

CPELEC1 0

Machine Intelligence Introduction

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What is Machine Intelligence ¹?

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machine intelligence

► Definitions

noun

(British, rare) another term for [artificial intelligence](#)

¹<http://www.collinsdictionary.com/dictionary/english/machine-intelligence>

What is Artificial Intelligence (AI)?

“It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.” - John McCarthy



What is Intelligence?

“Intelligence is the computational part of the ability to achieve goals in the world. Varying kinds and degrees of intelligence occur in people, many animals and some machines.” - John McCarthy



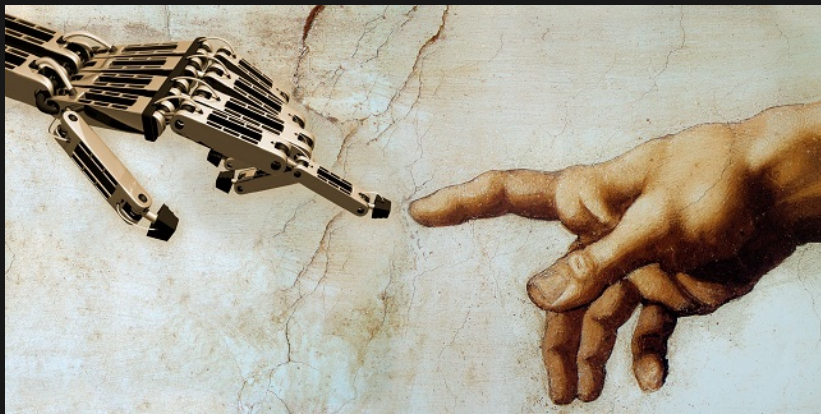
When did AI research start?

“After WWII, a number of people independently started to work on intelligent machines. The English mathematician Alan Turing may have been the first. He gave a lecture on it in 1947. He also may have been the first to decide that AI was best researched by programming computers rather than by building machines. By the late 1950s, there were many researchers on AI, and most of them were basing their work on programming computers.” - John McCarthy



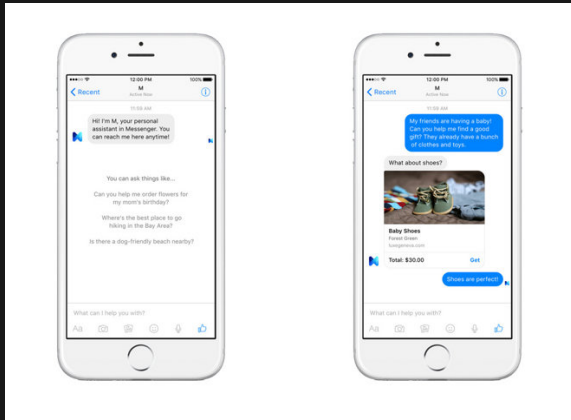
Does AI aim at human-level intelligence?

“Yes. The ultimate effort is to make computer programs that can solve problems and achieve goals in the world as well as humans. However, many people involved in particular research areas are much less ambitious.” - John McCarthy



Facebook's 'M' virtual assistant

A text-based virtual assistant integrated with Facebook Messenger that unlike Siri, Cortana, or Google Now relies on both human and artificial intelligence.



¹<http://appleinsider.com/articles/15/08/26/facebook-launches-m-virtual-assistant-driven-by-both-human-and-artificial-intelligence>

Google's Deepdream

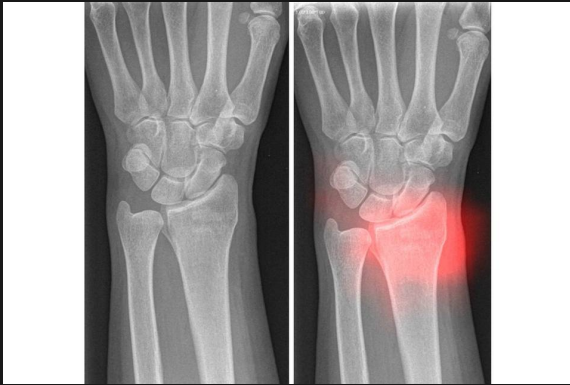
Artificial intelligence meets hallucinations with Google's deep dream.



¹<https://github.com/google/deepdream>

IBM's Watson software in Medicine

IBM intends to use around 30 billion images, including X-rays, computerized tomography, and magnetic-resonance-imaging scans to “train” its Watson software to identify ailments such as cancer and heart disease.



¹ <http://www.wsj.com/articles/ibm-crafts-a-role-for-artificial-intelligence-in-medicine>

AI Sub-fields

- ▶ Bioinformatics/ Genomics
- ▶ Computer Vision
- ▶ Machine Learning
- ▶ Natural language processing
- ▶ Reasoning/Logic
- ▶ Robotics
- ▶ Sensor and Network

Computer Vision

It is a field that includes methods for acquiring, processing, analyzing, and understanding images and, in general, high-dimensional data from the real world in order to produce numerical or symbolic information, e.g., in the forms of decisions. - Wikipedia



Robotics

It refers to the design, construction, operation, and application of robots. The term was coined by the Russian-born American scientist and writer Isaac Asimov.



