Universal Coalgebras and Their Logics

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State based systems, such as automata, transition systems (deterministic, nondeterministic or probabilistic), Kripke Structures, neighbourhood structures, object-oriented or stream based programs, and many more types of systems can be uniformly modelled as coalgebras. The development of a general theory of Universal Coalgebra in the last decade has provided an elegant framework for uniformly treating all those different types of models, introducing, explaining and relating relevant notions such as bisimulation, behavioural equivalence, coinduction and coequations. More recently, coalgebraic modal logic has been developed, generalizing classical modal calculi and providing a completeness result, encompassing the famous Hennessy-Milner theorem.

We shall motivate and introduce the theory of coalgebras, and give (revealing a lot of relevant intuition) an account of its basic theory and of coalgebraic modal logic. Finally, we explore an encoding into neighbourhood systems and their logics.