Why

We want to talk about learning associations between objects in time or space.

Definition

Let A and B be sets. An *inductor* is a function mapping a dataset of paired records in $A \times B$ to a function from A to B.

We call the elements of A the *precepts* and the elements of B the *postcepts*. We call a function from the precepts to the postcepts a *predictor*. We call the result of a precept under a predictor a *prediction*.

Using this language, an inductor maps datasets to predictors. A predictor maps precepts to postcepts.

Notation

Let D be a dataset of size n in $A \times B$. Let $g : A \to B$, a predictor, which makes prediction $g(a)$ on precept $a \in A$. Let $f : (A \times B)^n \to (A \to B)$, an inductor. Then $f(D)$ is the predictor which the inductor associates with dataset D.

Other terminology

Many authorities call the precepts the *independent variables*, *inputs*, *covariates*, *patterns* or *observations*. Similarly, some call the postcepts the *dependent variables*, *outputs*, *targets*, *outcomes* or *observational outcomes*. Some call a predictor

an *input-output* mapping. A predictor is sometimes called a *point predictor*.[1] Some authors refer to a prediction as a *guess*.

Learning algorithms

We use a predictor to make guesses on precepts which do not appear in the dataset that was used to construct the predictor. We refer to the task of proposing a predictor for a particular dataset a *learning problem*.

It is common in this context to refer to an inductor as a *learning algorithm* and call the task or problem of constructing a predictor from a dataset *supervised learning*. By supervision, we mean to indicate that we have the postcepts corresponding to the precepts.

In line with this usage, the postcepts are often called *labels* and the labels are said "to provide supervision." In this context, the dataset used to construct the predictor (i.e., the argument to the inductor) is called the *training dataset*.

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[1]Future editions may remove this. The intuition for the word point is from the real numbers, which is not a prerequistite sheet.

Inductors

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Datasets

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Direct Products

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Families

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Functions

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Relations

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Cartesian Products

Set Powers

Ordered Pairs   Unordered Triples

Pair Unions

Set Unions

Unordered Pairs   Empty Set

Set Specification

↓

Set Inclusion

↓

Standardized Accounts

↓

Accounts

↓

Deductions

↓

Quantified Statements

↓

Logical Statements

↓

Statements

Identities   Sets

Names

Letters   Objects