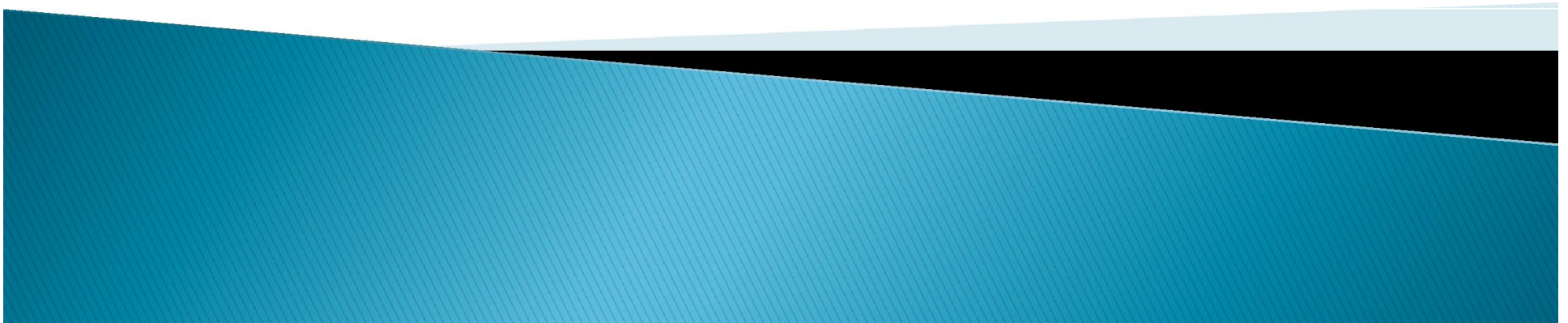


Machine Learning Welcome

Nazerfard, Ehsan
nazerfard@aut.ac.ir



چهار شاخه مرتبط

- ❑ Statistics
- ❑ Artificial Intelligence
- ❑ Machine Learning
- ❑ Data Mining

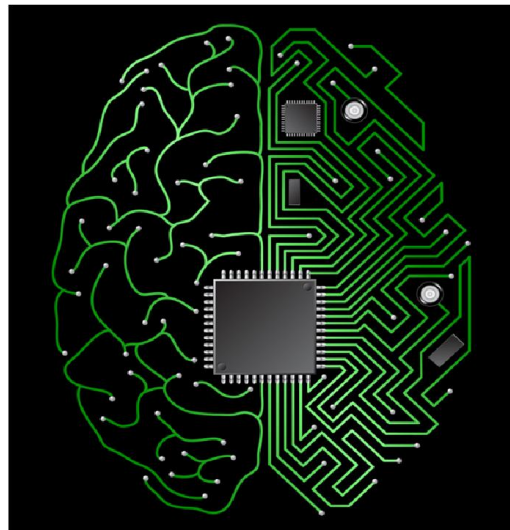
- ❑ آمار
- ❑ هوش مصنوعی
- ❑ یادگیری ماشین
- ❑ داده کاوی



Artificial Intelligence

□ Main AI problems:

- Reasoning
- Knowledge representation
- Automated planning
- Machine learning
- Natural language processing
- Computer vision
- Robotics
- Chatbots:
 - ALICE
 - Oliver

