HelpFromRabbeim

Benjamin Katz

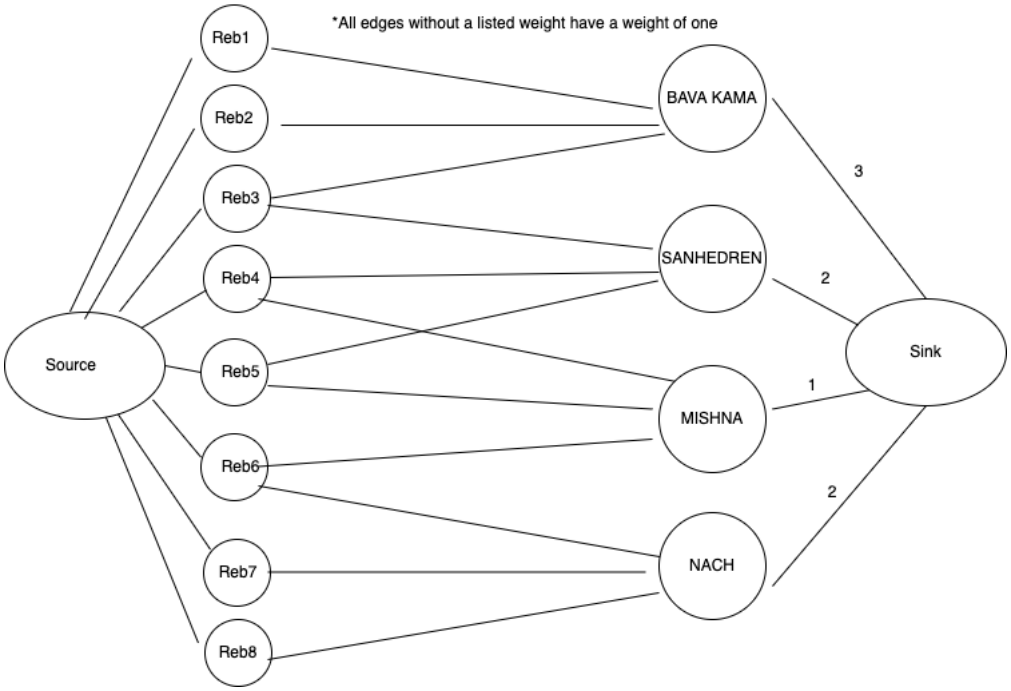
May 2022

1 Model

We can model this problem as a bipartite graph with Rebbeim on one side of the graph and teachable topics on the other side. When a given Rebbe is able to tutor for a given subject an edge is drawn between them with weight one(since he can only teach it once on a given day). We can then create a source vertex which essentially 'dispatches' all the rebbeim so an edge with weight one is drawn from the source to every Rebbe. A sink vertex is made, and an edge from every topic to the sink with the weight of the amount of students requesting tutoring for that topic is drawn. Now it can be seen as a network flow problem trying to divert the help to where it is needed most, or 'maximize flow' using Ford Fulkerson.

2 Justification

Every Rebbe has exactly one incoming edge from the source so it must be selected. Every topic can have multiple edges of weight one going in to it. Every topic only has a single edge leaving but it could have a weight ¿ 1. A Ford Fulkerson algorithm works to maximize the flow of the graph such that the edges to the sink will have a flow that will equal the weight if it is feasible (See slide deck: Applications of Network Flow)


*All edges without a listed weight have a weight of one
Reb1
Reb2
Reb3
Reb4
Reb5
Reb6
Reb7
Reb8
Source
BAVA KAMA
SANHEDREN
MISHNA
NACH
Sink
3
2
1
2