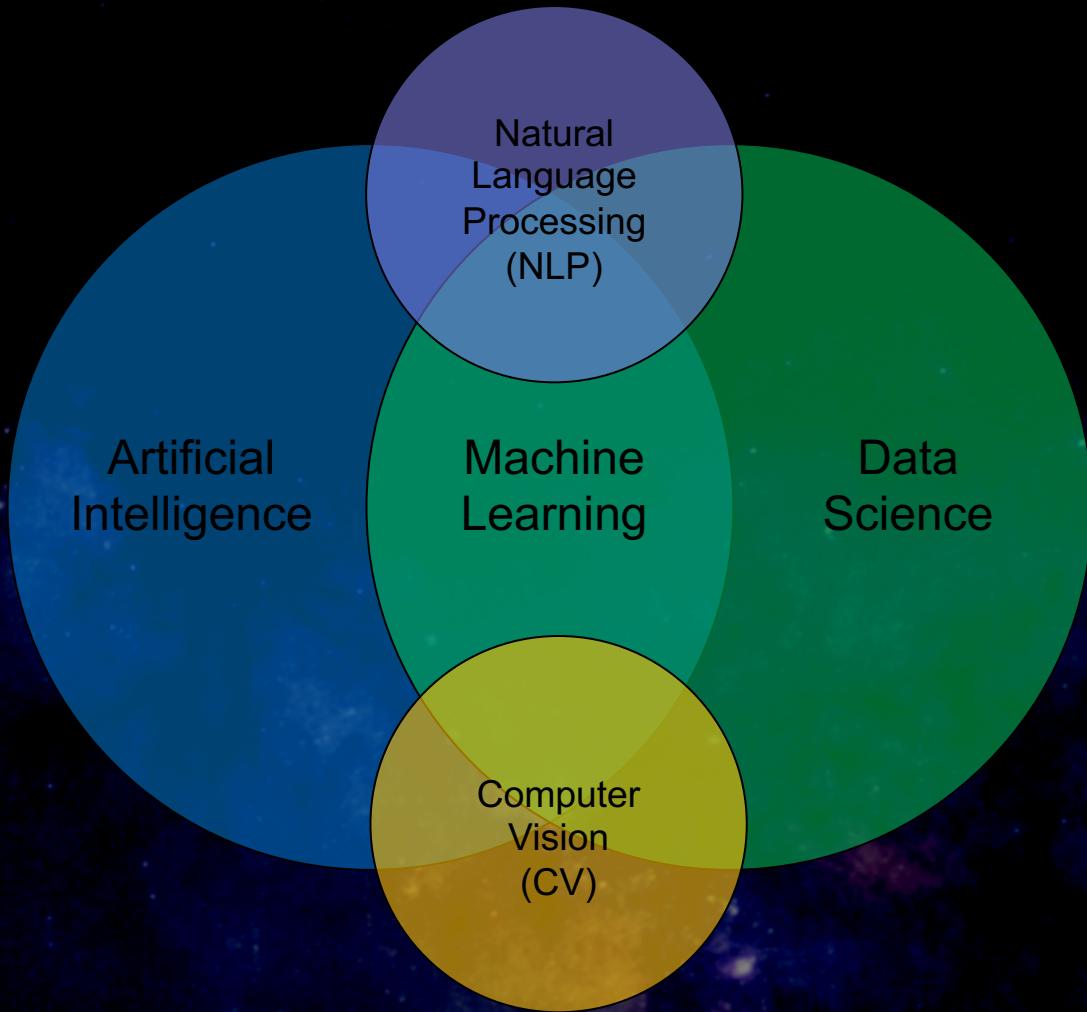
## Structured Data

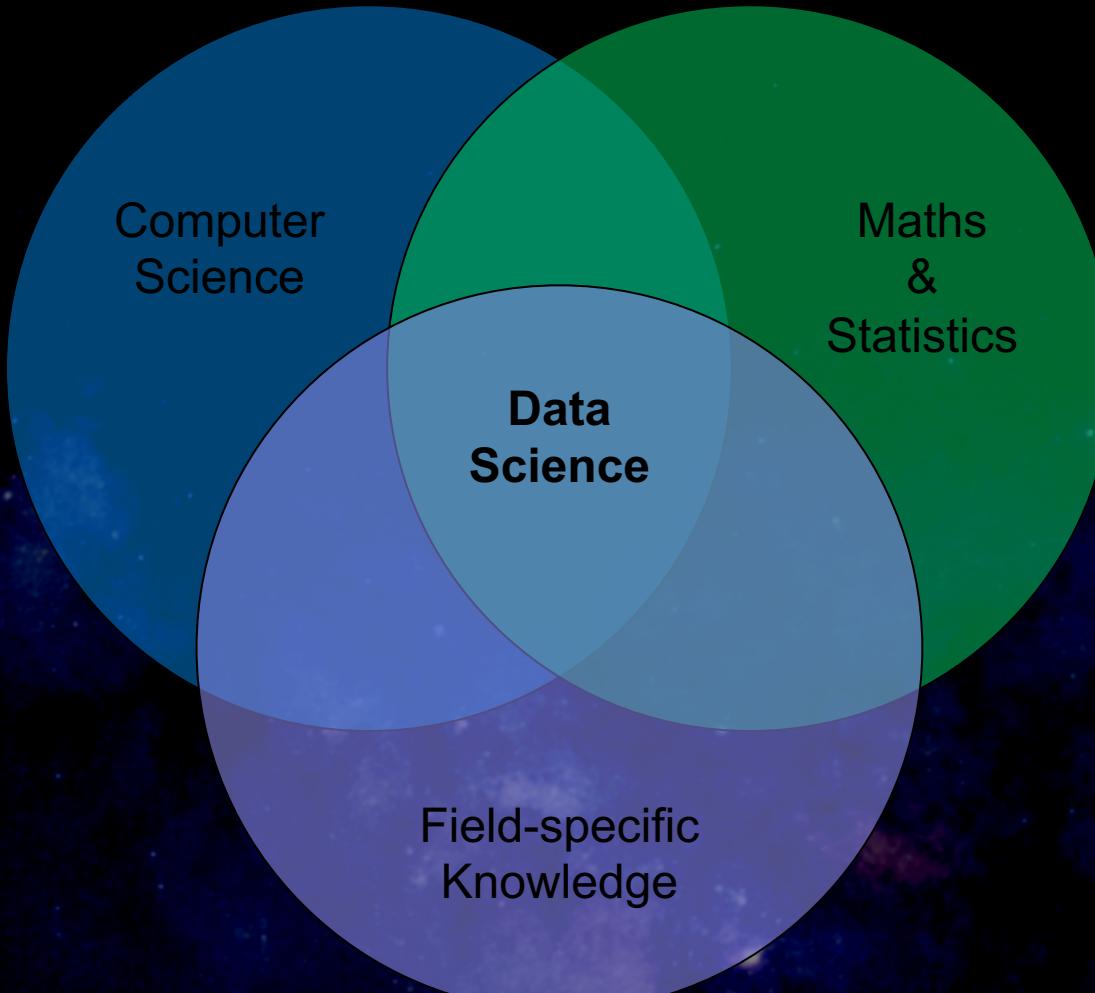
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1	0	3	Braund, Mr. Owen Harris	male	22	1	0	A/5 21171	7.25		S
2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Thayer)	female	38	1	0	PC 17599	71.2833	C85	C
3	1	3	Heikkinen, Miss. Laina	female	26	0	0	STON/O2. 3101282	7.925		S
4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	1	0	113803	53.1	C123	S
5	0	3	Allen, Mr. William Henry	male	35	0	0	373450	8.05		S
6	0	3	Moran, Mr. James	male		0	0	330877	8.4583		Q
7	0	1	McCarthy, Mr. Timothy J	male	54	0	0	17463	51.8625	E46	S
8	0	3	Palsson, Master. Gosta Leonard	male	2	3	1	349909	21.075		S
9	1	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27	0	2	347742	11.1333		S
10	1	2	Nasser, Mrs. Nicholas (Adele Achem)	female	14	1	0	237736	30.0708		C
11	1	3	Sandstrom, Miss. Marguerite Rut	female	4	1	1	PP 9549	16.7	G6	S
12	1	1	Bonnell, Miss. Elizabeth	female	58	0	0	113783	26.55	C103	S
13	0	3	Saundercock, Mr. William Henry	male	20	0	0	A/5. 2151	8.05		S
14	0	3	Andersson, Mr. Anders Johan	male	39	1	5	347082	31.275		S
15	0	3	Vestrom, Miss. Hulda Amanda Adolfina	female	14	0	0	350406	7.8542		S
16	1	2	Hewlett, Mrs. (Mary D Kingcome)	female	55	0	0	248706	16		S
17	0	3	Rice, Master. Eugene	male	2	4	1	382652	29.125		Q
18	1	2	Williams, Mr. Charles Eugene	male		0	0	244373	13		S
19	0	3	Vander Planke, Mrs. Julius (Emelia Maria Vandemoortele)	female	31	1	0	345763	18		S
20	1	3	Masselmani, Mrs. Fatima	female		0	0	2649	7.225		C