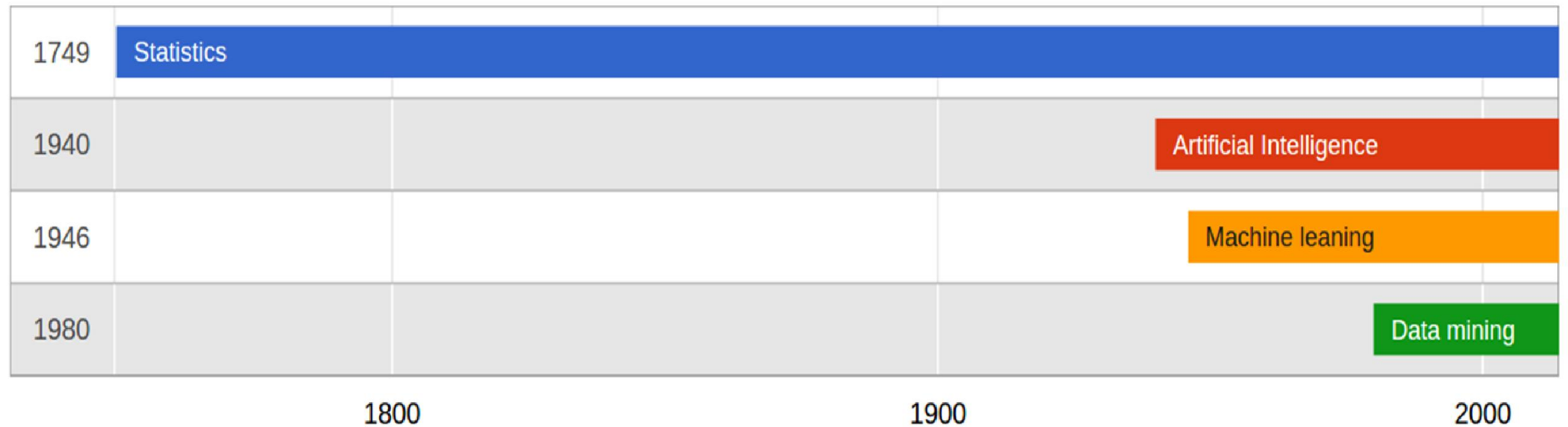


□ مسائل اصلی هوش مصنوعی

- استدلال
- بازنمایی دانش
- برنامه ریزی خودکار
- یادگیری ماشین
- پردازش زبان طبیعی
- بینایی ماشین
- رباتیک
- اتاق گپ
- ...

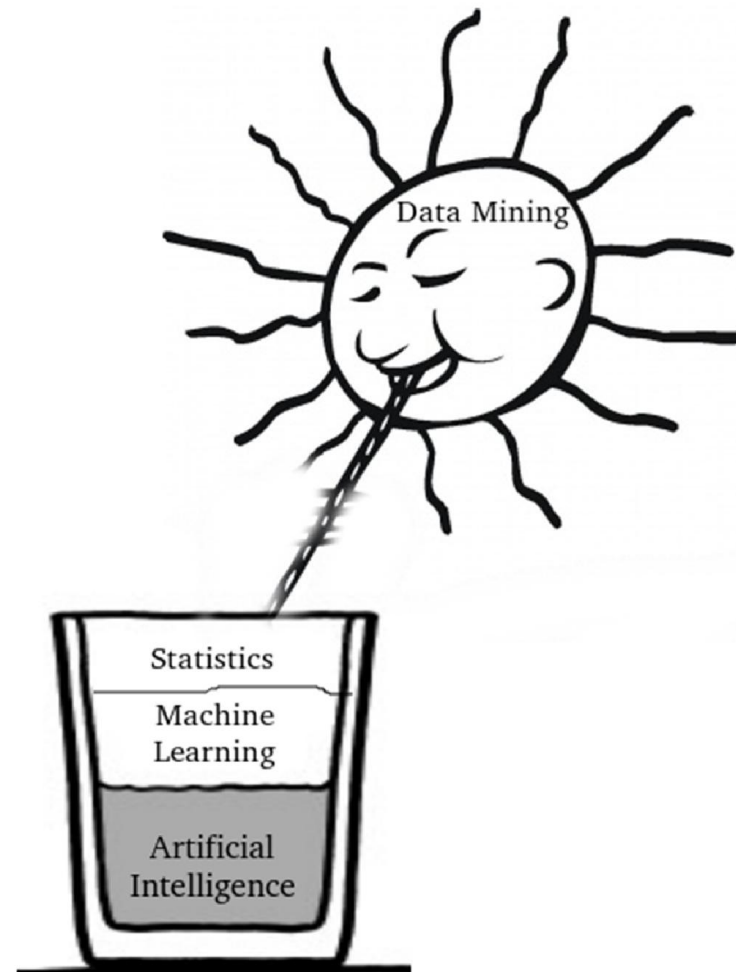
Hierarchy

سلسه مراتب □



Interdependency

□ ارتباط چهار شاخه



What is Machine Learning?

