Discrete Algorithms - Max Flow algorithms

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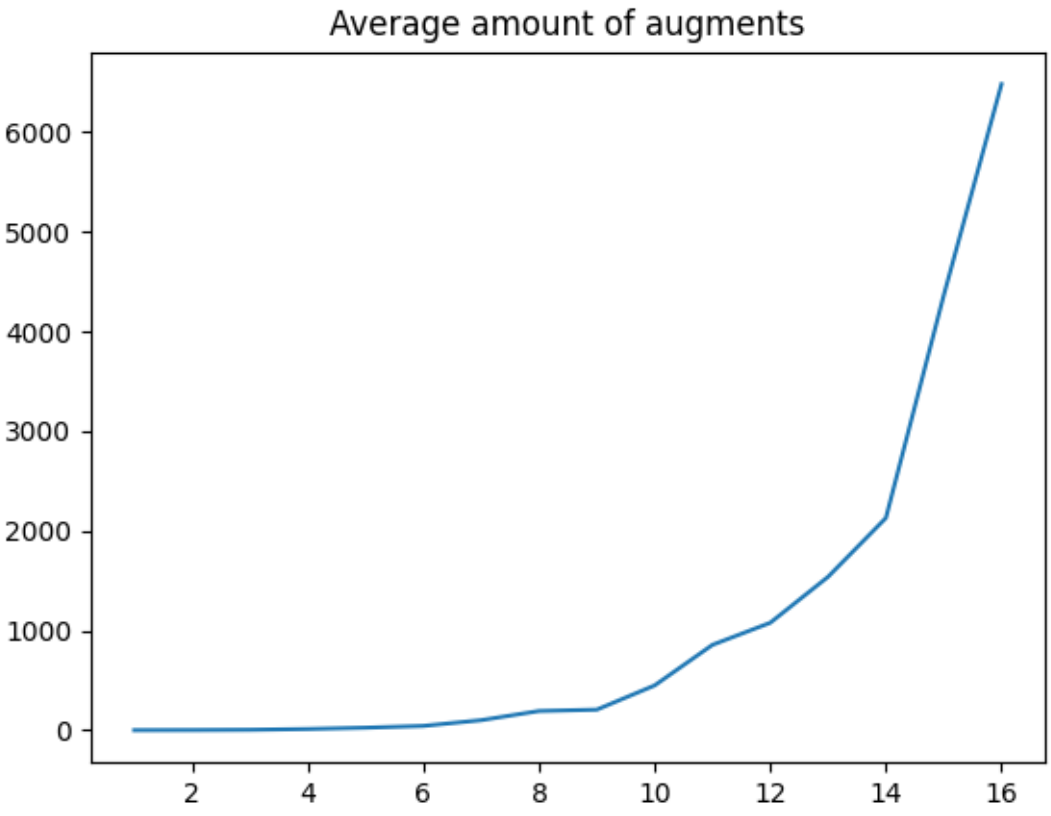
1 Exercise. Edmund Karp on HyperCube

