

Artificial Intelligence

Lecture 01

PowerPoint

http://www.bu.edu.eg/staff/ahmedaboalatah14-courses/14767

The screenshot shows a web interface for Benha University. At the top, there is a blue header with the university logo, the name 'Benha University', and a welcome message for 'Ahmed Hassan Ahmed Abu El Atta' with a 'Log out' link. Below the header, a navigation menu on the left lists various university services. The main content area displays course details for 'Automata and Formal Languages' by 'Ass. Lect. Ahmed Hassan Ahmed Abu El Atta'. The details are presented in a table with blue headers and white content. A 'Course password' section is also visible. On the right side, there are social media icons and a vertical toolbar with various icons.

Benha University

Staff Search: **Welcome: Ahmed Hassan Ahmed Abu El Atta (Log out)**

You are in: [Home](#) / [Courses](#) / [Automata and Formal Languages](#) [Back To Courses](#)

Ass. Lect. Ahmed Hassan Ahmed Abu El Atta :: Course Details:
Automata And Formal Languages [add course](#) | [edit course](#)

Course name	Automata and Formal Languages
Level	Undergraduate
Last year taught	2018
Course description	Not Uploaded
Course password	
Course files	add files
Course URLs	add URLs
Course assignments	add assignments
Course Exams & Model Answers	add exams

Course password

Course files [add files](#)

Course URLs [add URLs](#)

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(edit)

What Is Intelligence?

We call ourselves Homo sapiens (man the wise) because our intelligence is so important to us.

For thousands of years, we have tried to understand how we think; that is, how we can **perceive, understand, predict,** and **manipulate** a world far larger and more complicated than ourself.

Intelligence

Psychologists generally do not characterize human intelligence by just one trait but by the **combination** of **many** diverse **abilities**.

Research in **AI** has focused chiefly on the following components of intelligence: **learning**, **reasoning**, **problem solving**, **perception**, and **using language**.

What is artificial intelligence?

<p>“The exciting new effort to make computers think ... <i>machines with minds</i>, in the full and literal sense” (Haugeland, 1985)</p> <p>“[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning ...” (Bellman, 1978)</p>	<p>“The study of mental faculties through the use of computational models” (Charniak and McDermott, 1985)</p> <p>“The study of the computations that make it possible to perceive, reason, and act” (Winston, 1992)</p>
<p>“The art of creating machines that perform functions that require intelligence when performed by people” (Kurzweil, 1990)</p> <p>“The study of how to make computers do things at which, at the moment, people are better” (Rich and Knight, 1991)</p>	<p>“A field of study that seeks to explain and emulate intelligent behavior in terms of computational processes” (Schalkoff, 1990)</p> <p>“The branch of computer science that is concerned with the automation of intelligent behavior” (Luger and Stubblefield, 1993)</p>

Figure 1.1 Some definitions of AI. They are organized into four categories:

Systems that think like humans.	Systems that think rationally.
Systems that act like humans.	Systems that act rationally.

Artificial intelligence

The ability of machines to perform tasks commonly associated with intelligent beings.

Artificial intelligence Science

It is the science and engineering of making intelligent machines, especially intelligent computer programs.

The traditional problems of AI research include:

- reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects.

AI History

50s/60s: Early successes!

AI can draw logical conclusions, prove some theorems, create simple plans and Some initial work on neural networks.

Started running into difficulties:

- Ambiguity (translation programs)
- Scalability/complexity (early examples were very small)
- representations (Limited)

AI History

70s, early 80s: Creation of expert systems (systems specialized for one particular task based on experts' knowledge)

Industry adoption

Overpromising led to AI winter(s)

AI History

Return of Neural Networks (1986-present)

AI Becomes a Science (1987-present)

- More scientific, formal/mathematical
- Divided into many subareas interested in particular aspects
- More directly connected to “neighboring” disciplines
 - Theoretical computer science, statistics, economics, operations research, biology, psychology/neuroscience,

The State Of The Art

Robotic vehicles

A driverless robotic car named **STANLEY** sped through the rough terrain of the Mojave desert (صحراء (موهافي) at 22 mph, finishing the 132-mile course first to win the 2005 DARPA Grand Challenge.

