Artificial intelligence is a discipline that study ---.

There are different approaches to AI, such as:

* Classic (programmed) AI
* Fuzzy Logic
* Expert System

ML is an approach inside AI. There are several tools inside ML, one of them is Neural Networks and in the specific ---.

Computer were invented for artificial intelligence: the original goal was make automatic tasks.

Defining intelligence is hard, but one pragmatic definition of artificial intelligence is: “A machine is artificially intelligent if it can trick you into thinking that it is not a machine”.

There are two main approaches:

* Simulate the final result of brain processing. This approach is the classical artificial intelligence approach
* Simulate the inner mechanism of brain processing, approach that is called artificial neural networks.

Classical artificial intelligence is based on writing smart computer program that accomplish human-like works. Neural networks are based on writing generic computer programs that learn to accomplish human-like work by examining data.

Many problems are too complex to be solved by an algorithm. For these problems, only data are available. In this way, machine learning is using data to solve problems.

Tasks can be distinguished (for the professor) into:

* Perpetual tasks are tasks related to perception.
* Higher-level tasks are obtained by decomposing a problem into simpler perceptual tasks and solving them with either several simple models or just one or few large-scale deep models.

Data set is an unordered sequence of observations that is divided into a training set, validation set (during the training) and test set (at the end of the training when the model is freeze).

The convex combination will not go outside the cloud, imaging the cloud as points.

Learning is subdivided into supervised learning and unsupervised learning.

When the problem consists into mapping a stimulus (input) to a response (output).

We can differentiate based on the type of data:

* Categorical information, where there isn’t a natural ordering (such as green, blue, green), but you can compare two data and say if they are the same or not.
* quantitative data

Based on these two classifications, we can have 4 different types of problem: regression, classification, low-dimensional mapping and clustering.

Remove data with out-of-range to avoid error during the measurement.

Removing observations if the data is incomplete, removing a column if that variable has a few observations available, add missing values.

Feature extraction contains expert knowledge to transform your data into more evident information. An example is replacing pixels with segments to better understand the outline of a figure (example of a number). In this way you have less data, but the density of the information is bigger.

Learning machine (model) = learner

Both the model and is fixed