



**SEMINAR ON ARTIFICIAL INTELLIGENCE
AND LOGICS**

Non-monotonic reasoning in description logics through typicality models

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Description logics (DLs) are a popular family of logics for knowledge representation and reasoning focusing on the representation of concepts. DLs combine first-order expressivity with decidability and, in some cases, computational tractability. Because they are built over the foundations of first-order logic, they have a monotonic entailment relation.

Typicality is a widely studied non-monotonic phenomenon within conceptualization. According to prototype theory, concept members have different degrees of representativeness. A sparrow is a better example of a bird than a penguin. Modeling typicality is crucial for robust reasoning systems that can draw likely conclusions and reason under incomplete information.

In this talk, we present the state-of-the-art in incorporating typicality into DLs. Then, we delve into a major shortcoming of all popular approaches: the inability to extend typical information through quantifiers. We present a new semantical framework -- semantics based on typicality models -- which solves this problem for two DLs of the EL family. We show that our approach extends several popular reasoning methods based on materialization, such as rational, relevant, and lexicographic closures.



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