**Decompositions based on Decision Diagrams**

David Bergman, University of Connecticut, David.Bergman@business.uconn.edu

Decision diagrams have recently been investigated as a data structure for representing solutions to optimization problems and, ultimately, as the main mechanism by which general discrete optimization problems are solved. The basis for these algorithms is the use of limited-width relaxed decision diagrams, which supply an approximation of the set of feasible solutions and provide relaxation bounds, much like a linear programming relaxation in mathematical programming. Although the technique has been successful on a broad range of problems, there are problem classes in which the methodology is ineffective when compared to other generic exact approaches, as the corresponding relaxed decision diagram would have to be unreasonably large for obtaining comparatively good bounds. To overcome this shortcoming, this talk describes a new decomposition approach where small-sized decision diagrams exactly represent different portions of an optimization problem, all of which are linked through channeling constraints. Several decomposition examples will be presented, with each case elucidating a different type of decomposition that can be performed based on this concept. Finally, a few potential techniques for reasoning and solving over multiple decision diagrams will be introduced.