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Analysis on Optimizing in the Pre-Production Stage of The Tamil Movie Making

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ABSTRACT

[1] The Indian media and entertainment industry are of the fastest growing industries in the country. The status of the Tamil Movie productions attains new heights in the recent times. [1] The movie making is a process which takes a number of days to years to complete. This research, proposes to create a model by [3] Optimization technique for the effective pre-production stage of the Tamil movie making to fulfill the goal of maximizing the profit of production. The tool identify the genre of the movie is Simplex method.

Keywords: Pre-Production, Casting, Linear Programming, Simplex Method and Project Object Model (POM)

Introduction

The Production cost of Tamil Movies is increasing steadily due to the economic growth. Hence it is a time for the producers to adapt an optimization technique to the celluloid industry. [2] Linear programming is the mathematical technique for the optimum allocation of limited resources such as labour, material, machine, capital, energy, and so on, to several computing activities ,such as products, services ,jobs, new equipment, projects, and so on, on the basis of given criterion of optimality. The [4] simplex method examines the linear programming problem in a systematic manner, repeating the steps of the algorithm until an optimal solution is reached [11],[12]. Here the software POM is applied to solve the linear programming problem of 11 decision variables and 14 constraints.

Methodology and materals

Data Collection

The Tamil Movies released during the years 2010 has been taken for the study. The genres of all the movies are grouped in ten major categories. The details of Tamil Movies produced in 2010 are given to the sixty respondents and they are informed to fill the questionnaire given to them. (Table1).

From the available data, it is evident that the Kollywood viewers like the movies falls under the genre Drama and Romance. The action and comedy grabbed the next two positions respectively (Figure1). When we compared the data of movies taken against the hit movies a different scenario is observed in fig 2.

2010	
Genre	No of movies
Action	27
Adult	6
comedy	7
Crime	1
Drama	34
Fantacy	4
masala	9
Romance	34
Thriller	10
Horror	1
others	8
Total	141

Table 1

Data Collection on Genres of Tamil Movies [1] (Source: Wikipedia)

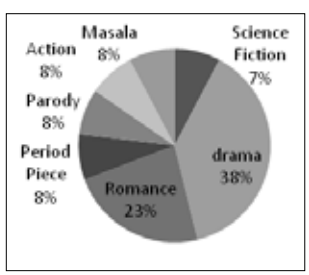

Fig 1 Shows composition of genres of Tamil Hit Movies in 2010

Linear Programming Problem

[5] Linear programming problem [LPP] essentially consists of three Components (i) The activities (Variables) and their relationship (ii) The Objective function and (iii) The constraints such as job. Here the decision variable which decides the genre of a movie is represented by X_1, X_2 ……X_n. All decision variables are continuous, controllable and non-negative. That is $X_1 \geq 0, X_2 \geq 0 \ldots X_n \geq 0$, the objective function is represented in one of two forms Optimize (Maximize or Minimize) $Z = c_1 x_1 + c_2 x_2 + .. c_n x_n$

[3] Where Z is the measure of performance variable, Which is a function of X_1, X_2 ……X_n The C_1, C_2 ……..C_n are parameters or uncontrollable variables that give the contribution of a unit of respective variables X_1, X_2 ……X_n to the measure of performance Z. budget of the movie. There are always some certain limitations (or constraints) on the use of limited resource like Artist, Technician, Cine equipment, weather etc. Such constraints must be expressed as a linear equalities or inequalities in terms of decision variables. The solution of the LP model should satisfy the constraint.

C. Mathematical Formulation of LPP

Optimize (Max or Min)

$Z = \sum_{j=1}^{n} c_j x_j + \sum_{i=1}^{m} os_i$

$z=c_1 x_1+c_2 x_2+\ldots\ldots\ldots\ldots c_{n1} x_n+0s_1+0_{s2}+0s_n$

Subject to the linear constraints

$\sum_{j=1}^{n} a_{ij} x_j + s_i = b_i \; ; \quad i = 1,2 \ldots$ **m (constraints)**

$x_i, s_j \geq 0$ for all i and j (Non-negativity conditions)

In Matrix notations the standard form is expressed as:

