

## Network Flows as Tools for Solving Real World Problems

### **Abstract**

Network Flows have a long standing history in the world of mathematical optimization. Starting with the Transportation Problem, many researchers have worked on methods for finding an "optimum flow" through a network. Here, a network consists of a set of nodes which are joined by directed arcs with capacities and possibly costs. The maximum flow problem asks to find a function which ships as much flow as possible from a given source to a given sink in the network while leaving all other nodes "balanced". We survey the history of flow problems starting in the 1930s and illustrate that the now well-known duality between flows and cuts had been used by various researchers to solve their problem of interest which was either to maximize the transported goods or to cut off troops from their supplies. We also give insights into more applications of flow techniques, for instance in the reconstruction of surfaces from satellite data and to solve sports scheduling problems.