

## Continuing the intro

### What is a feature?

Any *individual measurable property* of data *useful for the solution* of a specific task is called a **feature**.

Example: - Medical Diagnosis: information about the patient (age, clinical history, . . . ), symptoms, physical examination, results of medical tests, . . .  
- Weather forecasting: humidity, pressure, temperature, wind, rain, snow, ... -  
Image Processing: raw pixels, combination of adjacent pixels, ...

*Deep features* are features *built on raw features* for making *more informative data*.

Example: - *Signals*: raw input collected from sensors - *Data*: meaningful but not focused - *Features*: ==meaningful and focused==

Signals are transformed onto data, which in turn is transformed onto features. We want to try to automatize interesting features starting from the data.

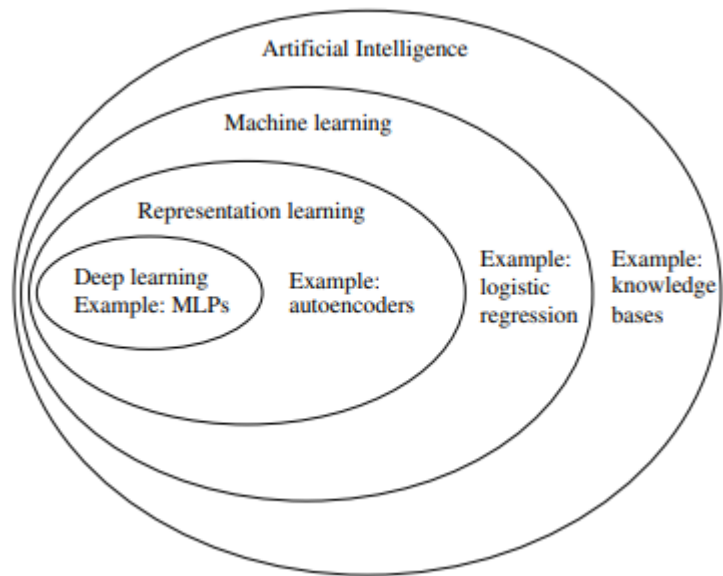
The idea is that deep learning exploits deep NN which uses a lot of layers, in order to compute complex, non-linear features. Each layer synthesizes new features in terms of the features received previously.

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### Comparison between methods

- Knowledge-based systems: take an expert, ask him how he solves a problem and try to mimic his approach by means of logical rules.
  - Nothing is learned by the machine.
- Traditional Machine-Learning: take an expert, ask him what are the features of data relevant to solve a given problem, and let the machine learn the mapping.
  - We ask the expert to ask the important features of the problem to solve.
- Deep-Learning: get rid of the expert.

-[[comparison-2.png) In a KB, we just have a hand-designed program written by hand. In classic machine learning, we have hand-designed features, and then we try to have the mapping. In case of deep learning, we have the input, the features, then more complex features made from these features, then the actual mapping.



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## Diving into DL

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