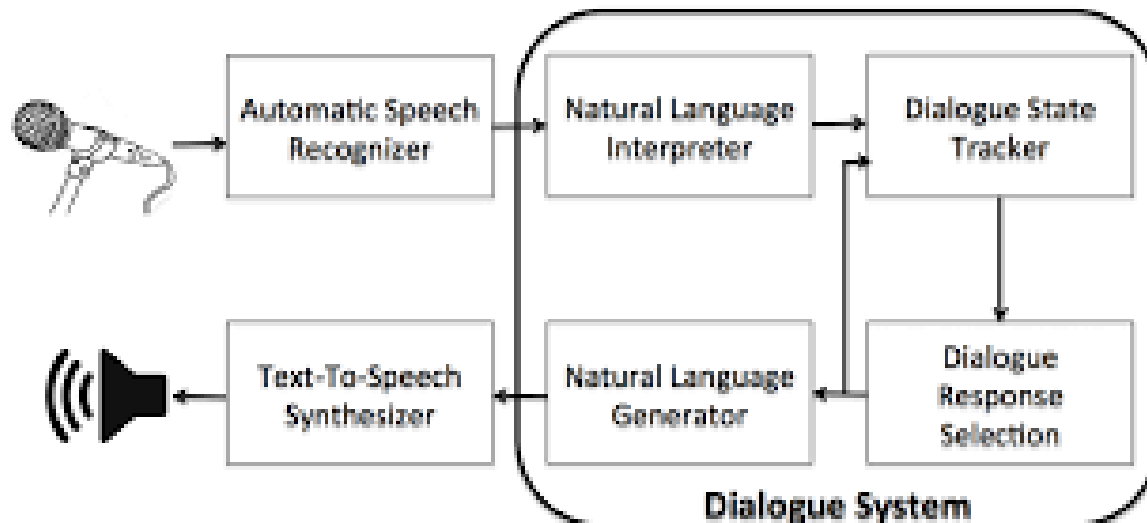


Mojave Desert

Vehicle	Team Name	Team Home	Time Taken (h:m)	Result
Stanley	Stanford Racing Team	Stanford University, Palo Alto, California	6:54	First place
Sandstorm	Red Team	Carnegie Mellon University, Pittsburgh, Pennsylvania	7:05	Second place
H1ghlander	Red Team Too		7:14	Third place
Kat-5	Team Gray	The Gray Insurance Company, Metairie, Louisiana	7:30	Fourth place
TerraMax	Team TerraMax	Oshkosh Truck Corporation, Oshkosh, Wisconsin	12:51	Over 10-hour limit, fifth place

Speech recognition

A traveler calling United Airlines to book a flight can have the entire conversation guided by an automated speech recognition and dialog management system.



Natural Language Processing

is a sub field of Artificial Intelligence that is focused on enabling computers to understand and process human languages, to get computers closer to a human level understanding of language

Speech recognition vs. natural language processing

NLP is after the words are recognized

Easy for restricted domains

- Dilation
- Automatic translation
- Control your computer
 - Say “Enter” or “one” or “open”

Autonomous planning and scheduling

A hundred million miles from Earth, NASA's Remote Agent program became the first on-board autonomous planning program to control the scheduling of operations for a spacecraft (Jonsson et al., 2000).

Successor program MAPGEN (Al-Chang et al., 2004) plans the daily operations for NASA's Mars Exploration Rovers, and

MEXAR2 (Cesta et al., 2007) did mission planning—both logistics and science planning—for the European Space Agency's Mars Express mission in 2008.

Images: www.nasa.gov



Game playing

1996:

IBM's DEEP BLUE became the first computer program to defeat the world champion in a chess match when it bested Garry Kasparov by a score of 3.5 to 2.5 in an exhibition match (Goodman and Keene, 1997).



Spam fighting

Each day, learning algorithms classify over a billion messages as spam, saving the recipient from having to waste time deleting what, for many users, could comprise 80% or 90% of all messages, if not classified away by algorithms.

Because the spammers are continually updating their tactics, it is difficult for a **static programmed approach** to keep up, and **learning algorithms work best**

Robotics

The iRobot Corporation has sold over two million Roomba robotic vacuum cleaners for home use.



The company also deploys the more rugged PackBot to Iraq and Afghanistan, where it is used to handle hazardous materials, clear explosives, and identify the location of snipers.



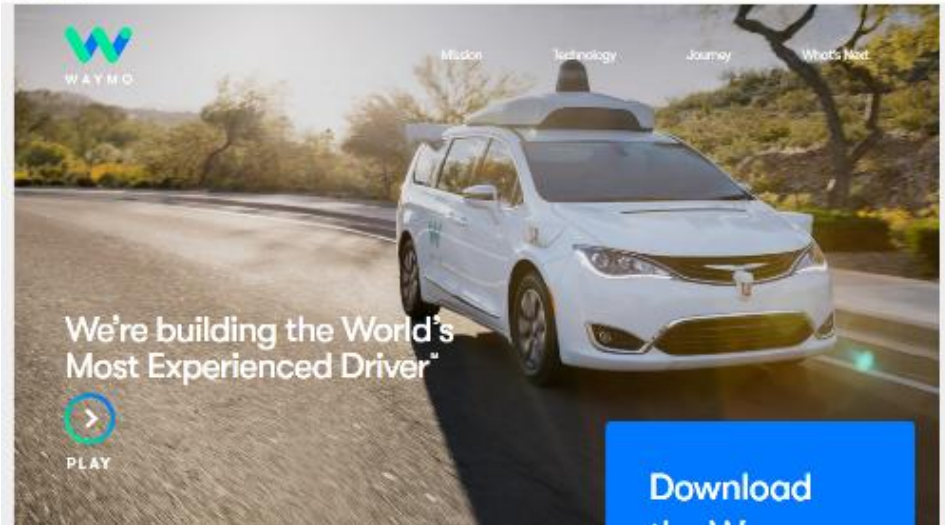
Waymo (formerly the Google self-driving car project)

Waymo LLC is an American autonomous driving technology development company.