Goal of this exercise was to

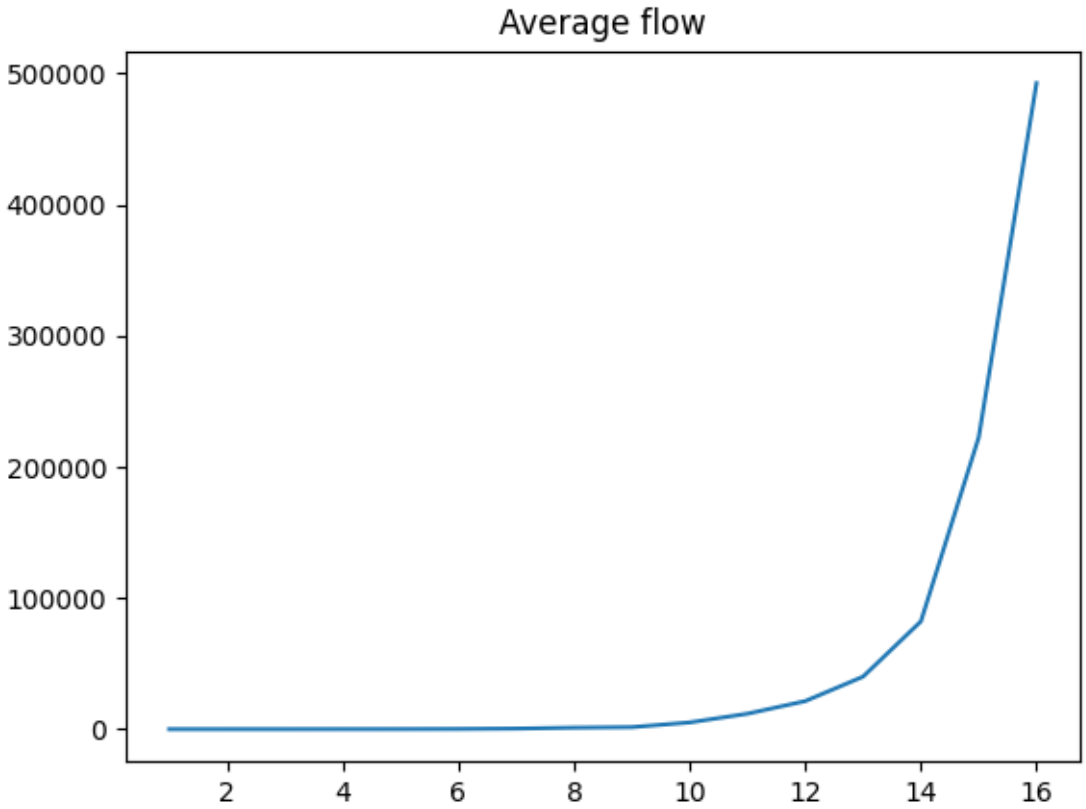
1. create graph of hypercube with random residual capacities from given range
2. find max flow from $(0)^n$ to $(1)^n$
3. conduct tests for several k where k is amount of dimensions of cube.

1.1 Plots



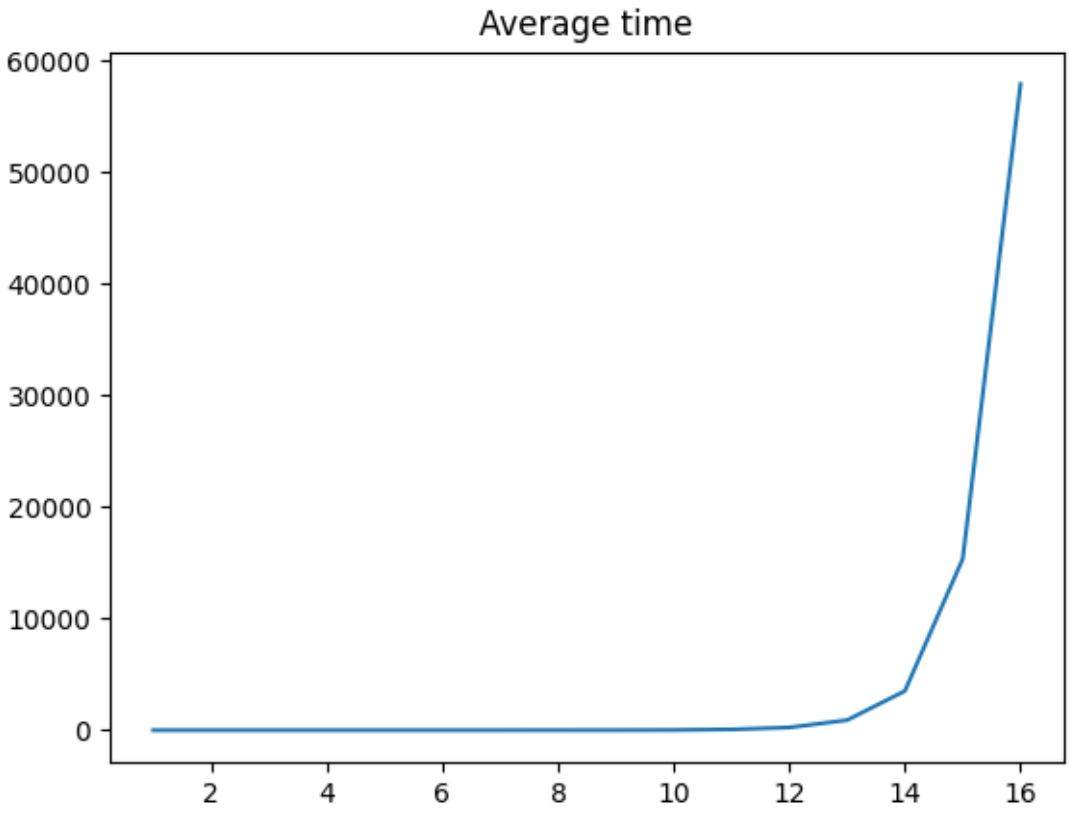
2 Exercise. Edmund Karp. Maximum Bipartite Matching