- ❑ Herbert Simon (1970)
 - Any process by which a system improves its performance.
- ❑ Tom Mitchell (1990)
 - A computer program that improves its performance at some task through experience.
- ❑ Ethem Alpaydin (2010)
 - Programming of computers to optimize a performance criterion using example data or past experience.
- ❑ Shai Ben-David (2014)
 - Automated detection of meaningful patterns in (large) datasets.

Machine Learning

- Machine learning is the study of algorithms that learn from data and experience.
- Any area in which you need to make sense of data is a potential consumer of machine learning.



Machine Learning (cont.)

- Machine learning (ML) develops algorithms for making predictions from data.
 - What does “prediction” mean here?



When ML is Used?

- Three criteria:

1. A pattern exists.
2. We cannot pin it down mathematically.
3. We have data on it ++



Learning Types

□ Types of machine learning algorithms:

- Supervised learning
- Unsupervised learning
- Reinforcement learning

- Semi-supervised learning
- Deep Learning
- Transfer learning
- Active learning
- Multilabel prediction
- ...

□ انواع الگوریتمهای یادگیری ماشین:

- یادگیری تحت نظارت/با معلم
- یادگیری بدون نظارت/بدون معلم
- یادگیری تقویتی

- یادگیری نیمه تحت نظارت
- یادگیری عمیق
- یادگیری از طریق انتقال
- یادگیری فعال
- پیش بینی چند برچسبی
- ...

Machine Learning Scholars



Robert Tibshirani

Professor of Biomedical Data Sciences, and of Statistics, Stanford University
Verified email at stanford.edu

Statistics Applied Statistics Statistical learning machine learning data science

Cited by 277501



Geoffrey Hinton

Emeritus Prof. Comp Sci, U.Toronto & Engineering Fellow, Google
Verified email at cs.toronto.edu

machine learning neural networks artificial intelligence cognitive science
computer science

Cited by 239729



Anil K. Jain

Michigan State University
Verified email at cse.msu.edu

Biometrics Computer vision Pattern recognition Machine learning
Image processing

Cited by 182724



Trevor Hastie

Professor of Statistics, Stanford University
Verified email at stanford.edu

Statistical learning and modeling data mining machine learning

Cited by 179240



vapnik

Professor of Columbia, Fellow of NEC Labs America,
Verified email at nec-labs.com

machine learning statistics computer science

Cited by 169396

Machine Learning Scholars



Jitendra Malik

Professor of EECS, UC Berkeley
Verified email at eecs.berkeley.edu

Computer Vision Computer Graphics Machine Learning

Cited by 146111



Michael I. Jordan

Professor of EECS and Professor of Statistics, University of California, Berkeley
Verified email at cs.berkeley.edu

machine learning statistics computational biology artificial intelligence optimization

Cited by 140992



Yoshua Bengio

Professor, U. Montreal (Computer Sc. & Op. Res.), MILA, CIFAR, CRM, REPARTI, GRSNC
Verified email at umontreal.ca

Machine learning deep learning artificial intelligence

Cited by 132603



Thomas Huang

University of Illinois, Urbana-Champaign
Verified email at ifp.uiuc.edu

AI Image Processing Computer Vision Pattern Recognition Machine Learning

Cited by 123083




Bernhard Schölkopf

Director, Max Planck Institute for Intelligent Systems; and Distinguished Amazon Scholar
Verified email at tuebingen.mpg.de

Machine Learning Causal Inference Artificial Intelligence
Computational Photography Statistics

