



Why

We name a predictor whose set of outputs is finite.

Definition

A *classifier* is a predictor whose codomain is a finite set. In the case that we call the predictor a classifier, we call the outputs *classes* or *labels* or *label set*. We call the prediction of a classifier on an input the *classification* of the input.

We call the classifier a *binary classifier* (or *two-way classifier* or *two-class*) if the set of labels has two elements. In the case that there are k labels, we call the classifier a *k-way classifier*, *k-class classifier* or *multi-class classifier*. The second term is meant to indicate, not that the classifier assigns to each point several classes, but that the classification decision is made between several classes.

Let A be a set of inputs and let B be a set of labels (outputs). Suppose $B = \{0, 1\}$, so that, in particular B is finite. Then $f : A \rightarrow B$ is a binary classifier with labels 0 and 1. Suppose instead that $B = \{\text{YES}, \text{NO}, \text{MAYBE}\}$. In this case, we would call $f : A \rightarrow B$ a three-way classifier.

Other terminology

Following our terminology, but speaking of processes, some authors refer to the application of inductors for these special cases as *binary classification* and *multi-class classification*. Or

they speak of *classification* or a *classification problem*.

Some authors refer to a classifier as a *discriminator* and reference *discrimination problems*. Some authors refer to a classifier as a *point classifier* since it makes one guess.¹

¹Future editions may remove this. This term is used in contrast with list predictors, mentioned in subsequent sheets.

