Tutorial on Topological Data Analysis

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Contents

Abstract

This is for the first tutorial of topological data analysis.

1 Tutorial on LaTeX

This is a **bold text**.
This is a underlined text.
This is a *italic text*.
This could also be ***combined***.
If you don't want to choose manually, you could use *emphsize*.
emphsize *under italic text*. ***emphasize*** **under bold text**.
Take a look at the Figure 1 .

- List one
- List two

1. Number one
2. Number two

Metric: (i) $d(x, y) \geq 0$ for all x, $y \in X$.

$$d(x,y) = \begin{cases} 0000000 & \text{if } x = y, \\ 1 & \text{if } x \neq y, \end{cases} \tag{1}$$

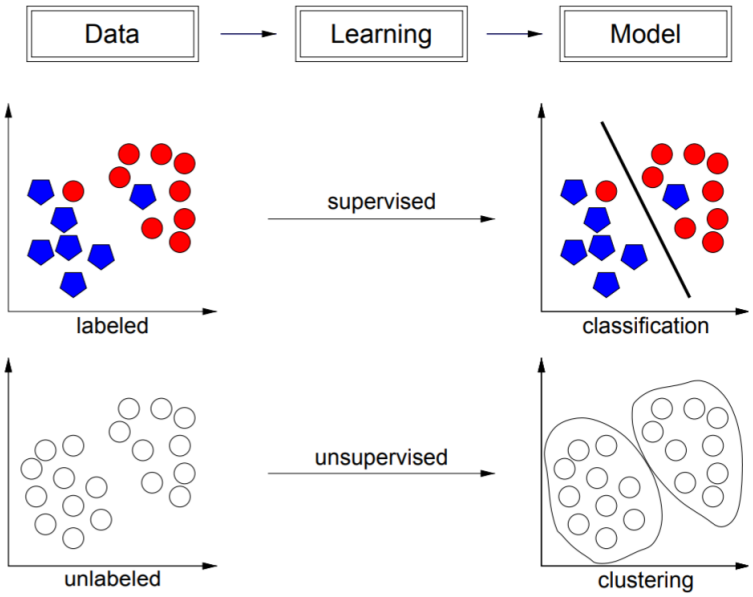

Figure 1: The introduction of xxx

2 Metric Space

Definition: Let X be a set and $d : X^2 \to \mathbb{R}$ a function with the follow properties:

(i) $d(x, y) \geq 0$ for all x, $y \in X$.

(ii) $d(x, y) = 0$ if only if $x = y$.

(iii) $d(x, y) = d(y, x)$ for all x, $y \in X$.

(iv) $d(x, y) + d(y, z) \geq d(x, z)$ for all x, y, $z \in X$. (This is called the *triangle inequality*).

Then we say that d is a *metric* on X and that (X, d) is a *metric space*.

Take away:

'(i) Distances are always positive.

(ii) Two points are zero distance part if and only if they are the same point.

(iii) The distance form A to B is the same as the distance from B to A.

(iv) The distance form A to B via C is at least as great as the distance from A to B directly. '