Cited by 118758

Applications

- ❑ Image & Speech Recognition
 - ❑ Natural Language Processing
 - ❑ Handwriting Recognition
 - ❑ Autonomous Control (Planes, Trains, Automobiles, ...)
 - ❑ Anomaly Detection in E-commerce (Fraud Detection)
 - ❑ Twitter Topic Modeling
 - ❑ Targeted Marketing
 - ❑ Medical Diagnosis
 - ❑ Rank Webpages in Search Engines
 - ❑ Email Spam Filtering
 - ❑ Recommender Systems
 - ❑ Bioinformatics
 - ❑ Sleep Quality Detection
 - ❑ ...
- 

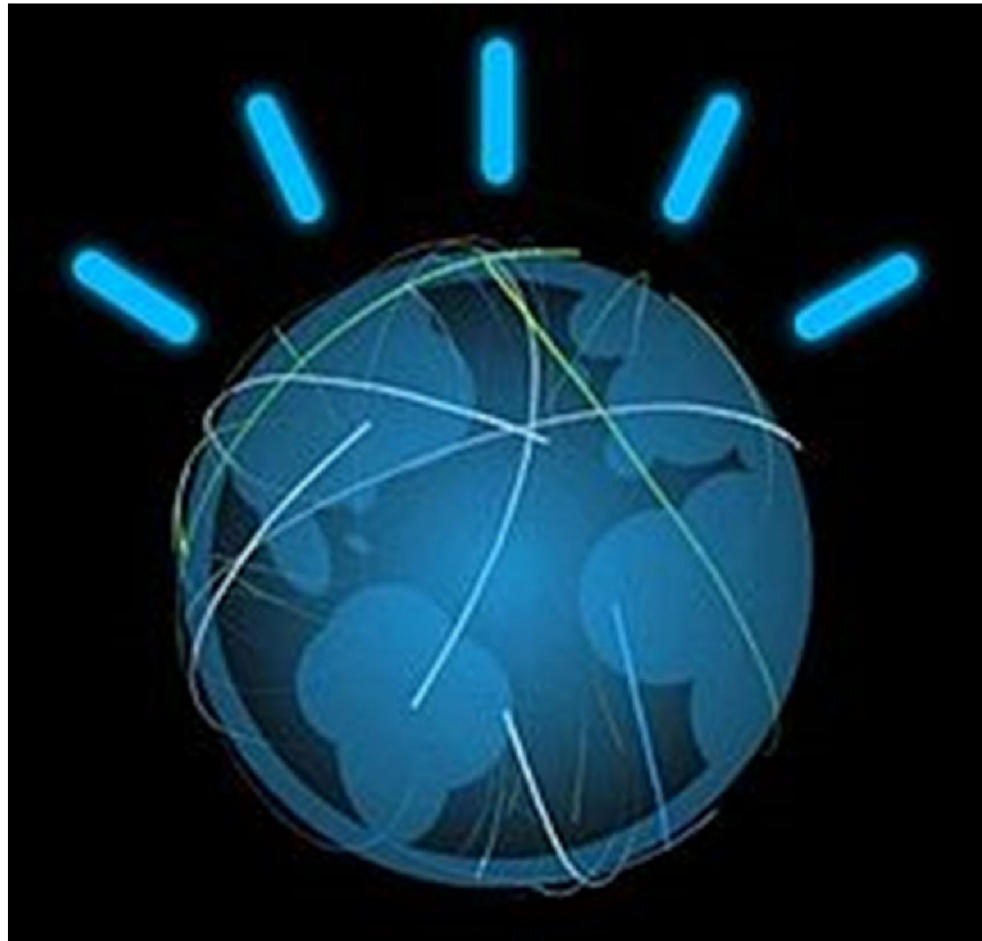
Heritage Health Prize



**Improve Healthcare,
Win \$3,000,000.**

Identify patients who will be admitted to a hospital within the next year using historical claims data.

IBM Watson



Microsoft Seeing AI Project



Robotics

□ Which of the following choices matches this figure?

- A. ROBI
- B. NAO
- C. ASIMO
- D. PEPPER
- E. CHEETAH



References

- ❑ shakthydoss.com
- ❑ www.stackoverflow.com
- ❑ stats.stackexchange.com
- ❑ ...

