Networks and Markets

Hw2 submission

Part 5: Experimental Evaluations

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10.

(b)  
i. Let

be a capacitated graph, where:

for every matching , we can define the following flow in :

And that's easy to see that .

Also, let be an integer max flow in the graph, then we can define a matching by

is a matching because there's only one edge that goes into each and its capacity is , and therefore, there can't be more than one s.t   
.

We've seen that for every matching , there's a flow , s.t. , and that there's a matching for the integer max-flow , s.t.   
, and therefore if there's an integer max-flow, its value is the maximal number of matches.

However, as a corollary from the Augmenting Path algorithm there's an integer max-flow, and therefore we can run on the augmenting path algorithm to find an integer max-flow and output the maximal flow's value as the maximum number of matches.

ii. In part i, we've seen how to define a maximal matching from an integer max-flow in (definition ), we can find that integer max-flow by running the augmenting path algorithm on and then use definition to find the maximal matching.

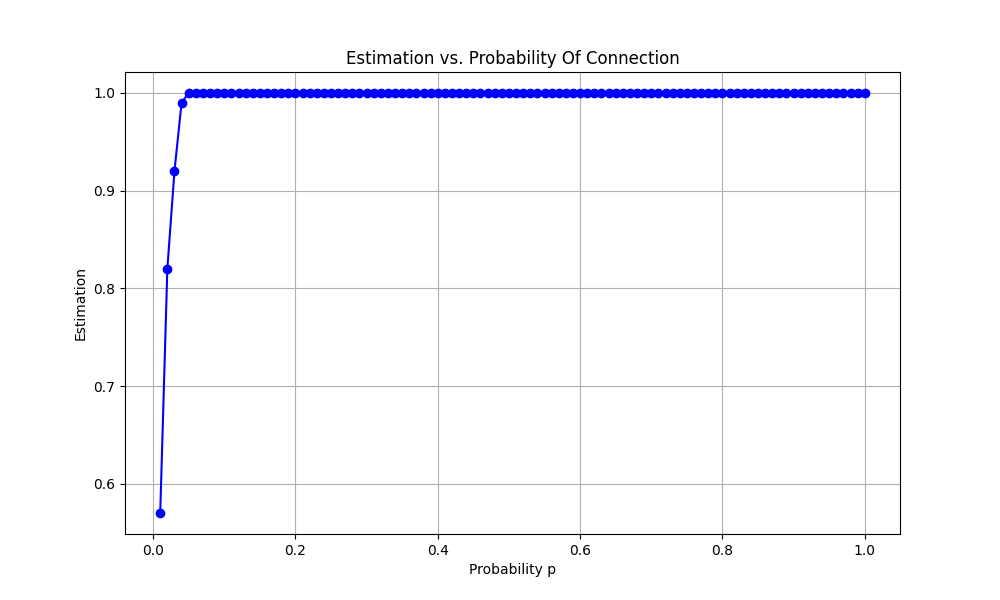
(c) In our first example, there were five drivers and five riders, driver 0 could only be matched to rider 1, driver 1 could only be matched to riders 0, 1, driver 2 could only be matched to rider 0, driver 3 could only be matched to riders 2 and 4, driver 4 could only be matched to riders 2, 3.

In that example we found out that the size of the maximal matching is four and an instance of such matching is the instance where driver 0 is matched to rider 1, driver 1 is matched to rider 0, driver 3 is matched to rider 2, rider 3 is matched to rider 3 and driver 3 and rider 4 are left unmatched.

In our second example, there were four drivers and four riders, where driver could be matched to riders and , except the last driver that could only be matched to rider .

In that example we found that the size of the maximal matching is 4 and that in that matching driver is matched to rider

(d) We fixed because was too much. We got the following results:



to estimate the probability we computed a case of drivers and riders where each driver could be connected to each rider with probability , then we fixed the connections according to that to or , and divided the size of the maximal matching by .