FMI, CS, Master I
Techniques of Combinatorial Optimization
Laurenţiu Leuştean

Seminar 5

(S5.1) Figure 1 represents a flow network $N = (D, c, s, t)$.

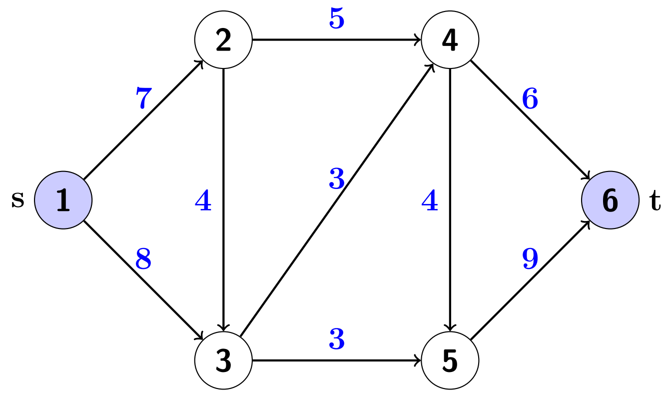

Figure 1: The flow network N

Give two iterations of the Ford-Fulkerson algorithm for N, considering the path $P = 1246$ for the first augmentation and $Q = 1356$ for the second augmentation.

(S5.2) Figure 2 represents a flow network N and an s-t flow f for N.

(i) Represent the residual graph D_f and the residual capacities c_f.

(ii) Choose an f-augmenting path P of minimum length and compute the flow $g := f_P^\gamma$, where $\gamma = \min_{e \in A(P)} c_f(e)$.

(iii) Represent the residual graph D_g and the residual capacities c_g. Can you find an s-t path in D_g?

(iv) What is the maximum value of and s-t flow for N?

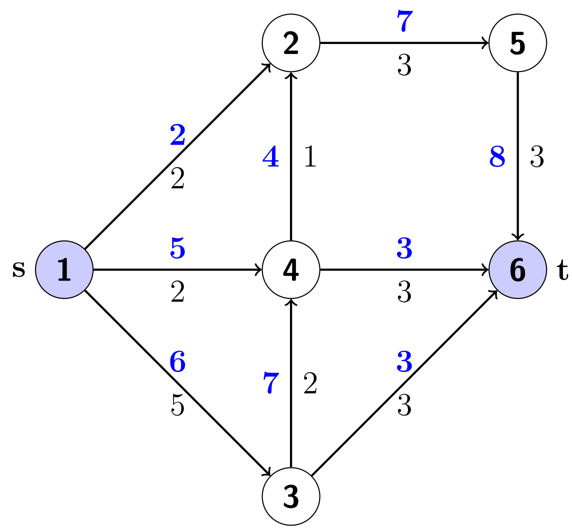

Figure 2: The flow network N with the flow f

(v) Give an example of an s-t cut in N of minimum capacity.

(S5.3) Prove Proposition 3.4.2..

(S5.4) For any s-t path P in D, prove that χ^P satisfies the flow conservation law at every $v \neq s, t$ and that $\text{value}(\chi^P) = 1$.