## Unstructured Data

**Unstructured data** is everything else.  
Emails, documents, images, audio,  
video.





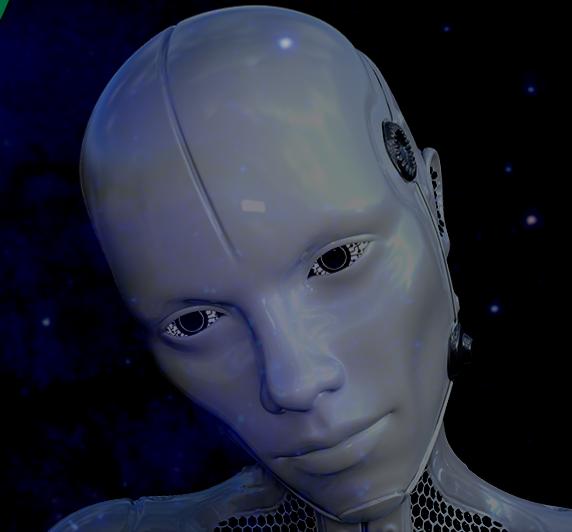


Computer  
Science

Maths  
&  
Statistics

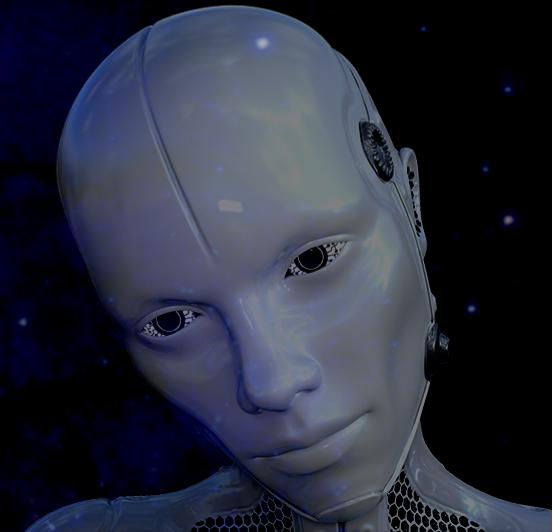
Data  
Science

Field-specific  
Knowledge



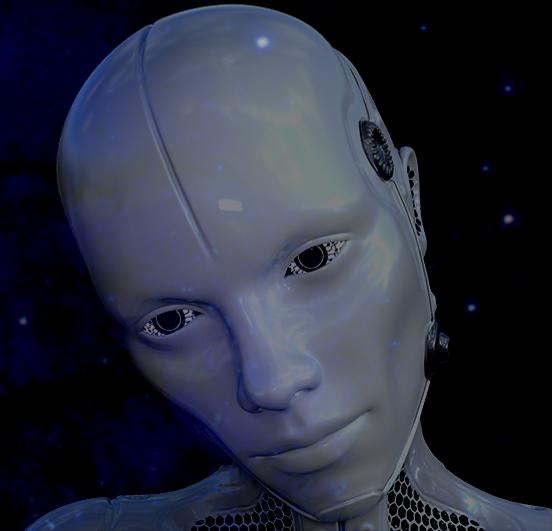
# **Big Data**

**Big Data** are extremely large data sets that are too large or complex to be dealt with by traditional data-processing applications.