Optimize (Max or Min) z=cx+os

$where\ c = (c_1, c_2 \ldots\ldots\ldots c_n)\ is\ the\ row\ vector,$
$\boldsymbol{X} = (x_1, x_2 \ldots\ldots\ldots\ldots x_n)^T, \boldsymbol{b} = (b_1, b_2 \ldots\ldots\ldots b_m)^T and$
$\boldsymbol{S} = (s_1, s_2 \ldots\ldots\ldots s_m)\ are\ column\ vectors,$
$and\ \boldsymbol{A}\ is\ the\ m \times n matrix\ of\ coefficient\ of\ variables$
$x_1, x_2 \ldots\ldots\ldots\ldots x_n\ in\ the\ constarints.$

D. Simplex algorithm

The steps of the simplex algorithm [5] for obtaining an optimal solution to a linear programming problem as follows:

Step 1: Formulate the mathematical model of the given linear programming problem. There should be an objective function, subject to the constraints and Non-negative constraints.

Step 2: Set-up the initial solution.

Write down the coefficients of all the variables in the LP Model in a tabular form, as shown in Table 2, in order to get an initial basic feasible solution [xB=B^(-1)b]

Step 3: Test for Optimality.

Calculate c_j-z_j value for all non-basic variables and examine the values of c_j- z_j .The following three cases may arise:

If all c_j- $z_j \leq 0$ then the basic feasible solution is optimal.

If at least one column of the coefficients matrix (i.e ak) for which c_k- $z_k > 0$ and all other elements are negative (i.e. aik < 0) then there exits an un bounded solution to the given problem.

If at least one c_j- z_j >0 and each of these columns have at least one positive element (i.e. aij) for some row, then this indicates that an improvement in the value of objective function Z is possible.

Step 4: Select the variable to enter the basis.

If case (iii) of step 3 holds, then identify the pivot or key column by using the equation ck- zk = Max {c_j- z_j; c_j- z_j >0}

Step 5: Test for feasibility (variable to leave the basis).

Find the minimum ratio= $\text{Min}\{\frac{x_{Bi}}{a_{rj}} ; a_{rj} > 0\}$ This ratio limits the number of units of the incoming variable that can be obtained from the exchange. The division by a negative or by a zero element is not permitted. The row selected in this manner is called key or pivot row. The element lies at the intersection of key row or key column is called key or pivot element.

Step 6: Finding the new solution.

The new entries in C_B (Coefficient of basis variables) and XB (Value of basic variables) columns are updated in the new simplex table of the current solution.

Step 7: Repeat the procedure

Go to step 3and repeat the procedure until all the entries in the c_j - z_j are either negative or zero.

Table 2

Shows Cost table for Decision variables and constraints in the pre-production stage of movie making process

	Maximize Z	300 X1	200 X2	375 X3	275 X4	700 X5	275 X6	250 X7	350 X8	550 X9	450 X10	250 X11	≤
	Constraint	Action	Adult	Comedy	Crime	Drama	Fantasy	Horror	Masala	Romance	Thriller	Others	
M1	Artist	210	75	200	220	280	195	180	175	150	150	125	2750
M2	Story	8	7	8	9	10	6	7	5	6	7	6	100
M3	Cine	10	8	9	10	20	12	13	14	12	16	13	150
M4	Transport	7	5	8	4	5	3	5	5	6	8	6	85
M5	Location	10	10	15	10	15	6	8	20	14	20	9	175
M6	ation	3	4	3	4	6	2	3	3	5	3	3	40
M7	Film	8	8	8	8	10	5	5	6	10	10	6	90
M8	Stunts	10	8	9	7	25	11	9	7	20	12	8	150
M9	Weather	5	4	3	4	10	5	3	4	7	8	4	65
M10	Costumes	2	1	2	2	4	2	2	2.5	4	2.5	2	40
M11	Telecine	4	3	4	4	5	4	4	4.5	5	4.5	4	50
M12	Food	2	2	2	2	3	3	2.5	3	3	3	3	45
M13	Office	3	2	3	2.5	3.5	3	1.5	4	3.5	4.5	3	50
M14	Advertiser	5	10	5	5	15	8	7	8	10	10	9	125

Defining the assignment problem for Casting of Tamil Movie

A square matrix of order 11×11 is obtained based on the genre of the movie. The artists for leading role are fixed based on the budget of the movie. Similar method is also applied for deciding the total salary for the technicians in the movie crew. In the cost table, the short listed artists are placed in the rows (resource) and the corresponding genres of the movies are treated as activities column. The call sheets offered by the artists to the various types of movies are indicated in the opportunity cells [8] of the cost table.