Laws of robotics

- ▶ Law Zero: ``A robot may not injure humanity, or, through inaction, allow humanity to come to harm."
- ▶ Law One: ``A robot may not injure a human being, or, through inaction, allow a human being to come to harm, unless this would violate a higher order law."
- ▶ Law Two: ``A robot must obey orders given it by human beings, except where such orders would conflict with a higher order law."
- ▶ Law Three: ``A robot must protect its own existence as long as such protection does not conflict with a higher order law."

Machine Learning

“Field of study that gives computers the ability to learn without being explicitly programmed” - Arthur Samuel.



Machine Learning

“A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P , if its performance at tasks in T , as measured by P , improves with experience E ” - Tom Mitchell.



Question

“A computer program is said to *learn* from experience E with respect to some task T and some performance measure P , if its performance on T , as measured by P , improves with experience E .”

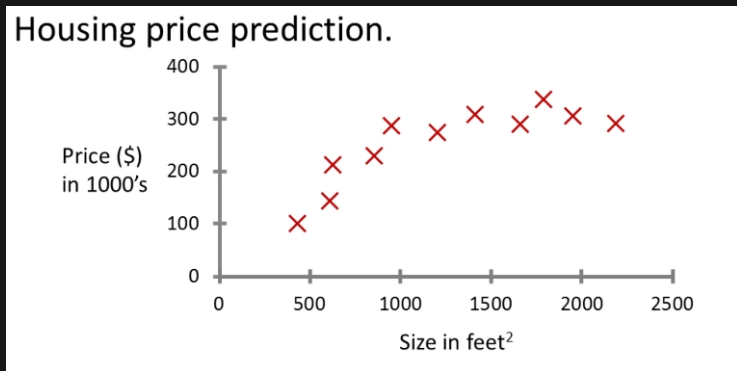
Suppose your email program watches which emails you do or do not mark as spam, and based on that learns how to better filter spam. What is the task T in this setting?

- ☐ Classifying emails as spam or not spam.
- ☐ Watching you label emails as spam or not spam.
- ☐ The number (or fraction) of emails correctly classified as spam/not spam.

¹Andrew Ng Lecture, <https://class.coursera.org/ml-005/lecture>

Supervised Learning

“Supervised learning entails learning a mapping between a set of input variables X and an output variable Y and applying this mapping to predict the outputs for unseen data.”

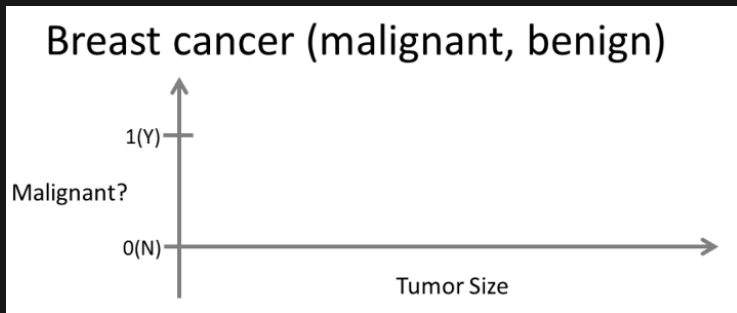


¹Cunningham, P. et al. "Supervised learning." Machine Learning Techniques for Multimedia. Springer Berlin Heidelberg, 2008. 21-49.

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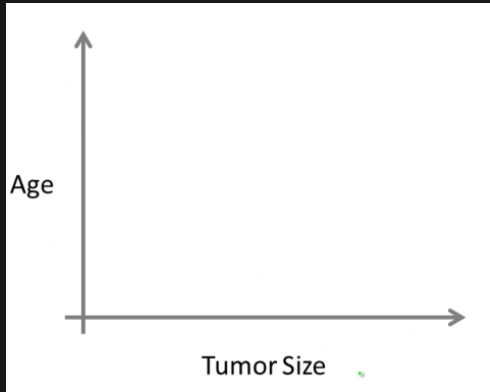


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Question

You're running a company, and you want to develop learning algorithms to address each of two problems.

Problem 1: You have a large inventory of identical items. You want to predict how many of these items will sell over the next 3 months.

Problem 2: You'd like software to examine individual customer accounts, and for each account decide if it has been hacked/compromised.

Should you treat these as classification or as regression problems?

- ☐ Treat both as classification problems.
- ☐ Treat problem 1 as a classification problem, problem 2 as a regression problem.
- ☐ Treat problem 1 as a regression problem, problem 2 as a classification problem.
- ☐ Treat both as regression problems.

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Discussion questions

- ▶ Will machine intelligence surpass human intelligence?
- ▶ What are the most important components of machine intelligence?
- ▶ Differentiate Supervised learning from Unsupervised learning.

Appendix

Inserting source code

```
#include<stdio.h>
#include<iostream>
// A comment
int main(void)
{
printf("Hello World\n");
return 0;
}
```
