

NETB507 - Assignment Problem

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1 Introduction

The assignment problem is a fundamental combinatorial optimization problem. In its most general form, the problem is as follows:

The problem instance has a number of agents and a number of tasks. Any agent can be assigned to perform any task, incurring some cost that may vary depending on the agent-task assignment. It is required to perform as many tasks as possible by assigning at most one agent to each task and at most one task to each agent, in such a way that the total cost of the assignment is minimized.

2 Method used to solve the assignment

2.1 The Hungarian method

The first thing we have to determine is if agents equals the tasks then assignment is balanced, if not its unbalanced.

2.1.1 Step 1

For the first step we have to find the smallest element in the the row and subtract it from all the elements in that row.

2.1.2 Step 2

With the table acquired from the previous step, we can continue to the next one. Find the smallest element in each column and subtract it from all the elements in that column.

2.1.3 Step 3

With the calculations from the previous two steps, we can work with the data to find the most optimal solution. Step 3 is to find the row containing only one zero and mark it as 'O', and mark the other zeros in that column with 'X', continue to execute 'Step 3' till all rows and columns have been examined.

2.1.4 Step 4

With the data acquired we can return the optimal result.

2.1.5 Unbalanced

If the assignment is unbalanced we add another column with zeros, so we can start the algorithm.

3 Conclusion

The algorithm works only with the examples used here: [https://www.brainkart.com/article/Solution-of-assignment-problems-\(Hungarian-Method\)_39044/](https://www.brainkart.com/article/Solution-of-assignment-problems-(Hungarian-Method)_39044/)