Why

We often want to predict one of several outcomes.

Definition

A *classifer* is a predictor whose codomain is a finite set. In this case, we call the codomain the *label set* and we call its elements *classes* (or *labels*, *categories*). We call the prediction of a classifier on an input a *classification*.

If the set of labels has two elements, then we call the classifier a *binary classifier* (or *two-way classifier*, *two-class classifier*, *boolean classifier*). In the case that there are k labels, we call the classifier a *k-way classifier* (or *k-class classifier*, *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.

Basic examples

Let A be a set of inputs and let B be a set of labels. Define $B = \{0, 1\}$ (or $\{-1, 1\}$, FALSE, TRUE, NEGATIVE, POSITIVE). Then B is finite with two elements and $f : A \to B$ is a binary classifier with labels 0 and 1.

If the case $B = \{$NO, MAYBE, YES$\}$, we call $f : A \to B$ a three-way classifier. Other examples for B include a list of languages, the set of English words in some dictionary, or the set of $m!$ possible orders of m horses in a race. Often convenient to take $B = \{1, \ldots, k\}$ for $k \in \mathbb{N}$.

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* and a *classification problems*. Roughly speaking, a classifier *classifies* all inputs into categories.

Alternatively, some authors (especially in the statistics literature) refer to a classifier as a *discriminator* and reference *discrimination problems*.

Classifiers

Predictors   Factorials

Sequences   Natural Products

Lists   Natural Sums

Set Numbers   Direct Products   Recursion Theorem

Finite Sets

Equivalent Sets

Function Inverses   Natural Order   Family Unions and Intersections

Function Composites   Function Images   Peano Axioms   Families

Equivalence Relations   Functions

Relations   Natural Induction

Set Products

Set Powers   Natural Numbers   Generalized Set Dualities

Partitions   Unordered Triples   Successor Sets   Intersection of Empty Set   Set Dualities   Set Unions and Intersections

Ordered Pairs   Set Intersections   Pair Unions   Set Complements

Set Unions   Set Differences   Pair Intersections

Unordered Pairs   Empty Set

Set Specification

Set Equality

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities   Sets

Names

Letters   Objects