MEC Day 5 Assignment Results

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May 25, 2018

Q1 One to many matching

Here are my results for Q1 with (1) Kelso-Crawford algorithm and (2) linear programming with Gurobi solving the primal and (3) linear programming with Gurobi solving the dual problem. As we can see below, the total value and the optimal assignment is same across the three methods. However, we get different wages, while wages from method (1) are the lowest.

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[1] "Kelso-Crawford algorithm converged in 96 steps and 0.0519999999999996s."
[1] "Precision error is = 0"
[1] "Total social output of the optimal assignment is = 5.58009814705259"
The optimal assignment is as follows:
     Var1 Var2 Var3 Var4 Var5
[1,]    1    0    0    0    1
[2,]    0    1    1    1    0
Wages workers get are:
[1] 0.39 0.20 0.35 0.24 0.44
Utilities firms get are:
[1] 1.768972 2.211126
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[1] "Value of the problem (Gurobi) =5.58009814705259"
The optimal assignment is as follows:
     [,1] [,2] [,3] [,4] [,5]
[1,]    1    0    0    0    1
[2,]    0    1    1    1    0
Wages workers get are:
[1] 0.3845292 0.1941625 0.4662076 0.2397148 0.4312576
Utilities firms get are:
[1] 1.763185 2.101041
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[1] "Value of the dual problem (Gurobi) =5.58009814705259"
The optimal assignment is as follows:
     [,1] [,2] [,3] [,4] [,5]
[1,]    1    0    0    0    1
[2,]    0    1    1    1    0
Wages workers get are:
[1] 0.3845292 0.2062065 0.3872958 0.2727517 0.5496189
Utilities firms get are:
[1] 1.644824 2.134872
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Q2 NTU and Immediate Acceptance

With utility specified in this question:

$$\phi_{Bj} = (\sum_{i \in B} (\phi_{ij}^2))^{\frac{1}{2}}$$

firms will prefer to hire workers individually instead of groups.