Invariants, patterns and weights for ordering terms

Ursula Martin

University of St Andrews, Computer Science Department
St Andrews, Fife KY16 6SS, Scotland

Any simplification ordering on a monadic term algebra is an extension of an ordering by weight. We extend this result to simplification orderings over arbitrary terms, by considering a related monadic term algebra called the spine. We show that any simplification ordering on the spine lifts to an ordering on the full term algebra. Conversely a simplification ordering on the term algebra defines a weight function on the spine which in turn can be lifted to a real valued function on the original ground terms, with the property that the original ordering is an extension of the weight ordering thus defined on ground terms. Thus we may associate numeric weights to any simplification ordering on the term algebra, and hence determine a classifying space. We also investigate the Knuth Bendix and polynomial orderings in this light, provide a general framework for orderings terms by counting embedded patterns, and investigate linear orderings related to the recursive path ordering.

See http://www-theory.dcs.st-and.ac.uk/~um/publications/papersonline.html