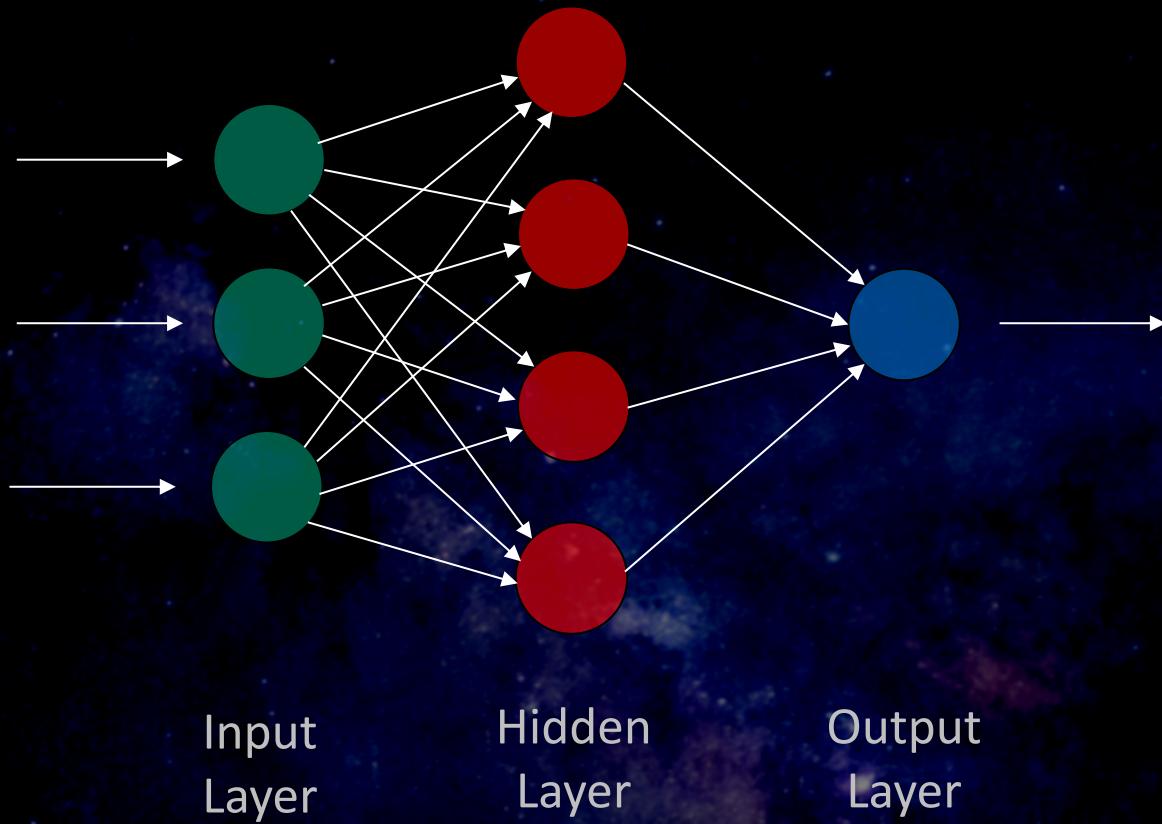


## Deep Learning

**Deep learning** is machine learning  
based on artificial neural networks.

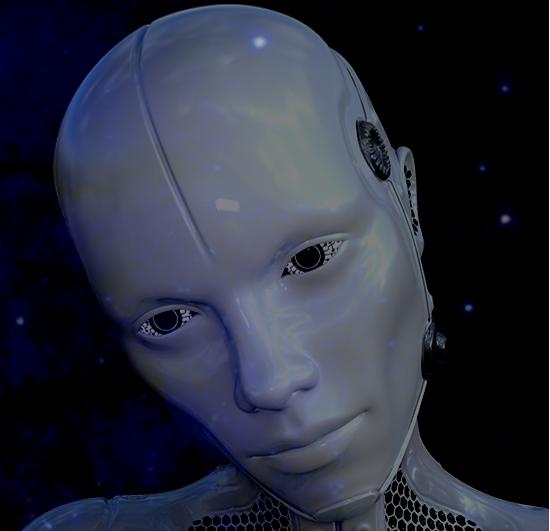


# Artificial Neural Network



## **Supervised learning**

**Supervised learning** - you use training data to teach the machine.



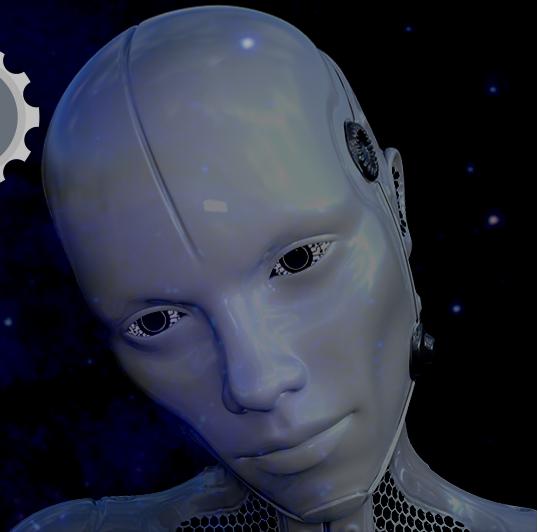
## Supervised learning



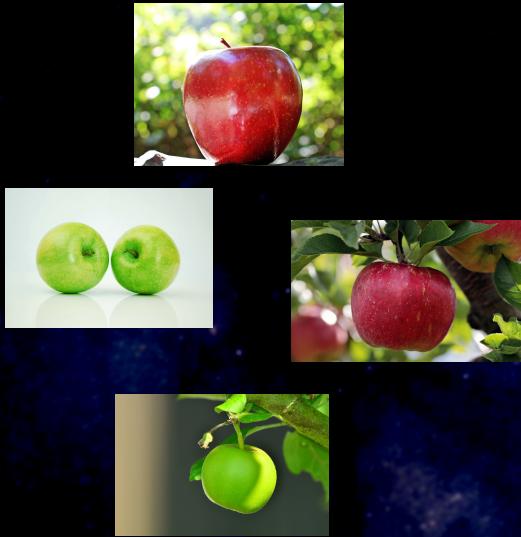
Learning



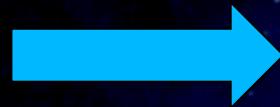
This is apple



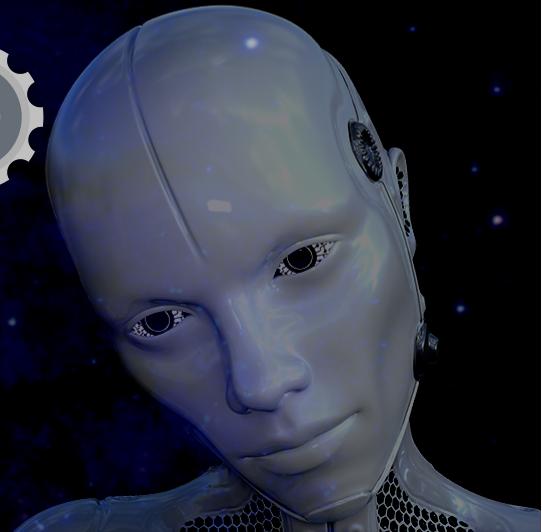
## Supervised learning



Learning



These are  
apples too



## Supervised learning



Input  
→



Output  
→

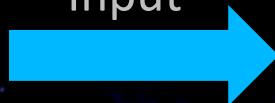
This is Apple



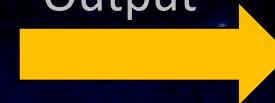
## Supervised learning



Input



Output



I don't know



## **Unsupervised learning**

**Unsupervised learning –**  
machine clustering data based  
on the patterns it finds in the data.



## Unsupervised learning



## Unsupervised learning



## Unsupervised learning

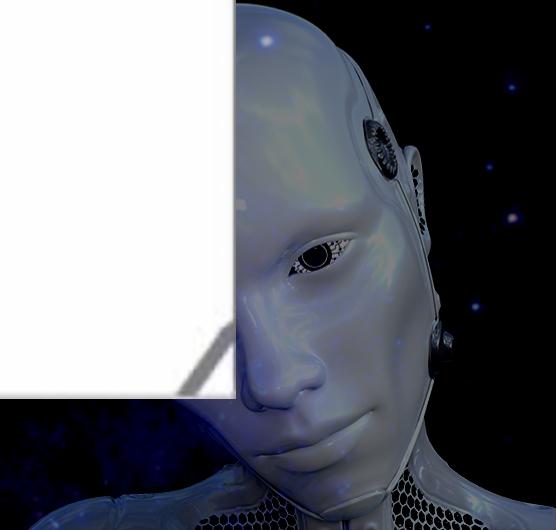
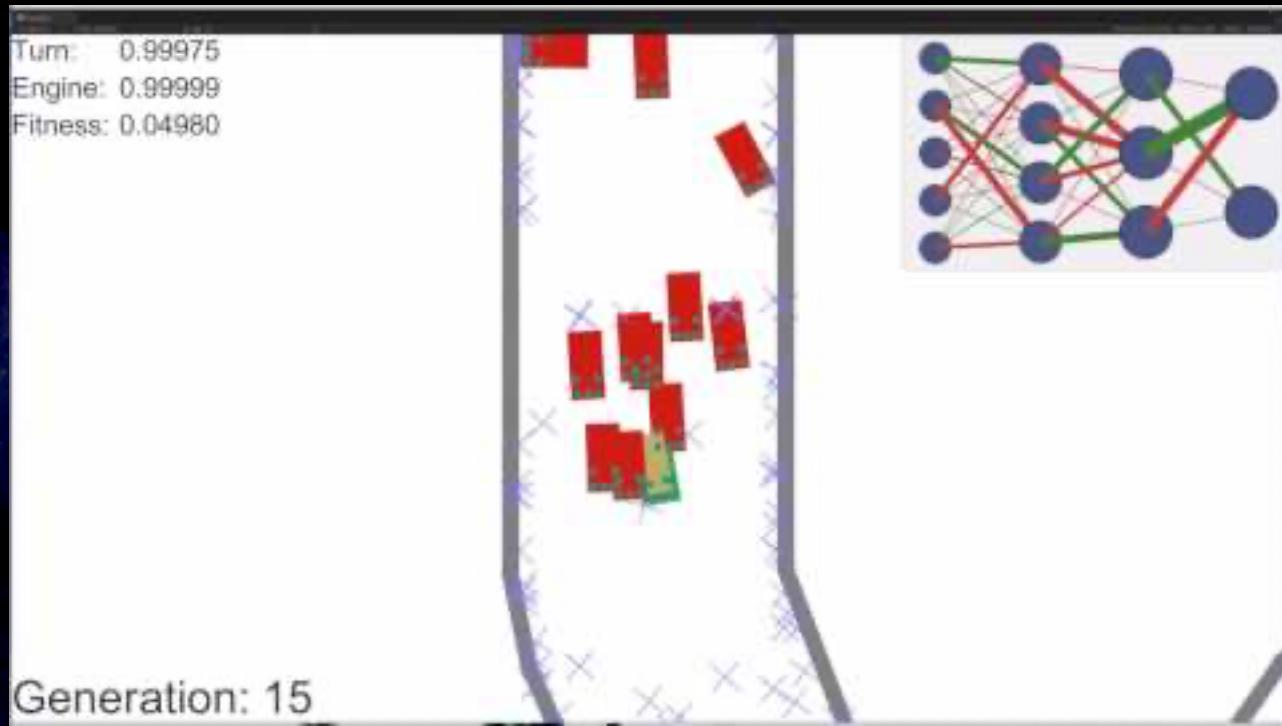


## Reinforcement learning

**Reinforcement learning** is the method where we let the machine to iterate and improve in each iteration based on the feedback.