Waymo originated as a project of Google and became a stand-alone company in December 2016.

In April 2017, Waymo started a limited trial of a self-driving taxi service in Phoenix, Arizona.

On December 5, 2018, the service launched a commercial self-driving car service called "Waymo One"; users in the Phoenix metropolitan area use an app to request a pick-up.

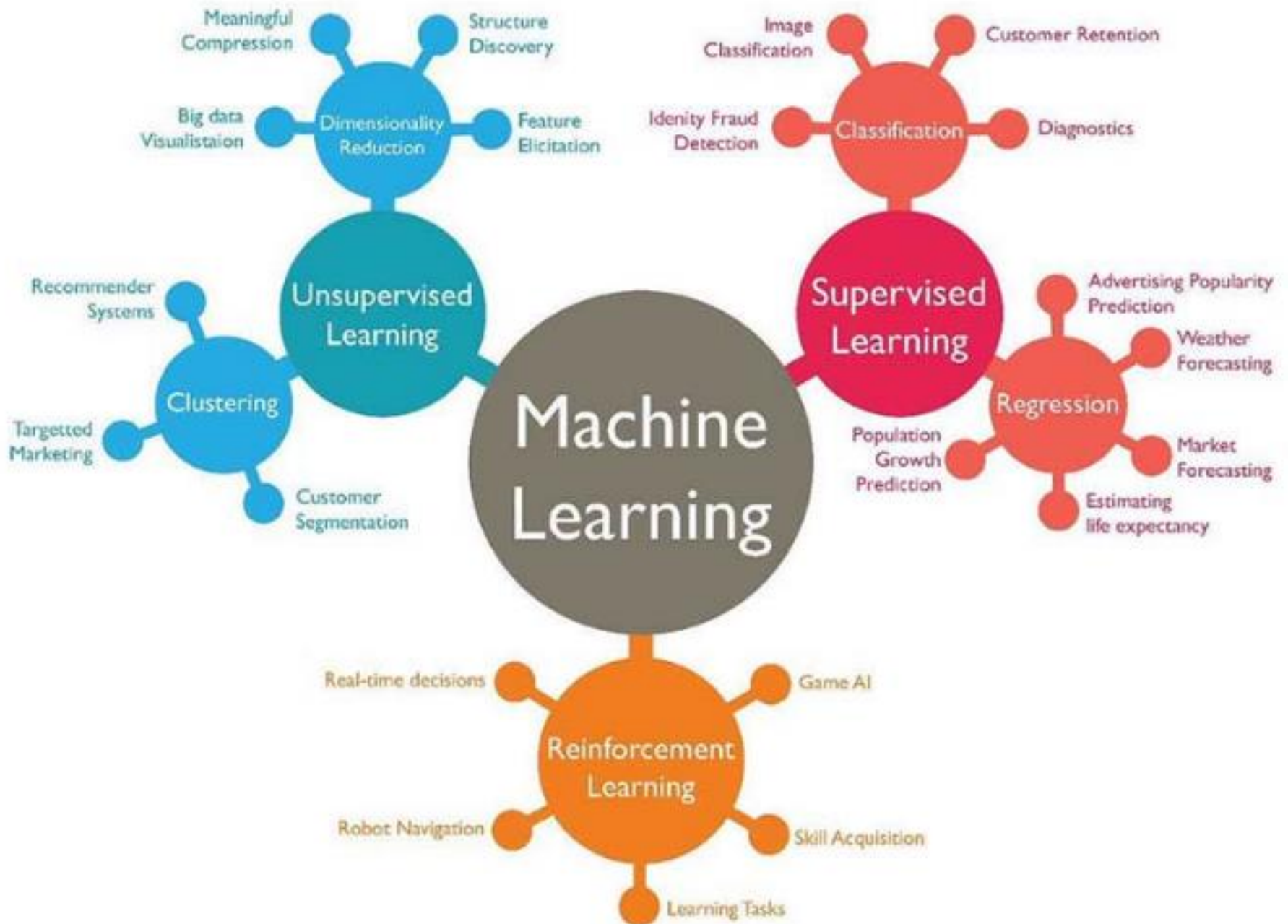


Machine learning

Machine Learning

is a type of artificial intelligence (AI) that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so.





Supervised Learning

In supervised learning, we are given a data set and already know what our correct output should look like, having the idea that there is a relationship between the input and output.

(Data sets are labeled)

Regression — Estimate continuous values (Real valued output)

Classification — Identify a unique class (Discrete values, Boolean or Categories)

Unsupervised Learning

Group of algorithms that try to draw inferences from non-labeled data.

(Data sets are unlabeled)

In Unsupervised Learning, there are no correct answers. Models based on this type of algorithms can be used for discovering unknown data patterns and data structure itself.

Pattern recognition and data clustering - Process of dividing and grouping similar data samples together.

Reducing data dimensionality - Data dimension is the number of features needed to describe data sample.

Reinforcement Learning

Branch of Machine Learning algorithms which produces so-called agents. The agent role is slightly different than classic model.

Training of an agent is a process of trial and error.

Data sets aren't labeled but, after performing an action or several actions, the AI system is given feedback

