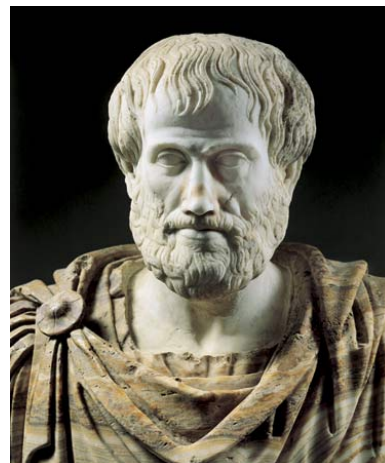


The ten Aristotelian categories, features and dissimilarities

 37steps.com/184/aristotelian-categories/

August 14, 2014

The founding fathers of philosophy, Plato and Aristotle, created two competing foundations for knowledge: the ideas and the categories. According to Plato reality is constituted by the non-materialistic ideas: they are the true objects of the world. In his view ideas can be grouped into more and more universal ideas. According to Aristotle there is an end to this grouping. The ten categories are the highest possible generalization. Here we will link the system of categories to the pattern recognition problem.



Aristotle starts his knowledge on the world by the phenomena, by what we can observe, not by ideas on reality. The observations are expressed by language and exchanged between people. Everything we can say is captured by one of the ten categories. Here is an example for each of them.

- **Substance**, the *chair*
- **Quantity**, the chair has *four* legs
- **Qualification**, the chair is *brown*
- **Relative**, the chair is *lower* than the table
- **Where**, the chair is *in the room*
- **When**, we bought the chair *yesterday*
- **Being-in-a-position**, the chair is *upside-down*
- **Having**, the chair *has* four legs
- **Doing**, the chair *carries* a heavy load
- **Being-affected**, the chair *collapses* by the heavy load

From the pattern recognition point of view it is interesting that the **latter nine categories** are all attributes attached to the chair. Each of them could be changed such that the chair remains a chair. None of them defines the chair. Together they point into the direction that we are dealing with a chair. They are

like **features** in an object representation. The set of feature values together makes a particular class more probable than another and can thereby be used for classification.

The first category, **substance**, is basic. It directly states that we are dealing with a chair. According to Aristotle this category has two sides: matter and form. **Matter** should be understood very broad. It is a potential, pointing to a set of possible realizations. Various different objects, with different shapes, could all be a chair. In pattern recognition terms it is the **class** name, or the **label**. Matter might also be understood as the class concept.

The realization of the **substance** is the **form**. It is the chair, neglecting all the nine other categories. It is its **shape**, without mentioning any possible feature including shape features. In pattern recognition we can use shape for recognizing objects by the **dissimilarity representation**, often discussed on this website. It does not use any feature. Instead, it relates objects to other objects by differences in shape.

This discussion on the ten categories related to pattern recognition deals primarily with real world objects or events. In problems like medical diagnosis, security and various others, we are not dealing with the objects themselves but just with their traces in the world. The substance category is not available and often not accessible in such applications.