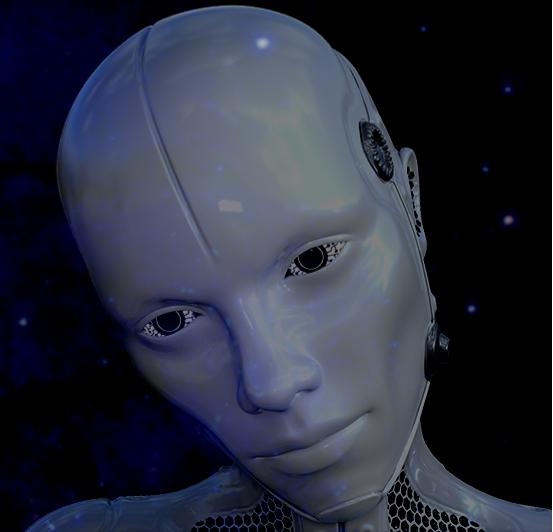


## Reinforcement learning

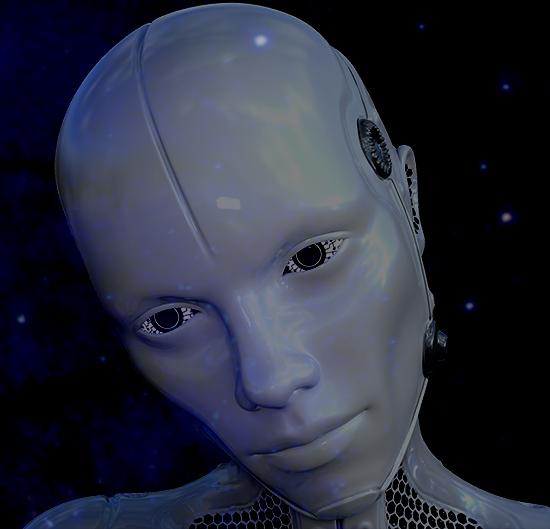


## Predictive analytics

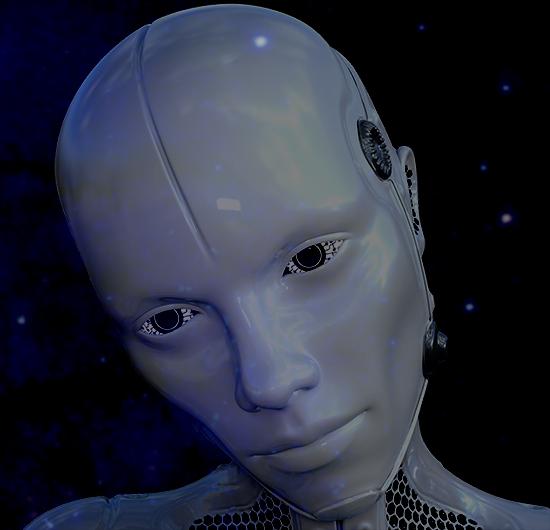
**Predictive Analytics** is a way of predicting what might happen in the future based on the current and historic data.



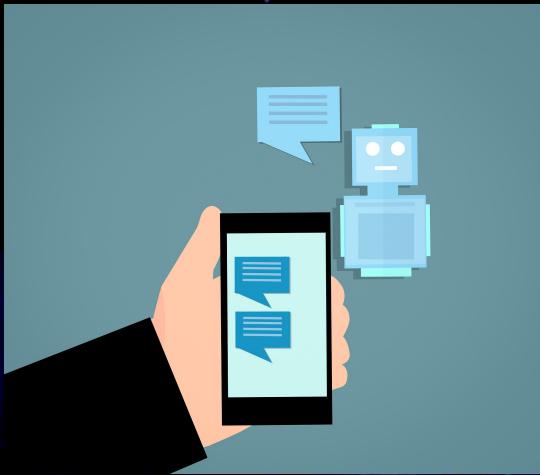
# Examples of AI in real life



**AI in retail, e-commerce,  
web and home**



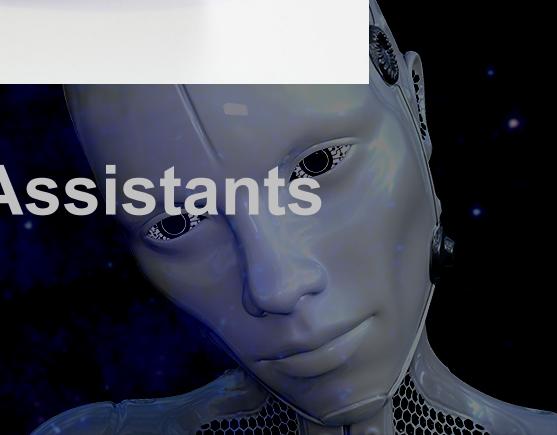
# Natural Language Processing (NLP)



**Chatbots**



**Voice Assistants**



Machine Learning (ML)



NETFLIX



Product Recommendation Systems



## Computer Vision (CV)



Face Recognition & other CV



# Creative Work



Get Started   Studio   Demos   Blog   Research   Talks   Community

# Make Music and Art Using Machine Learning

[Get Started](#)

[Try the Demos](#)

## Smart Home & Other AI



NEON by Samsung

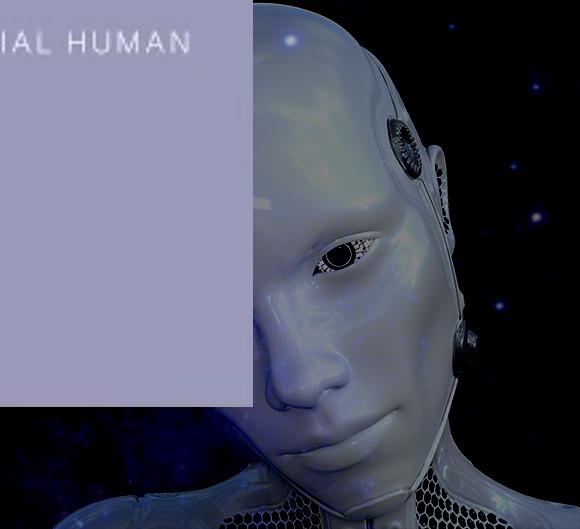
SAMSUNG

NEON

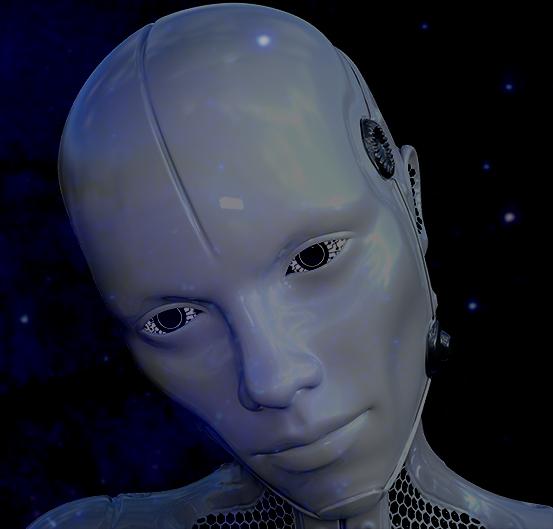


neon.life

ARTIFICIAL HUMAN



# AI in Healthcare



# Computer Vision (CV)

Stanford ML Group

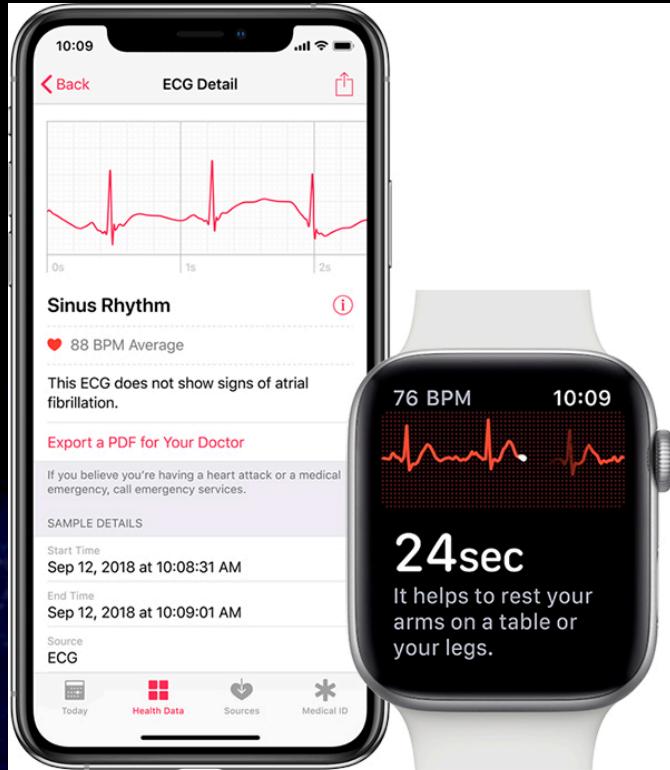
We develop an algorithm that can detect pneumonia from chest X-rays at a level exceeding practicing radiologists.

Chest X-rays are currently the best available method for diagnosing pneumonia, playing a crucial role in clinical care and epidemiological studies. Pneumonia is responsible for more than 1 million hospitalizations and 50,000 deaths per year in the US alone.

