Why

We name a predictor whose set of outputs is finite.

Definition

A *classifer* is a predictor whose codomain is a finite set. In this case, we call the outputs *classes* (or *labels, categories, label set*). 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, multiclass 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 Example

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

If the case $B = \{\text{NO}, \text{MAYBE}, \text{YES}\}$, 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* 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] Roughly speaking, a classifier *classifies* all inputs into categories.

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

Classifiers

Inductors

Factorials   Datasets

Natural Products   Sequences

Natural Sums   Set Numbers

Finite Sets   Direct Products

Recursion Theorem   Equivalent Sets

Natural Order   Family Unions and Intersections   Function Inverses

Peano Axioms   Families   Function Images   Function Composites

Equivalence Relations   Functions

Natural Induction   Relations

Set Products

Natural Numbers   Generalized Set Dualities   Set Powers

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

Set Complements   Pair Unions   Set Intersections   Ordered Pairs

Set Differences   Pair Intersections   Set Unions

Empty Set   Unordered Pairs

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities   Sets

Names

Letters   Objects