

Fakultät für Mathematik

Berufungsvorträge "Mathematische Logik mit Berücksichtigung der Grundlagen der Informatik"

Die Berufungsvorträge schließen folgende Punkte mit ein:

Didaktischer Vortrag (25 Minuten) Fragen/Pause (10 Minuten) Wissenschaftlicher Vortrag (45 Minuten) Fragen/Pause (15 Minuten) Kommissionelles Hearing -(Dekanatsbesprechungszimmer, 11. Stock)

Dienstag, 9. Oktober 2018, Seminarraum 11

Prof. Ana Sokolova (Universität Salzburg)

9:00 Uhr: Didaktischer Vortrag

"Undecidability of First-Order Logic"

I will present the famous result of Turing on undecidability of validity (equivalently, satisfiability) of first-order logic (FOL) formulas, Hilbert's Entscheidungsproblem, via a reduction of the halting problem to unsatisfiability of a FOL formula. The method of proof and the results I will present are close to the original sources by Turing and Büchi. We may also briefly discuss connections to undecidability of FOL on the class of finite models, i.e., Trakhtenbrot's theorem.

9:35 Uhr: Wissenschaftlicher Vortrag

"Proper Semirings and Proper Convex Functors"

In this talk, I will present recent results on the semantics of probabilistic transition systems and convexity that enable proving completeness of axioms for trace equivalence of probabilistic transition systems. Our results show that certain semirings and convex functors are "proper". The notion of proper semiring was introduced by Esik and Maletti. They also proved that some important (classes of) semirings -- Noetherian semirings, natural numbers -- are proper. Properness matters as the equivalence problem for weighted automata over a semiring which is proper and finitely and effectively presented is decidable. Recently, Milius generalised the notion of properness from a semiring to a functor. As a consequence, a semiring is proper if and only if its associated "cubic functor" is proper. Moreover, properness of a functor renders soundness and completeness proofs for axiomatisations of equivalent behaviour. However, proving properness is difficult. In a joint work with Harald Woracek, we provide a method for proving properness of functors, and instantiate it to cover both the known cases and several novel ones: (1) properness of the semirings of positive rationals and positive reals, via properness of the corresponding cubic functors; and (2) properness of two functors on (positive) convex algebras. The latter functors are important for axiomatising trace equivalence of probabilistic transition systems. Our proofs rely on results that stretch all the way back to Hilbert and Minkowski.