READ OUR PAPER



## Health Monitoring



Pulse and ECG, Atrial Fibrillation (AF) detection

# Health Monitoring

The screenshot displays the Babylon Health website interface. At the top, the navigation bar includes the Babylon logo, About, Services (which is underlined), What we treat, Blog, NHS, Pricing, Sign up, Log in, a Download app button, and a menu icon.

The main content area features a horizontal navigation bar with arrows: Ask Babylon → Talk to a doctor → Healthcheck → Monitor →. Below this, four mobile device screens illustrate different features:

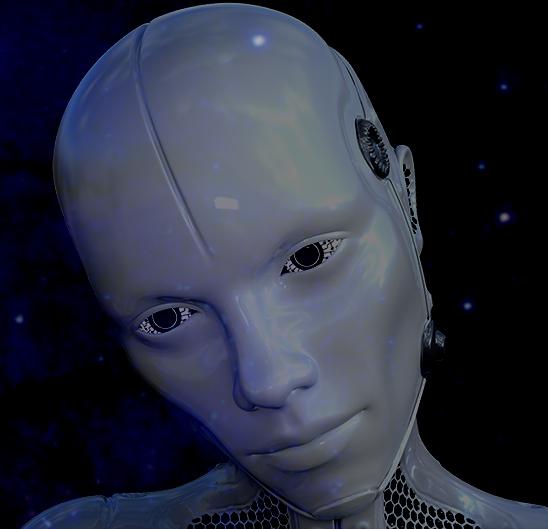
- Ask Babylon:** An AI consultation screen asking, "Does your headache come and go, or is it there all the time? What does this mean?" with options: "It comes and goes", "It's there all the time", and "I don't know".
- Talk to a doctor:** A video call interface showing a smiling female doctor wearing a white coat and stethoscope.
- Healthcheck:** A summary screen for a healthcheck, showing a human body diagram with internal organs and four circular icons for overview, activity, nutrition, and mood.
- Monitor:** A dashboard showing mood and activity data. Mood is represented by a line graph with peaks and troughs, and Activity shows 6,678 steps with an average of 10,130.

## Digital Health Consultation Tools

# Privacy, Trust, & Human doctors



# AI in Games



# IBM's Deep Blue vs Garry Kasparov

1997

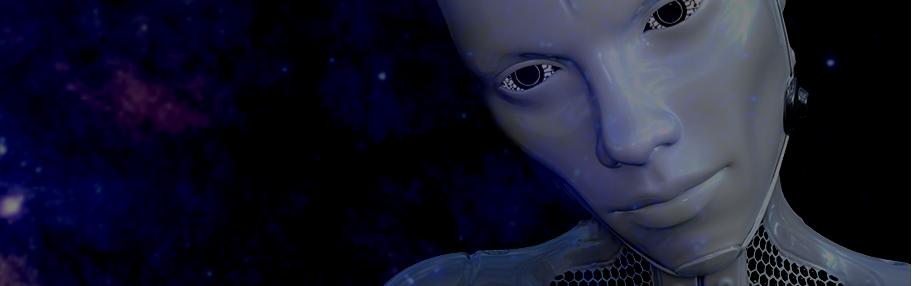
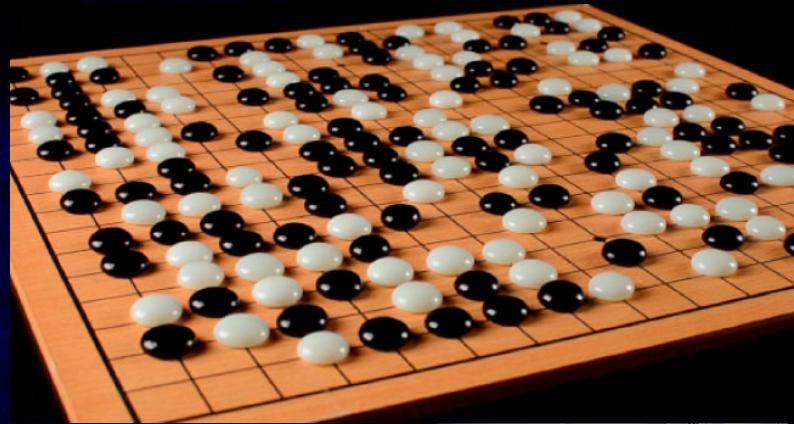


Google's AlphaGo

VS

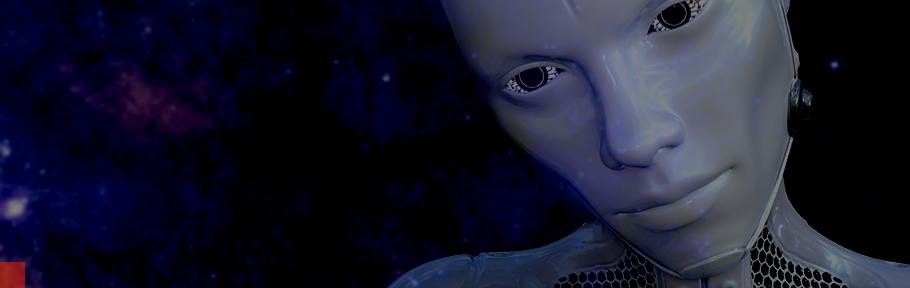
Lee Sedol

2016



# AlphaGo Zero

AlphaZero  
(chess, shogi, and Go)



# OpenAI Five vs International champions

Dota 2, 2019



**Make the games  
more fun by analysing  
player's behaviour  
(e.g. when they  
pause, restart and quit  
the game).**



# AI, Machine Learning and Data Science Tools



# AI, Machine Learning and Data Science Tools



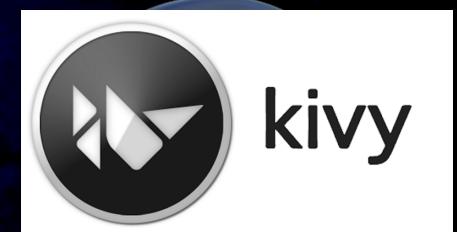
# AI, Machine Learning and Data Science Tools



Data Science  
& Machine Learning



Web Framework

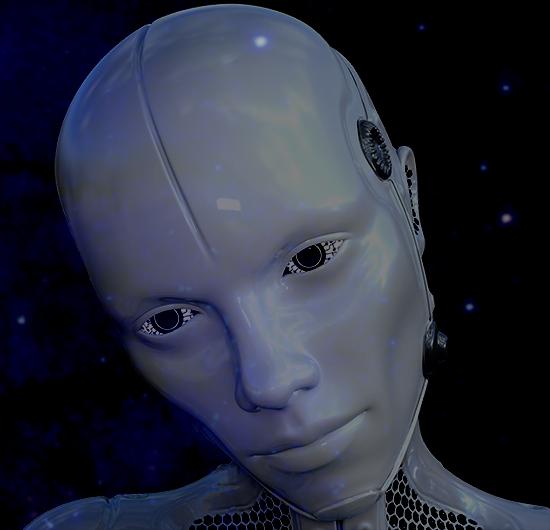


Mobile App  
Development

## AI, Machine Learning and Data Science Tools



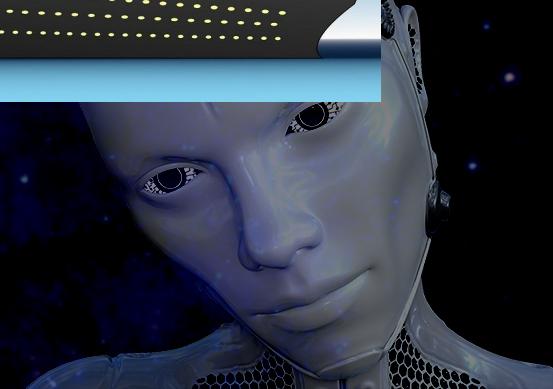
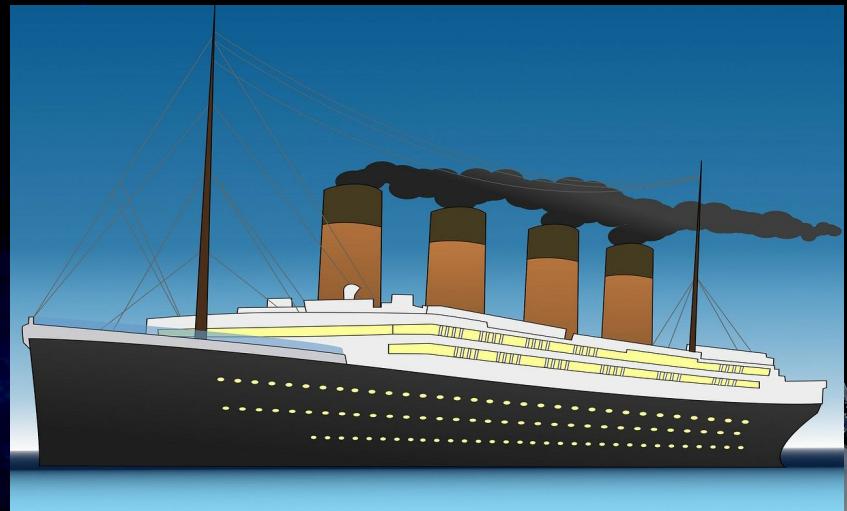
# Code Examples



