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ASSIGNING TEACHING STAFFS FOR TEACHING VARIOUS SUBJECTS IN COLLEGE

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ABSTRACT

An assignment model is one of the most important techniques of operations research. It consists of assigning a number of resources to an equal number of activities assuming that there are the numbers of resources equal to the number of tasks available. The objective of assignment is to minimize the total cost or to maximize the total profit. This paper presents a review pertaining to assignment problem within the education area for assigning teaching staff to different subjects so that the percentage of result is maximized.

KEYWORDS

Hungarian method, assignment problem, optimal solution.

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INTRODUCTION

Assignment problem is most important technique of operation research to find optimal solution of given problem in the area of business, economics, and education and even in day to day life activities. The area of application of assignment problem is very vast and used for the purpose of decision making such as:

- i) Assign of different workers to different machines
- ii) Assign of different jobs to different workers.
- iii) Assign sales people to sales territories
- iv) Assign different products to different machines
- v) Assign different subjects to different faculties
- vi) Assign batting position to batsman

One of the most widely used methods for solving assignment problems is called, the Hungarian method. This method of assignment was developed by the Hungarian Mathematician D. Konig in 1955, and is therefore known as Hungarian method of assignment problem.

There are many types of assignment problems, such as:

1. Minimization problems: Related to objective of minimization of cost, time, loss, expenses, distance etc.
2. Maximization problems: Related to objective of maximization of profit, sales, income, runs, exam result etc.
3. Unbalanced problem: when available resources are not equal to available activities/tasks i.e. numbers of rows are not equals to number of columns.
4. Impossible assignment: when a particular job cannot be completed by machine or worker. The reasons are numerous such as lack of required skills, deficiency in technical knowhow, improper training, and physical inability are few reasons.

Hungarian method of assignment is applicable only when problem is related to minimization and balanced problem (Rows = Columns)

REVIEW OF LITERATURE

Importance of allocation of different jobs to various machines by assignment method was explain by the A. Seethalakshmy and N. Srinivasan in 2013 which provide the new approach to solve unbalanced assignment problem. ElSiddigIdriss Mohamed Idriss & Elfarazdag Mahjoub Mohamed Hussein (2013) has given the application of linear programming problem specially assignment model to solve complex business problem. They have given customization model to reduce the cost of resource allocation. A. Ahmed and Afaq Ahmad in 2014 have given a new method is for finding an optimal solution of a wide range of assignment problems, directly.

OBJECTIVES

1. To assigning various subjects to various lecturers so that result can be maximised.
2. To use operation research technique to find required solution.

HYPOTHESIS

1. All the available lecturers can teach given subjects.
2. The efficiency of teacher can be measured in terms of result

RESEARCH METHODOLOGY

This study is based on exploratory research which provides practical solution of real life given problem. Last 5 years results of students in various subjects were used to develop payoff matrix. Operation research technique that is assignment method is used to solve the problem. The problem is related to maximization of results on the basis of that subjects will be assigned to different lecturers. In the given problem one restriction is that in future Rajiv will not teach economics subject.

RESULTS AND DISCUSSION**Mathematical Formulation of Assignment Problem**

Each assignment problem has a matrix associated with it. Generally, the row contains the resources or people we wish to assign and the column comprise the jobs, tasks or activities we want them assigned to. In this study available lectures were shown in rows and different subjects were shown in columns. Payoff matrix was developed on the basis of last 5 years result of lectures in teaching various subjects in percentage. (See Table: 1).

TABLE 1: PAYOFF TABLE (Result in %)

Lecturers/Subjects	Economics	Statistics	Accountancy	Management
Ashish	75	85	90	65
Manish	85	78	92	76
Rajiv	69	91	88	77
Khushboo	80	100	90	80

The steps for solving this assignment problem using the Hungarian method are given below:

Step 1: The above problem is related to maximization of result, so first convert maximization in minimization problem by subtracting all the entries of the original payoff table from the maximum entry of that table.

TABLE 2: RELATIVE LOSS TABLE (Result in %)

Lecturers	Economics	Statistics	Accountancy	Management
Ashish	25	15	10	35
Manish	15	22	8	22
Rajiv	31	9	12	24
Khushboo	20	0	10	20

Step 2: Problem is balanced that is number of rows (4) = number of columns (4). So there is no need to add dummy row or column.

TABLE 3

15	5	0	25
7	14	0	14
22	0	3	15
20	0	10	20

Step: 3 Row Deduction- Subtract least entry of each row from all the entries of that row to obtain row reduced matrix.

TABLE 4

8	5	0	11
0	14	0	0
15	0	3	1
13	0	10	6

Step: 4 Column Deduction- In the reduced matrix subtract least entry of each column from all the entries of that column to obtain column reduced matrix.

TABLE 5

8	5	0	11
0	14	0	0
15	0	3	1
13	0	10	6

Step: 5 Draw minimum number of lines (horizontally and/or vertically) to cover all the zeros.

TABLE 6

7	5	0	10
0	15	1	0
14	0	3	0
12	0	10	5

Step: 6 Optimality Test-Number of drawn lines (3) ≠ number of rows or columns (4), so solution is not optimal.

TABLE 7

7	5	0	10
0	15	1	0
14	0	3	0
12	0	10	5

Step: 7 For Optimal Solution- Select smallest value from all the uncovered values (here it is 1) subtract this from all the uncovered values, add it to all the values which are at the intersection of two lines and other covered values will remain unchanged. The revised matrix is-

Step: 8 Repeat step number 5 and draw minimum number of lines to cover all the zeros.

Step: 9 Now number of lines (4) = number of rows or columns (4), so solution is optimal.

Step: 10 Final Assignment- Starting from the top row examine rows successively until a row with exactly one zero is obtained. Make an assignment to this single zero by making a square around it and cross all other zeros in the same row and/or column of that zero. If zero is not found in row search in column also. Continue these processes until all zeros in rows/ columns are either enclosed or cross. If all the rows/columns have at least one square box then assignment process is completed.

TABLE 8

Lecturers/Subjects	Economics	Statistics	Accountancy	Management
Ashish	7	5	0	10
Manish	0	15	1	0
Rajiv	14	3	3	0
Khushboo	12	0	10	5

Step: 11 We will write values from original payoff matrix Table: 1

TABLE 9

Lecturers	Subjects	Result %
Ashish	Accountancy	90
Manish	Economics	85
Rajiv	Management	77
Khushboo	Statistics	100
Total:		352

FINDINGS

Since problem was related to assigning different subjects to lecturers which will give maximum result. Out of 400 (100 percent * 4), 352 is maximum.

CONCLUSION

This paper seeks to solve a real-life problem of an assigning staffs to different subjects using the Hungarian assignment technique and provide true and real solution.

RECOMMENDATION

The use of a scientific approach gives a systematic and transparent solution as compared with a haphazard method. Using the more scientific assignment problem model for the placement and selection of the school's staff to various subjects gives a better result.

Management may benefit from the proposed approach for placement and selection of staff to guarantee optimal results from staff. I therefore recommend that the assignment problem model should be adopted by the college for assigning subjects to staffs.

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