



Minisymposium 1 - Discrete Optimization

Network Flows with Path Restrictions

MARTIN SKUTELLA (UNIVERSITÄT DORTMUND)

Network flows are usually specified by assigning flow values to the arcs of a given network. Flow conservation constraints ensure that, except for certain source and sink nodes, the amount of flow entering a node equals the amount of flow leaving that node. Moreover, arc capacities often bound the flow values on the arcs. It is a classical and well known result that any flow can be decomposed into flows along paths and cycles. This insight yields the so-called path-based formulation of a flow problem where the task is to assign flow values to paths and cycles (instead of arcs). By imposing certain restrictions on the paths that are used to send flow, interesting variants of classical flow problems can be derived. Motivated by practical applications, one can, for example, bound

- the number of flow-carrying paths (*unsplittable* or *k-splittable* flow problems),
- the length of flow-carrying paths (*length-bounded* flow problems),
- the amount of flow sent through each path (flows with *path capacities*).

Also all sorts of combinations of the above mentioned constraints can be taken into consideration. We present recent results on network flows with path restrictions and discuss interesting directions for future research.