Title: Induction
Name: Angelika Kimmig
Affil./Addr.: Katholieke Universiteit Leuven, Heverlee, Belgium
angelika.kimmig@cs.kuleuven.be

Induction

Synonyms

Definition

Induction is the process of inferring general laws from specific observations.

Characteristics

The key principle underlying induction is that of hypothesizing a general rule that holds for a given set of observations. For instance, having seen a number of white swans, one could induce a rule saying that all swans are white ($\forall x. \text{swan}(x) \rightarrow \text{white}(x)$).

Induction can also be seen as the inverse of [deduction](#): instead of deriving specific consequences from general laws, it infers general laws from specific observations and thus allows for conclusions about unseen individuals as well. In contrast to deduction, induction is *falsity-preserving*, that is, future observations that are not in line with the observations used during induction will falsify the induced rule. For instance, the rule inferred above no longer holds if the next swan observed is black.

Inductive reasoning forms the basis of rule-learning systems in artificial intelligence and machine learning (Michalski 1983). Its properties have also been studied in the inductive inference community (Angluin and Smith 1983).

Cross-references

Deduction

References

Angluin D, Smith CH (1983) Inductive inference: Theory and methods. *ACM Comput. Surv.* 15:237–269.

Michalski RS (1983) A theory and methodology of inductive learning. *Artificial Intelligence* 20:111–161.