Speaker : Ralph Matthes

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Tarski's fixed-point theorem and higher-order term rewrite systems

Tarski proved that monotone operators on complete lattices have a least fixed-point which is simply given by the infimum of all pre-fixed-points. This theorem is the basis of a general understanding of induction. The computational counterpart of induction is iteration. Classically, one may derive (full) primitive recursion from iteration. However, this translation is computationally not acceptable. We introduce some polymorphic lambda calculi suitable for studying those phenomena. Led by the lattice-theoretic motivation we even arrive at a surprisingly simple reduction of arbitrary monotone inductive types (the lambda calculus representation of those least fixed-points) to syntactically monotone (i. e. positive) inductive types—reduction in the sense of higher-order term rewrite systems which is simulation of computation.