# Titanic

## Data Science

### Machine Learning



# Train Data Set

PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
1	0	3	Braund, Mr. Owen Harris	male	22	1	0	A/5 21171	7.25		S
2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Thayer)	female	38	1	0	PC 17599	71.2833	C85	C
3	1	3	Heikkinen, Miss. Laina	female	26	0	0	STON/O2. 3101282	7.925		S
4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	1	0	113803	53.1	C123	S
5	0	3	Allen, Mr. William Henry	male	35	0	0	373450	8.05		S
6	0	3	Moran, Mr. James	male		0	0	330877	8.4583		Q
7	0	1	McCarthy, Mr. Timothy J	male	54	0	0	17463	51.8625	E46	S
8	0	3	Palsson, Master. Gosta Leonard	male	2	3	1	349909	21.075		S
9	1	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27	0	2	347742	11.1333		S
10	1	2	Nasser, Mrs. Nicholas (Adele Achem)	female	14	1	0	237736	30.0708		C

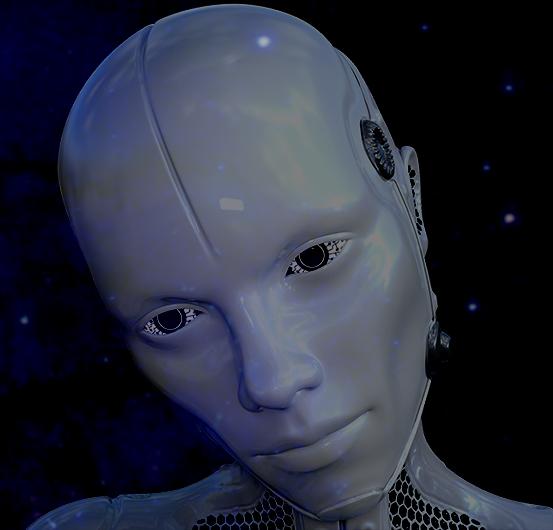
# Test Data Set

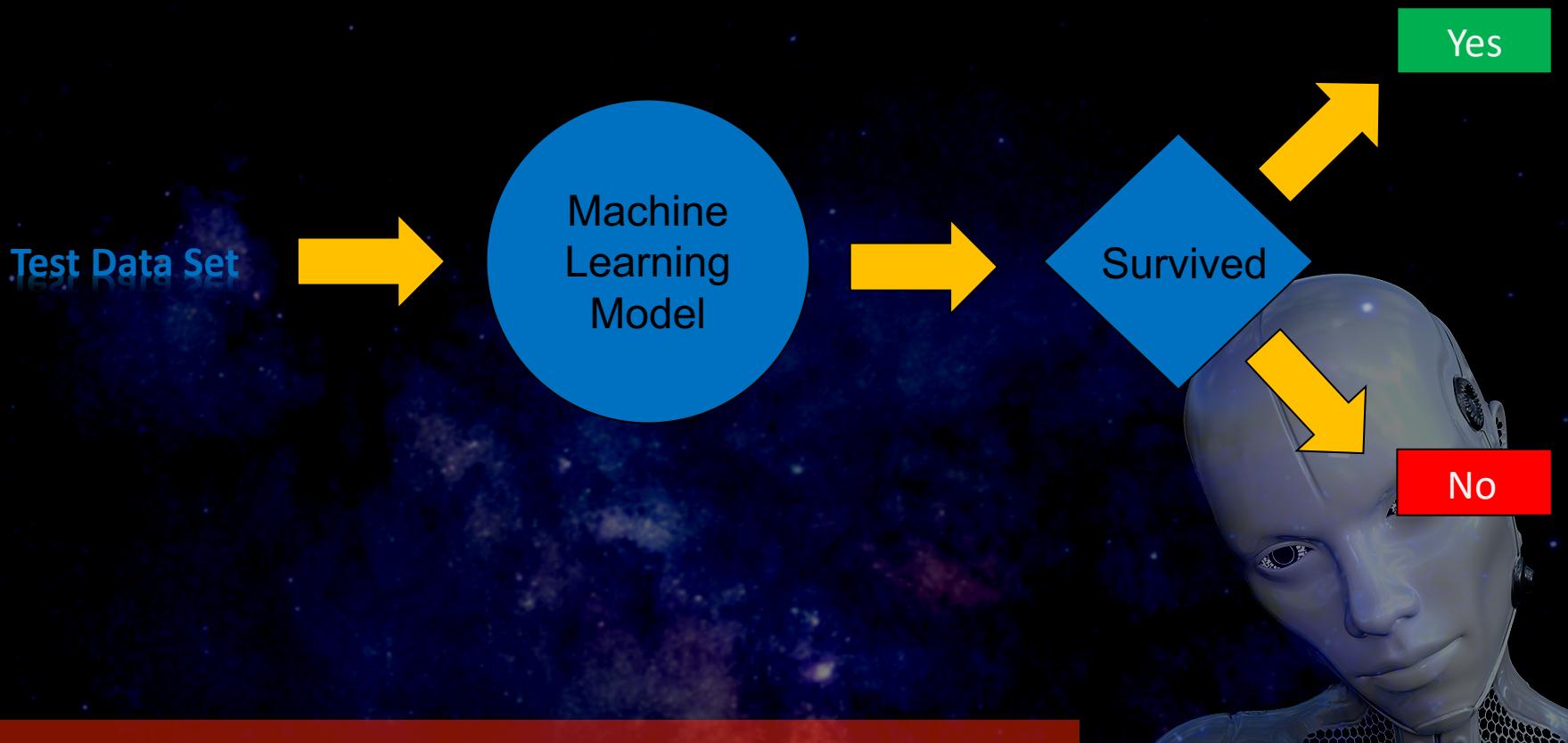
PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
892	3	Kelly, Mr. James	male	34.5	0	0	330911	7.8292		Q
893	3	Wilkes, Mrs. James (Ellen Needs)	female	47	1	0	363272	7		S
894	2	Myles, Mr. Thomas Francis	male	62	0	0	240276	9.6875		Q
895	3	Wirz, Mr. Albert	male	27	0	0	315154	8.6625		S
896	3	Hirvonen, Mrs. Alexander (Helga E Lindqvist)	female	22	1	1	3101298	12.2875		S
897	3	Svensson, Mr. Johan Cervin	male	14	0	0	7538	9.225		S

