

Machine Learning

Introduction

Aleksandr Petushko

ML Research

October 2nd, 2023



Content

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Content

- ➊ Introduction
- ➋ Course logistics and syllabus

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- 1 Introduction
- 2 Course logistics and syllabus
- 3 Historical reference

Intro

Time to introduce yourselves: what are your hobbies, motivation in ML, etc.: please go into “**Module 1 Students Introduction**” thread

Sofia Plagiarism Policy

- It covers parts “*sourced from AI*”
 - ▶ Please read the “**Sofia Plagiarism Policy**” thread
 - ▶ **First offense:** students need to rewrite assignment
 - ▶ **Second offense:** students fail the course
 - ▶ **Third offense:** students re to be withdrawn from their program

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- The caveats are the following:
 - ▶ It can really hallucinate some things which are just untrue
 - ▶ It can produce very different information in comparison to the source used to ask question (e.g., book chapter)

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- Only the answers with some non-trivial arguments that contradict the initial post will be considered as graded ones

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- Preliminary grading scale:

Grade	Percent accumulated
A	90-100 %
B	75-89 %
C	60-74 %

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- Current ML is: half Math, half Programming
 - ▶ **Math:** for research and design of ML algorithms
 - ▶ **Programming:** usage and tuning of ML algorithms
- Hopefully we could touch on both a little

Github

- Course page: <https://github.com/fatheral/sofia-ml-2023-2>
- The professor's lectures will be uploaded there

What is Artificial Intelligence?

Natural Intelligence (human)

- Able to perceive the information, analyze it, make decisions based on this analysis



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- (Strong) The same as natural intelligence, but computer is instead of human



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Artificial Intelligence

- (Strong) The same as natural intelligence, but computer is instead of human
- (Weak) Algorithm which is able to train using the input data in order to do tasks afterward — instead of human



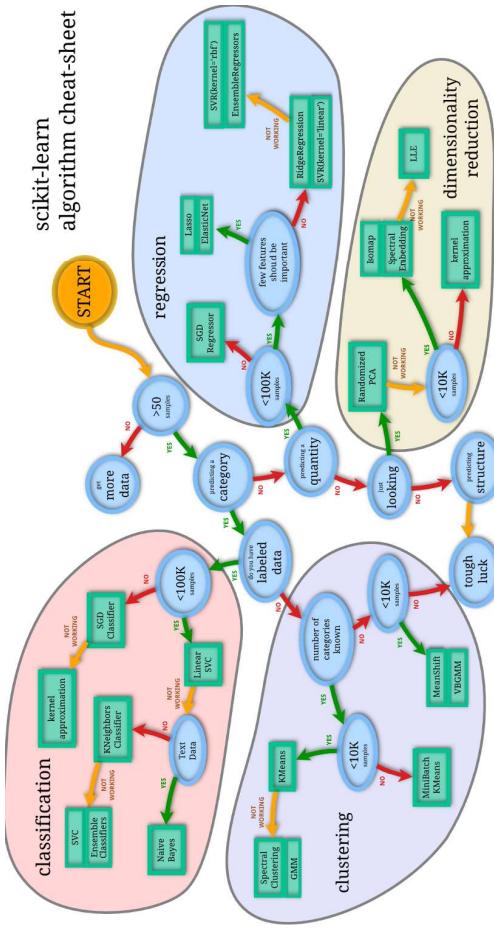
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Scikit-Learn² Roadmap



(Tentative) future content

Theoretic part

- Quality metrics
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Practice part

- Data processing and analysis by Python
 - Scikit-Learn, Numpy, ...



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In 1959 Arthur Samuel introduced the term “machine learning” into scientific use.

General definition

Machine Learning — the process leading computers to gain ability to show the behavior that wasn't explicitly programmed.



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In 1997 Tom M. Mitchell introduced more formal definition of a machine learning algorithm.

Formal definition

A **computer program** is said to **learn** from examples E for some set of problems T and a quality metric P if its performance on problems from T , as measured by P , is improved by using examples E .



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- **1901:** Karl Pearson invented the Principal Component Analysis (PCA) — a master method for data dimensionality reduction.
- **1906:** Andrey Andreyevich Markov develops the apparatus of Markov chains, which in **1913** he uses to study the text “Eugene Onegin”. Markov chains are used to generate and recognize signals.

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- 1958: Frank Rosenblatt invented the Perceptron — the first artificial neural network — and built the first “Mark-1” brain computer. *New York Times: The Perceptron is “the embryo of an electronic computer that [the Navy] expects will be able to walk, talk, see, write, reproduce itself and be conscious of its existence”*.

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- 1963: Lawrence Roberts formulated the thesis of computer vision in his dissertation at MIT.

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- **1997:** The Deep Blue computer beat world chess champion Garry Kasparov.

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- **2022:** OpenAI, a (not so) non-profit research company, provided the breakthrough in LLMs: ChatGPT.

Machine Learning Paradigms

Definitions

- X — set of objects
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- Reinforced
 - Action generation based on interaction with the environment

Takeaway notes

- 1 Please go through all the materials of Module 0

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- ➋ Please introduce yourself, complete the **Assignment 1** and discuss the question inside “**Module 1 DQ 1**”
- ➌ We are going to cover the most important things needed for ML, and will have small optional programming tasks
- ➍ ML History is intriguing!

Thank you!