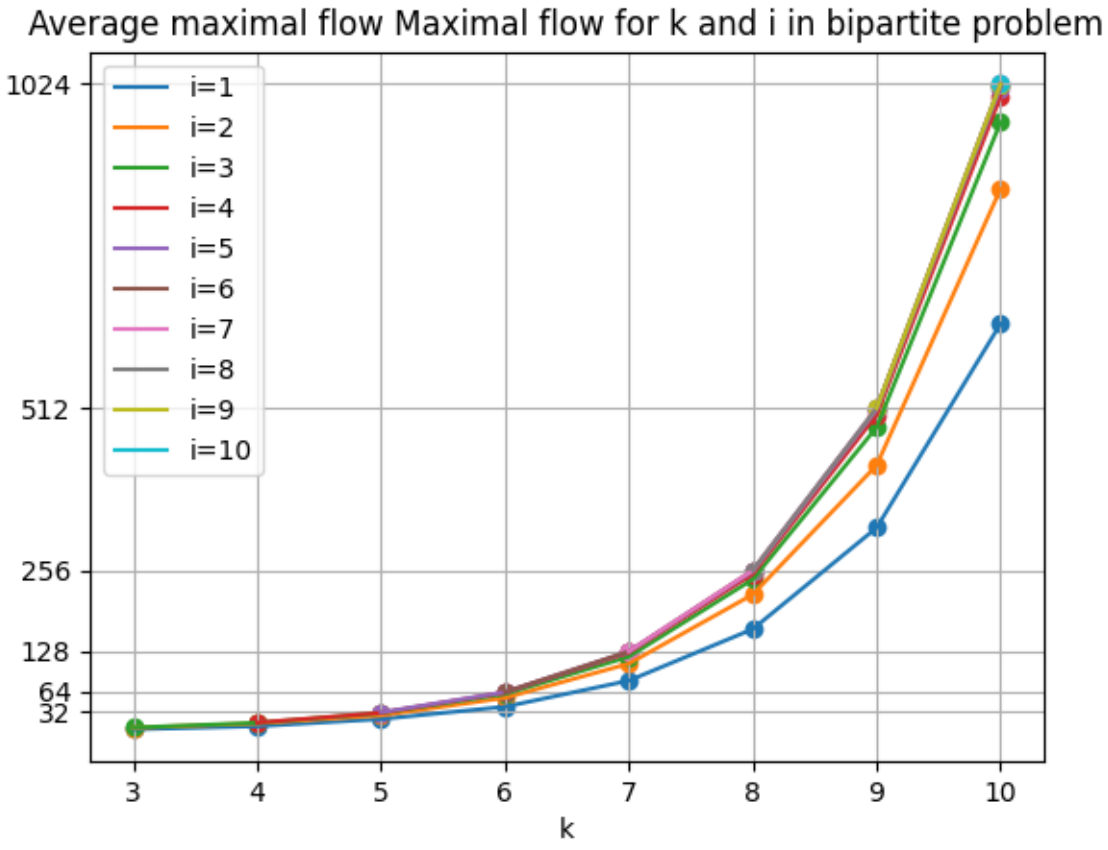
In this exercise we should find maximum matching for bipartite graph. We will use edmund karp algorithm for it, by reducing maximum bipartite matching to max flow problem through adding source with edges to

