Abstract

Learning spatio-temporal patterns is an active research in the field of Artificial Intelligence. Being able to detect and track objects as well as to distillate from it the changing spatial relations of one object with respect to another presents a challenge. One of the largest pool of work to address this comes from the area of Knowledge Representation and Reasoning. Any framework for learning spatio-temporal patterns needs to reason about many interacting entities communicating or related to one another in a multifarious way and thus accommodating ample uncertainties .Uncertainty which is an ineluctable feature of the world cannot be handled well by the logic based representation as they delineate a delicate approach to handle the uncertain feature and relationships. Probability theory is the most widely used tactic to reason under uncertainty. Therefore, an attempt to combine the logic based representation and probability theory along with Qualitative spatio-temporal reasoning may beget fruitful results while applying it in uncertain domains.

This dissertation is about an approach to amalgamate Qualitative Spatio-Temporal Reasoning, Description Logic and Bayesian Network. Qualitative spatio-temporal reasoning qualifies a given sptio-temporal data stream in terms of spatio-temporal relations .Spatial relations includes direction relations and orientation relations while temporal relations is defined in terms of episodes. Description Logic is used for representing the knowledge of the domain of interest in a structured and well-understood way while Bayesian Network which is a probabilistic directed acyclic graph is used to handle uncertainty to finally arrive at a Bayesian Description Logic. Such an approach could be used for learning patterns from spatio-temporal data streams. The report presents how this formalism formulate motion patterns along with its probabilities in a traffic scenario.