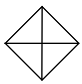


## Why

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

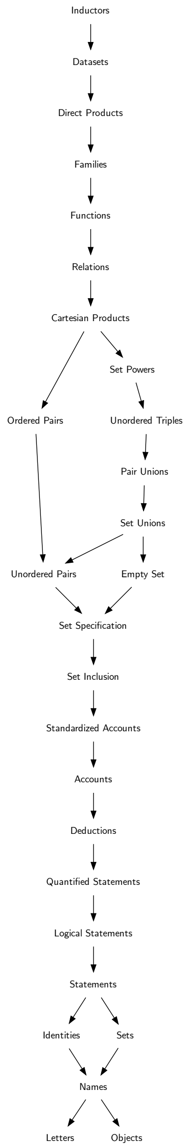
Many authorities call the precepts the *independent variables*, *inputs*, *covariates*, *pattern* or *observations*. Similarly, some call the postcepts the *dependent variables*, *outputs*, *targets*, *outcomes* or *observational outcomes*. Some call a predictor an *input-output* mapping. A predictor is sometimes called a *point predictor*.[1] Some authors refer to a prediction as a *guess*.

### Supervised learning

In these sheets, we discuss mathematical objects. There is, therefore, no notion of time. Recall that we use only present-tense verbs "is" and "belongs" (see Statements), represented, of course, by $=$ and $\in$.

In spite of this, we acknowledge that many authors discuss "problems," "fields," and "areas." Many authors refer to application of an inductor to a dataset (that of associating to a dataset a predictor) the task or problem of *supervised learning*. They refer to supervised learning as the problem of constructing an input-output mapping from empirical data.

[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
Datasets
Direct Products
Families
Functions
Relations
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