Train Data Set

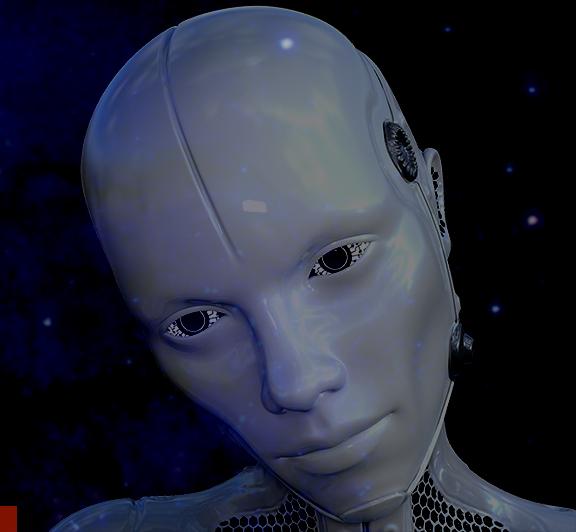
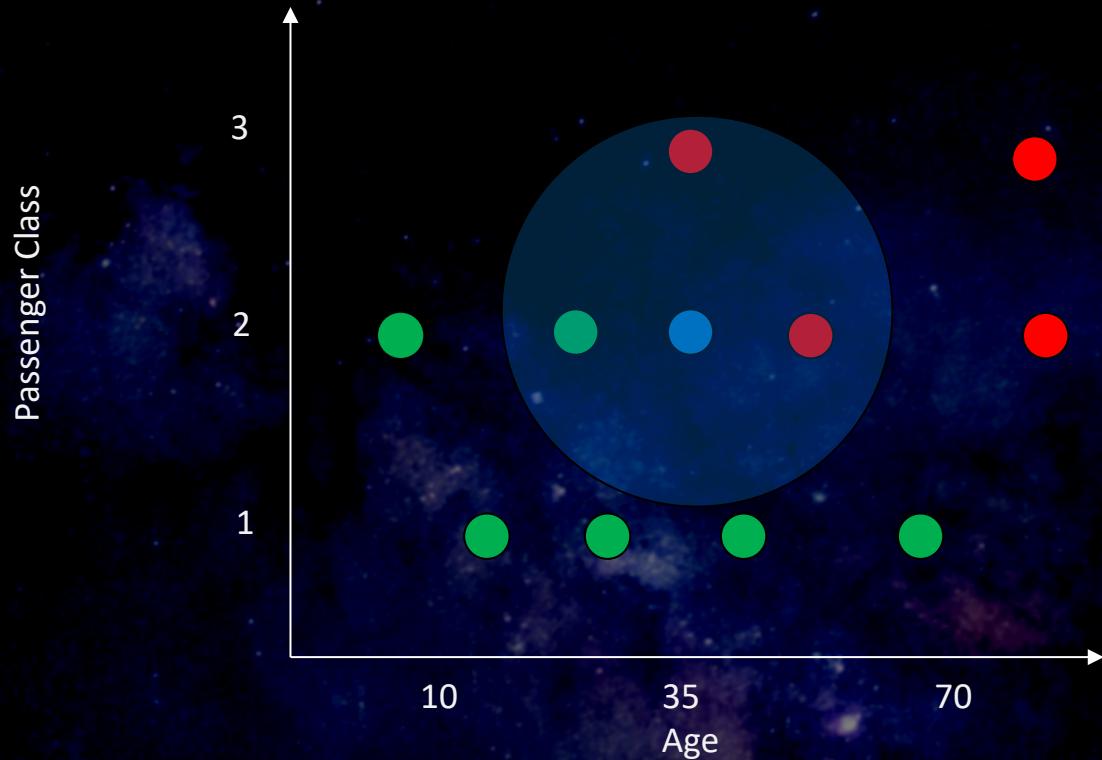


Machine  
Learning  
Model

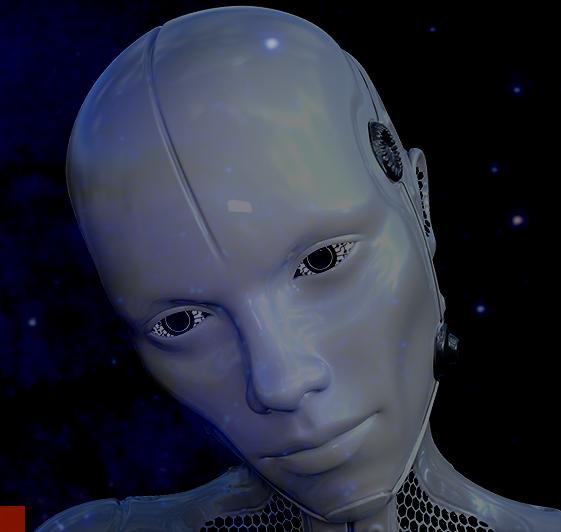
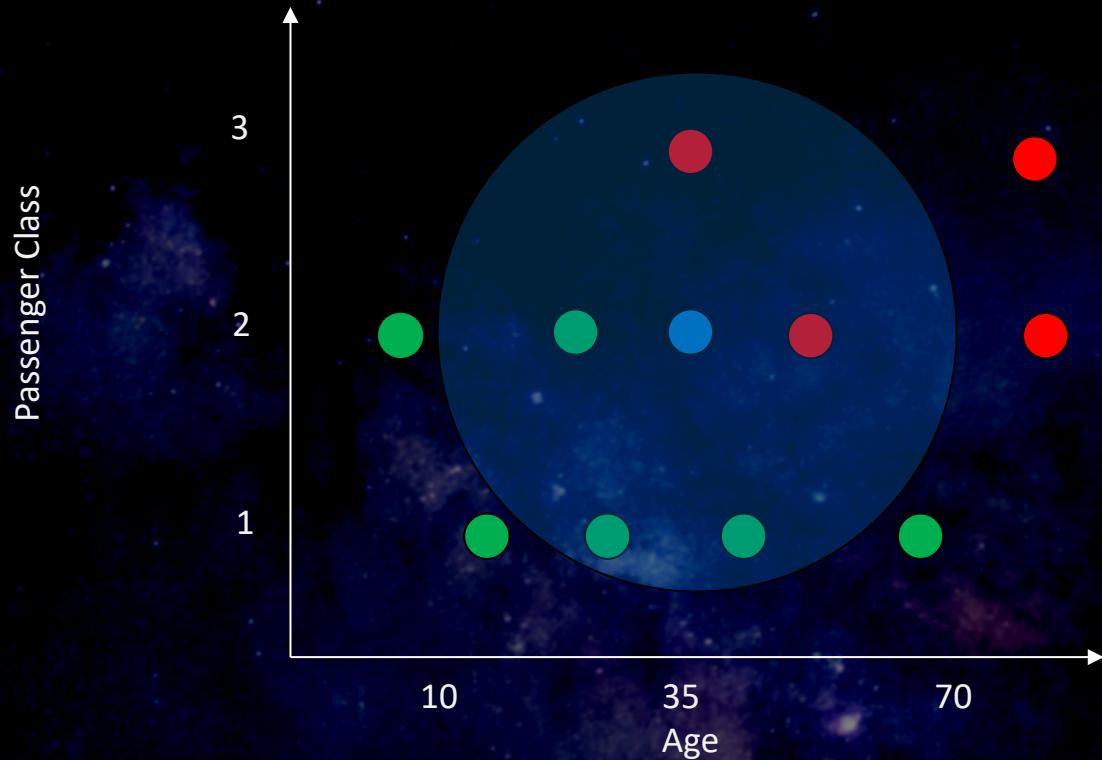




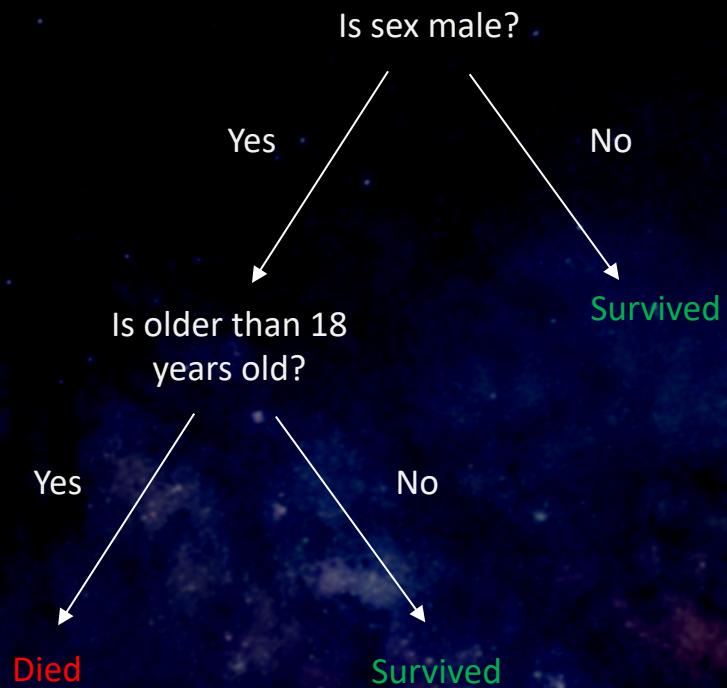
## K-nearest neighbors classifier (KNN)



