



## Why

We sometimes use special language for a function inductor, which alludes to its similarities with “learning.”

## Definition

Let  $\mathcal{U}$  and  $\mathcal{V}$  be sets and let  $\{G_n : (\mathcal{U} \times \mathcal{V})^n \rightarrow \mathcal{P}(X \times Y)\}_{n \in \mathbf{N}}$  be a family of functional inductors.

Suppose we have a dataset  $(u^1, v^1), \dots, (u^n, v^n) \in \mathcal{U} \times \mathcal{V}$ , and we use our inductor (i.e., learning algorithm) to produce a predictor  $f : \mathcal{U} \rightarrow \mathcal{Y}$  defined by  $f \equiv G_m(a^1, \dots, a^m)$ . Thus, we have a sequence of predictors  $f^1, \dots, f^n$ . We can evaluate our learning algorithm on the A predictor can be used to “guess” inputs which do not necessarily appear in the dataset. For this reason, some authors call an inductor (or family of inductors) a *learner* or *learning algorithm*. In accordance with this usage, they refer to the argument of an inductor as the *training data* or *training dataset* or *training set*. As with our terminology dataset, the word “set,” however, may mislead since we are speaking of a sequence.

It is common to refer to the construction a predictor from a dataset a *learning problem*. In this case, the learning problem is said to be *supervised learning*. By supervision, we mean to indicate that we have the outputs corresponding to the inputs. In line with this usage, the outputs are often called *labels* and the labels are said “*supervise*” or “to provide supervision.” Since a predictor can be used to *guess* the output of an input, some authors call an inductor (or family of inductors) a *learner* or *learning algorithm* or *supervised learning algorithm* and refer to the argument as the *training dataset*. Often the word “supervised” is included, as in *supervised learning*. This language intends to indicate that inputs are given along with outputs, and these outputs “provide supervision to the algorithm.”



