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Analysis of Algorithms II: Final Project Question 2

It is not guaranteed that the Ford Fulkerson method will yield the optimal (Max flow) result, however it is guaranteed for the push-relabel algorithm. Push-relabel algorithm doesn't construct "augmenting path" instead it uses height based priority to divide the flow between edges. Ford Fulkerson method's complexity is $O(V*E^2)$ where V is number of the nodes and E is the number of edges. If we say n = V, in a dense graph E is roughly n^2 , then it will be $O(n^5)$. However Push-Relabel algorithm's complexity is $O(V^2*E)$, in a dense graph it will be $O(n^4)$. Hence Push-Relabel algorithm is much more efficient than Ford Fulkerson method.