II. What is AI?

- Artificial Intelligence (AI) is an area of Computer Science and Engineering whose goal is to develop computational systems that can be considered intelligent in some meaningful way

- Examples of activities requiring intelligence:

  - winning at chess

  - proving mathematical theorems

  - translating texts from a language to another

  - understanding speech

  - interpreting images or videos

  - planning complex activities (e.g., production in a factory, traffic in an airport)

  - driving vehicles on ordinary roads

  - …

- On the contrary, the following activities, although complex and demanding, do not require intellegence, at least in the sense we are trying to clarify:

  - playing chess (in the sense of just following the rules of chess)

  - performing complex mathematical computations following a predefined algorithm

- The term "Artificial Intelligence" was first proposed by John McCarthy during a scientific meeting in 1956

- A concise introduction to the history of AI will be given by Prof. Viola Schiaffonati in an online lesson (on 27th November)

- Since the beginning, the goal of AI has been to program digital computers in order to replicate aspects of human intelligence

  Of course, this presupposes that we know what we are talking about when we use the terms "intelligence", "intelligent", and so on

■ So, what do we actually mean by "intelligence", "intelligent", etc.?

More precisely, under what conditions can the proposition "*X* is intelligent" be considered true?

- ■ "an intelligent mountain" → meaningless!
- ■ "an intelligent person" → meaningful, but when is it true?
- ■ "an intelligent dog" → meaningful? if so, when is it true?
- ■ "an intelligent computer program" → meaningful? if so, when is it true?
- ■ "an intelligent coffee machine" → meaningful? if so, when is it true?
- ■ "an intelligent answer" → what is said to be intelligent here?
  the answer or the answer*er*?

■ Of the terms "intelligence", "intelligent", etc., we have an intuitive understanding, but no rigorous definition that is universally accepted

■ Possibly, these words of everyday language cannot be turned into rigorous scientific terms (like "mass", "force", "atom", "magnetic field", and so on), also because what we call intelligence is actually a mixture of many different and heterogeneous aspects

- A possible interpretation of the term "intelligent" tends to identify it with the term "rational", which in turn is viewed under the rather restricted perspective that is typical of the economical sciences: being rational means being able to act in such a way that some utility function is maximised (or some cost function is minimised)

- Under this view, the predicate "intelligent" may be applied:
  1. to an **agent**, that is, to a systems that we regard as capable of performing actions (persons, dogs, ..., maybe certain types of artificial systems)
  2. to a specific **action** perfromed by an agent (e.g., an intelligent answer)
  3. to the **result** or product of an action (e.g., an intelligent coffee machine)

- So, saying that a computer program is intelligent (e.g., a computer program that can play chess at Grandmaster level), is a case of 1, 2 or 3?

  If, as it seems reasonable, we opt for 1, this implies that we are ready to regard a computer program as an agent

  In fact, this idea has proved extremely fruitful, and is a crucial component of the approach to AI proposed by RN