AN $O(M + N)$ MAXIMUM FLOW PROBLEM ON DIRECTED ACYCLIC NETWORKS

Mehdi Kadivar

Faculty of Mathematical Sciences
Shahrekord University

e-mail: m_kadivar@aut.ac.ir

The maximum flow problem is a variant of the classical flow problem in which the flow from a source node $s$ to a sink node $t$ is maximized in a directed capacitated network with arc costs. It is important to study this problem because it has important applications, such as in logistics, telecommunications and computer networks; and because it is related to variants of classical problems such as the shortest path problem, transportation problem, or assignment problem, all of which have important applications as well. In this paper, a directed acyclic network $G$ is considered and then an $O(m + n)$ time algorithm is presented to solve the maximum flow problems (MFP) in which $n$ and $m$ are the number of nodes and arcs, respectively. In our algorithm the upper bound of the flow that can be passed through each node is computed and then the feasible in- and out-flow for each node is computed independently. Experimental results demonstrate that the proposed algorithm is up to 16 times faster than the well-known previously proposed algorithms.

Keywords: Maximum Flow problem, Time complexity, Acyclic networks.

AMS Subject Classification: 05C21, 05C85, 05C15.

References


