

An example I found is from a journal article “Student learning time analysis during COVID-19 using linear programming - Simplex method” by Pardeshi et al.

Optimization Function:

Therefore, the LP Model to maximize the optimization function Z to assess the learning activity with an instructor and without an instructor is as follows:

$$\text{Maximize } Z = 3X_1 + 5X_2 \quad (2)$$

Subject to following constraints

$$214X_1 + 616X_2 \leq 4$$

$$589X_1 + 209X_2 \leq 5.5$$

$$55X_1 + 33X_2 \leq 7$$

Where $X_1, X_2 > 0$.

The summarization of the data to form the LP model is given in Table 4.

To optimize the function of learning activity, it is necessary to introduce three non-negative slack variables S_1, S_2 and S_3 variables. Add them to convert to non-equality to equality constraints, shown in eq (3).

$$Z = 3X_1 + 5X_2 + 0S_1 + 0S_2 + 0S_3 \quad (3)$$

Subject to the following constraints

$$214X_1 + 616X_2 + S_1 = 4 \quad (4)$$

$$589X_1 + 209X_2 + S_2 = 5.5 \quad (5)$$

$$55X_1 + 33X_2 + S_3 = 7 \quad (6)$$

Where $X_1, X_2, S_1, S_2, S_3 \geq 0$.

Figure 1. Screenshot of the Optimization model from the journal article of Pardeshi et al.

From the figure above, we can see that the model is continuous since there are decimal numbers on the constraints. Also, the optimization model is constrained since we can see constraints. We can also see that it is single-objective since there is only one objective function. Furthermore, since the constraints, on the left side of the inequalities are number of students, it is dynamic.

Additionally, the type of the optimization model, as mentioned also in the journal article, is an LP model.

The objective function in their model is to

$$\text{Maximize } Z = 3X_1 + 5X_2 \quad (2)$$

And the constraints are

$$214X_1 + 616X_2 \leq 4$$

$$589X_1 + 209X_2 \leq 5.5$$

$$55X_1 + 33X_2 \leq 7$$

$$\text{Where } X_1, X_2 > 0.$$

Where the domain is all real numbers.

The optimal solution found on the article is that $X_1 = 0.009332341$ and $X_2 = 0.006432907$ with $Z = 0.06016155$.

References

Pardeshi (Assistant Professor), S., Gawade (PhD, Professor), S., & Hemant (PhD, Senior Research), P. (2022, March 15). *Student learning time analysis during COVID-19 using linear programming - simplex method*. Social Sciences & Humanities Open. <https://www.sciencedirect.com/science/article/pii/S2590291122000201>