## 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 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*. 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*, *pattern* 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**

Many authorities call inductors *learning algorithms*, and refer to *supervised learning* when they speak of the task or problem of constructing a predictor from a dataset. By supervision is meant that we have the postcepts which go along with the precepts. In this context, the postcepts are often called *labels*.

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 we need not have discussed for this point.

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

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Statements

Identities

Sets

Names

Letters

Objects