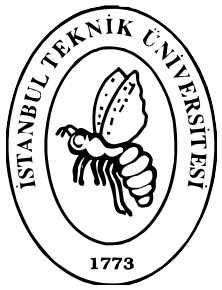
ISTANBUL TECHNICAL UNIVERSITY



BLG-336E
ANALYSIS OF ALGORITHMS 2

PROJECT 3 REPORT

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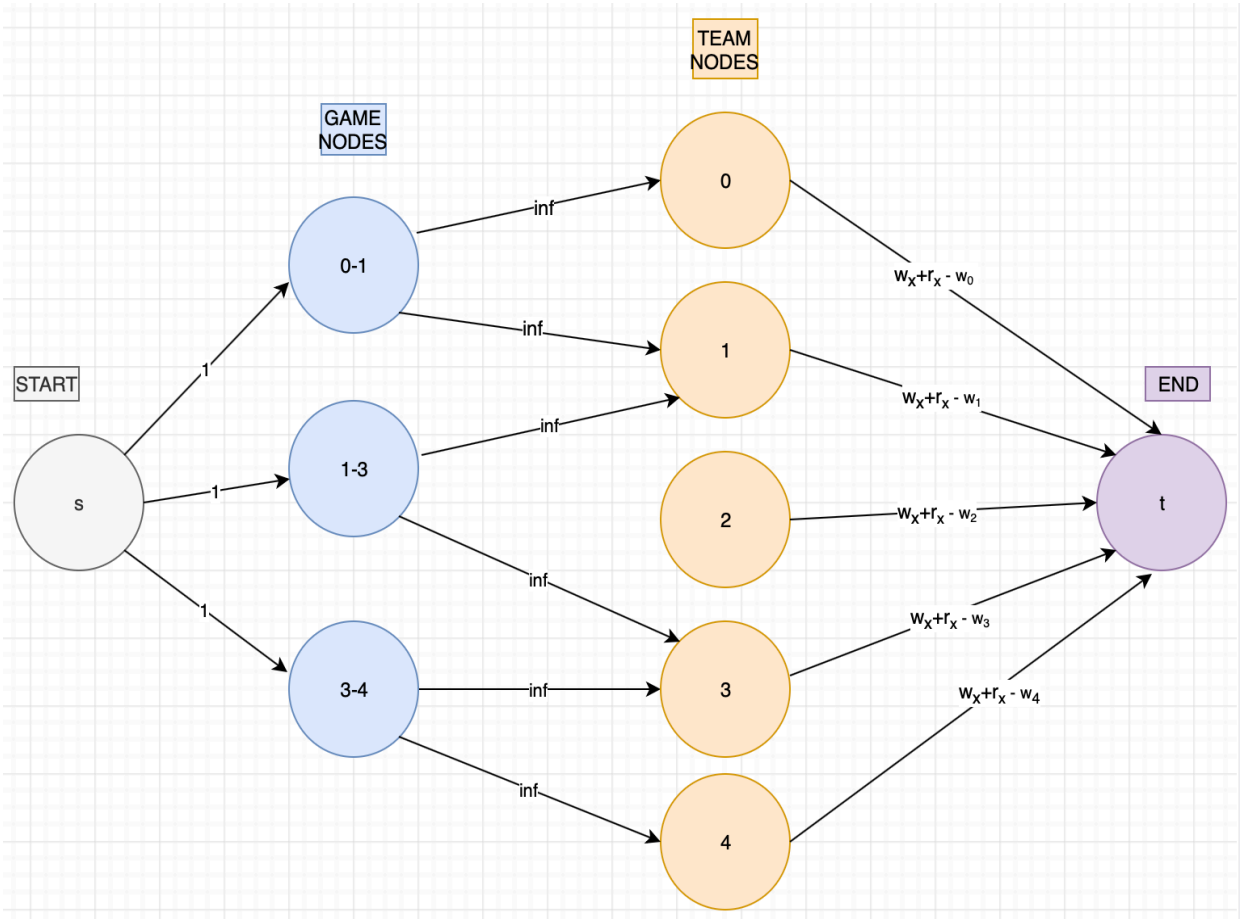
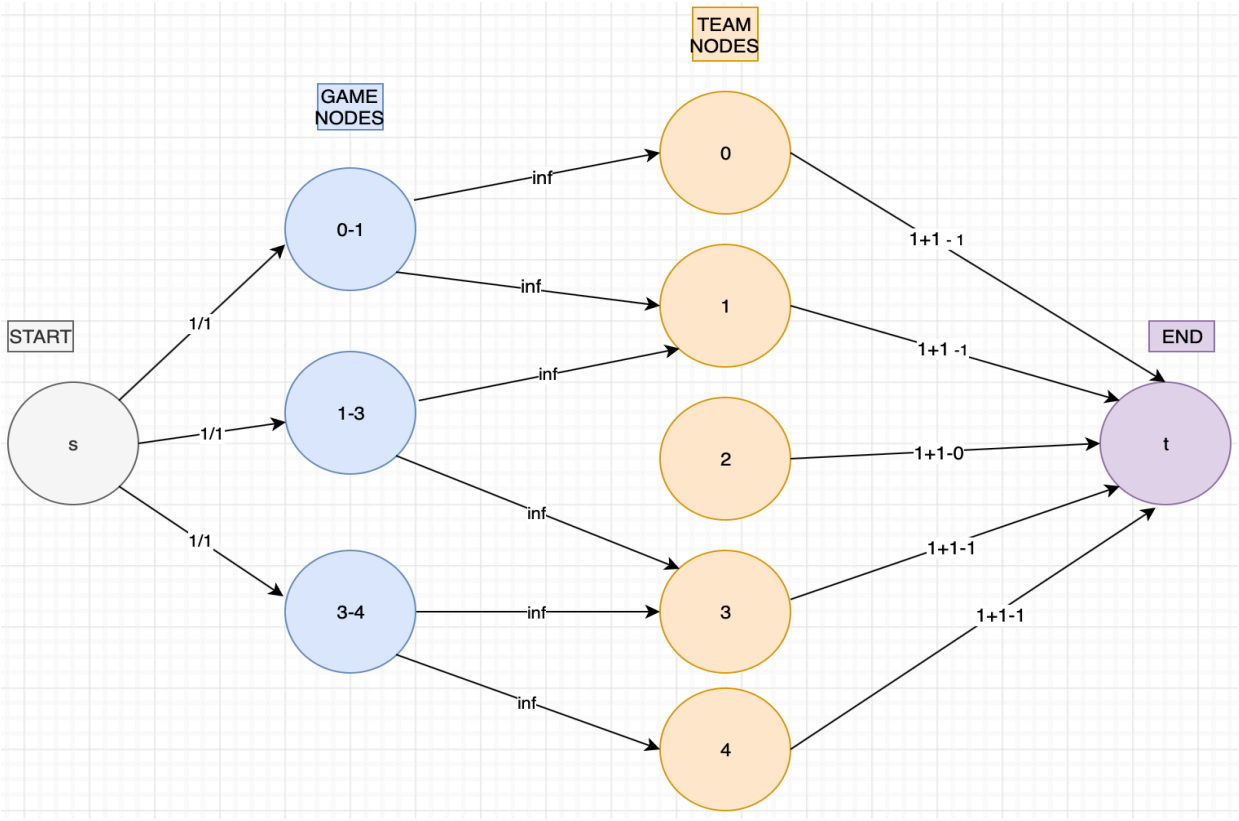
150160510