## K-nearest neighbors classifier (KNN)



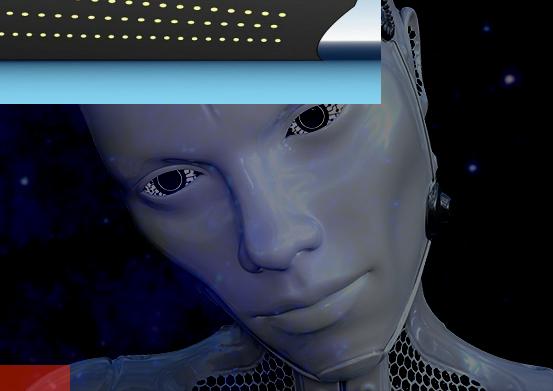
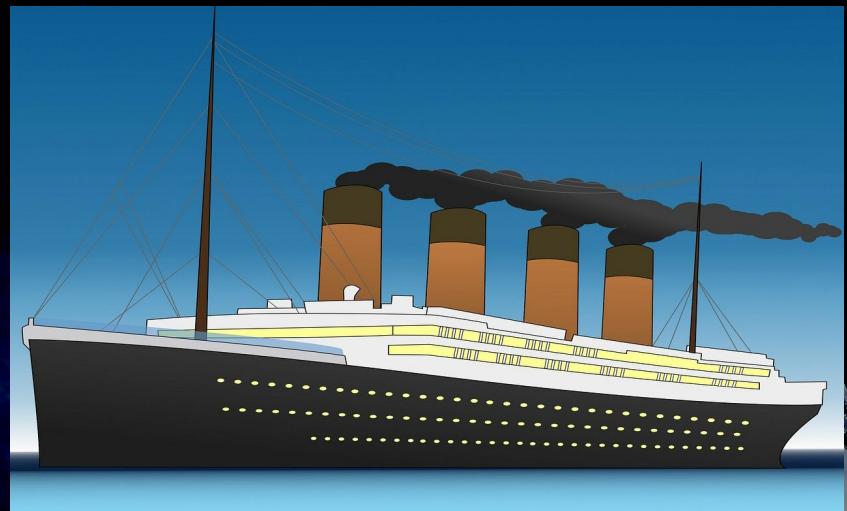
## Decision Tree classifier



# Titanic

## Data Science

### Machine Learning



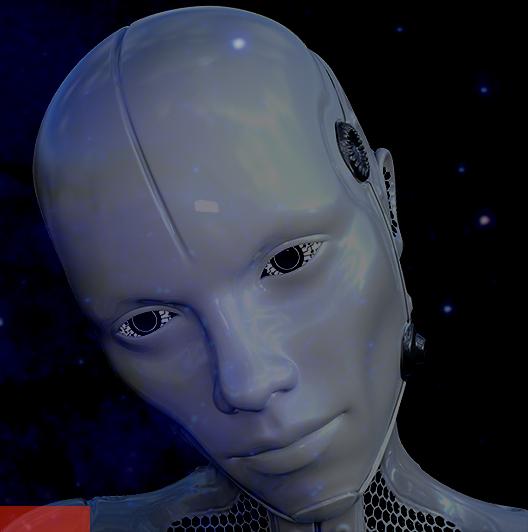
# Face Recognition

Computer Vision (CV)



# Sentiment Analysis

Natural Language Processing (NLP)



## Examples

<https://github.com/pjonline/WebX-2020>

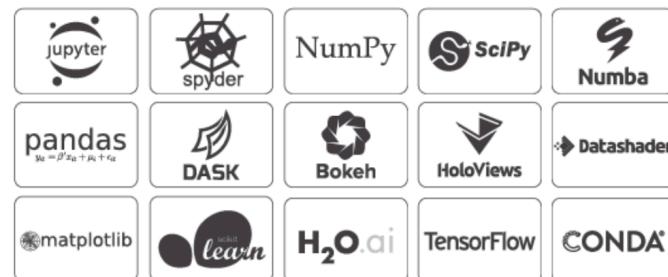
# Anaconda Distribution

The World's Most Popular Python/R Data Science Platform

[Download](#)

The open-source **Anaconda Distribution** is the easiest way to perform Python/R data science and machine learning on Linux, Windows, and Mac OS X. With over 19 million users worldwide, it is the industry standard for developing, testing, and training on a single machine, enabling *individual data scientists* to:

- Quickly download 7,500+ Python/R data science packages
- Manage libraries, dependencies, and environments with [Conda](#)
- Develop and train machine learning and deep learning models with [scikit-learn](#), [TensorFlow](#), and [Theano](#)
- Analyze data with scalability and performance with [Dask](#), [NumPy](#), [pandas](#), and [Numba](#)
- Visualize results with [Matplotlib](#), [Bokeh](#), [Datashader](#), and [Holoviews](#)





Windows



macOS



Linux

## Anaconda 2019.10 for macOS Installer

### Python 3.7 version

[Download](#)

64-Bit Graphical Installer (654 MB)

64-Bit Command Line Installer (424 MB)

### Python 2.7 version

[Download](#)

64-Bit Graphical Installer (637 MB)

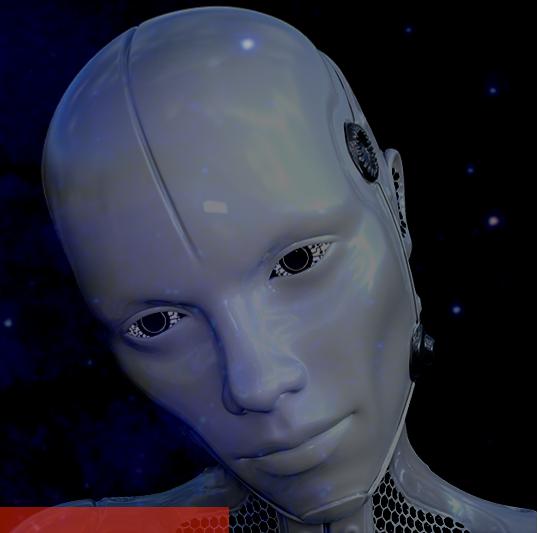
64-Bit Command Line Installer (409 MB )

# Learning Resources



## Resources

Google



## Resources



YouTube



## Resources

LinkedIn LEARNING

Udemy

coursera

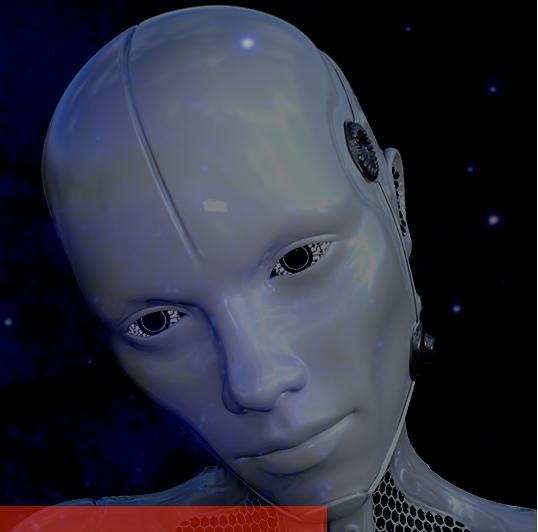
<https://www.coursera.org/learn/ai-for-everyone>



## Resources



## Resources



# Bonus Tips



## Bonus Tips

This is a learning game.



## Bonus Tips

You need more than  
technical skills.

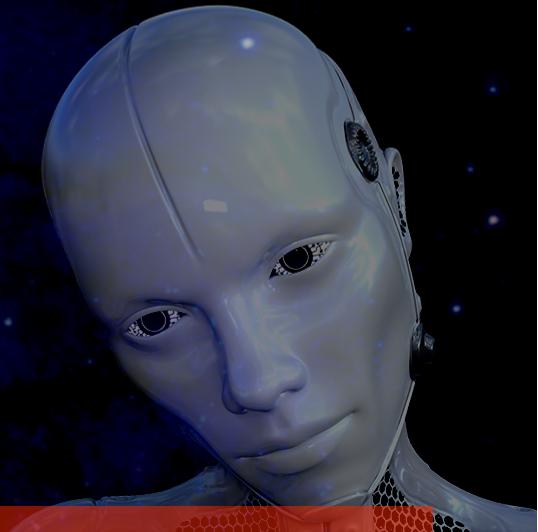


## Bonus Tips

Communication.

Time management.

Problem solving.



## Bonus Tips

Communication.

Time management.

Problem solving.



## Bonus Tips

Communication.

Time management.

Problem solving.



# Thank you



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<http://pjonline.me/twitter>



<http://pjonline.me/github>



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# Q&A and Experiment



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