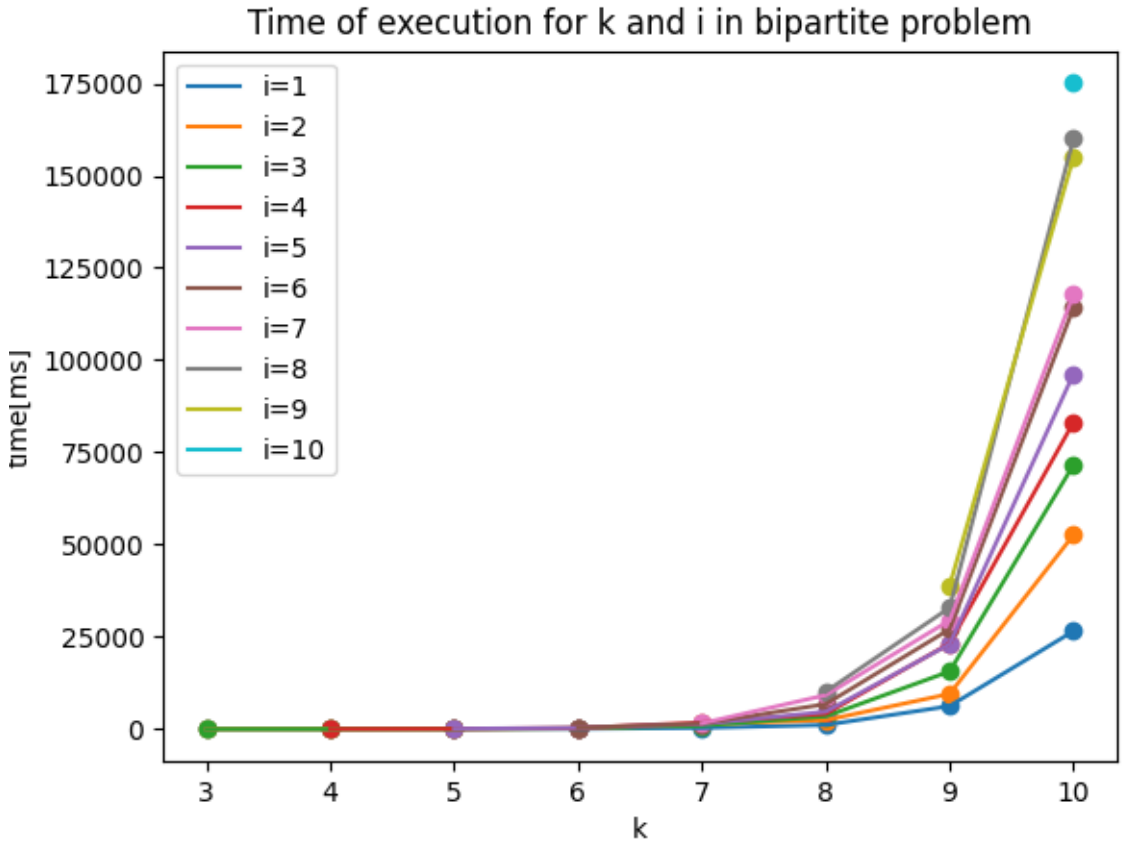


all vertices from first set and sink with edges from every vertice from set2 towards sink.

2.1 Plots


Average time
60000
50000
40000
30000
20000
10000
0
2
4
6
8
10
12
14
16


Average maximal flow Maximal flow for k and i in bipartite problem
1024
512
256
128
64
32
i=1
i=2
i=3
i=4
i=5
i=6
i=7
i=8
i=9
i=10
3
4
5
6
7
8
9
10
k


Time of execution for k and i in bipartite problem
time[ms]
k
i=1
i=2
i=3
i=4
i=5
i=6
i=7
i=8
i=9
i=10
175000
150000
125000
100000
75000
50000
25000
0
3
4
5
6
7
8
9
10