PROBLEM FORMULATION



Picture 1 Network Representation

For formulating this problem using Network Flow, we need to represent games and teams as nodes. After that we need to add a source and an end node to them. Then we are ready to use this network. From source to games we need to give remaining number of games matching teams as capacities to edges. From games to teams we need to give infinity to their edge capacities. From teams to end node we need to give selected teams wins + remaining games – wins of team node as capacity.

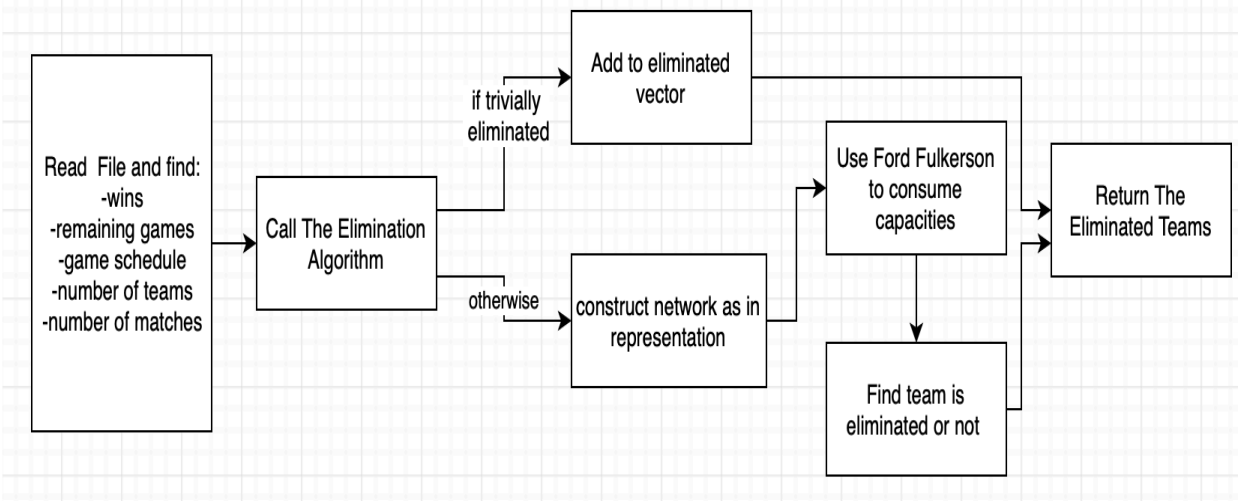


Picture 2 Flow Values

Lets assume we use input1.txt to build a network. In this network flow values are included. According to this representation We can say that 2 is already eliminated. Because it's wins + remaining games are less then the selected any game. So, if we select 0^{th} team to find if it is eliminated or not, We need to look capacities if they are consumed or not.

METHOD DESCRIPTION

To solve this problem in base step, I checked all the teams if they are trivially eliminated or not as team 2 for input1.txt. After that, if the team is not trivially eliminated I created the flow network and I used Ford Fulkerson Algorithm to detect if given team eliminated or not. I checked flow and capacity values of the edges.



TIME AND SPACE COMPLEXITIES

My algorithms complexity is O(V*E^2) because I am using breadth first search algorithm and it takes O(V^2) and we are using adjacency matrix so time complexity becomes O(V*E^2). This implementation requires O((2*v)^2) space because of adjacency matrix and sum of team number, game number and 2.

A SIMPLER ELIMINATION RULE

NO. Because the winning chance does not depend on a team's wins and remaining matches. It also depends on the other teams wins and remaining matches. For example think like, teams just wins or loses all matches. If team A wins all matches against team B and team B loses all matches against team C then team A and C wins their all matches. So it is not proper to implement a solution as given in the question.

HOW TO RUN CODE ?