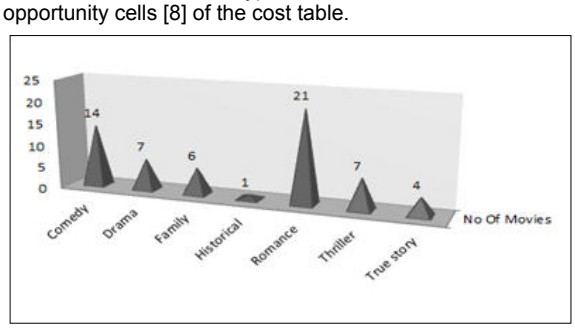

Fig 2.Shows Favorite Movie Genres of Respondents

Result

The Genre of the movie to be produced is allocated using the Simplex Method. In the LPP (table 3), Profit of each genre of a movie is the objective function and the 14 constraints involved in the pre-production stage of the different genres of Tamil movie are placed. The optimized values of the profit oriented genres are obtained at the end of iterations showed in table 4.

Table 3

Shows LPP of Simplex Method to the Pre-production stage of Tamil Movie using POM [5]

```
*** LINEAR PROGRAMMING ***
============================================================
PROBLEM NAME: Optimization in Pre-Production of Movie Making
============================================================
Max Z=  300 X1 + 200 X2 + 375 X3 + 275 X4 + 700 X5 + 275 X6 + 250 X7
+ 350 X8 + 550 X9 + 450 X10 + 250 X11
ST
(1)     210 X1 + 75 X2 + 200 X3 + 220 X4 + 280 X5 + 195 X6 + 180 X7
+ 175 X8 + 150 X9 + 150 X10 + 125 X11 <= 2750
(2)     8 X1 + 7 X2 + 8 X3 + 9 X4 + 10 X5 + 6 X6 + 7 X7 + 5 X8
+ 6 X9 + 7 X10 + 6 X11 <= 100
(3)     10 X1 + 8 X2 + 9 X3 + 10 X4 + 20 X5 + 12 X6 + 13 X7 + 14 X8
+ 12 X9 + 16 X10 + 13 X11 <= 150
(4)     7 X1 + 5 X2 + 8 X3 + 4 X4 + 5 X5 + 3 X6 + 5 X7 + 5 X8
+ 6 X9 + 8 X10 + 6 X11 <= 85
(5)     10 X1 + 10 X2 + 15 X3 + 10 X4 + 15 X5 + 6 X6 + 8 X7 + 20 X8
+ 14 X9 + 20 X10 + 9 X11 <= 175
(6)     3 X1 + 4 X2 + 3 X3 + 4 X4 + 6 X5 + 2 X6 + 3 X7 + 3 X8
+ 5 X9 + 3 X10 + 3 X11 <=  40
(7)     8 X1 + 8 X2 + 8 X3 + 8 X4 + 10 X5 + 5 X6 + 5 X7 + 6 X8
+ 10 X9 + 10 X10 + 6 X11 <=  90
(8)     10 X1 + 8 X2 + 9 X3 + 7 X4 + 25 X5 + 11 X6 + 9 X7 + 7 X8
+ 20 X9 + 12 X10 + 8 X11 <=  150
(9)     5 X1 + 4 X2 + 3 X3 + 4 X4 + 10 X5 + 5 X6 + 3 X7 + 4 X8
+ 7 X9 + 8 X10 + 4 X11 <=  65
(10)    2 X1 + 1 X2 + 2 X3 + 2 X4 + 4 X5 + 2 X6 + 2 X7 + 2.5 X8
+ 4 X9 + 2.5 X10 + 2 X11 <=  40
(11)    4 X1 + 3 X2 + 4 X3 + 4 X4 + 5 X5 + 4 X6 + 4 X7 + 4.5 X8
+ 5 X9 + 4.5 X10 + 4 X11 <=  50
(12)    2 X1 + 2 X2 + 2 X3 + 2 X4 + 3 X5 + 3 X6 + 2.5 X7 + 3 X8
+ 3 X9 + 3 X10 + 3 X11 <=  45
(13)    3 X1 + 2 X2 + 3 X3 + 2.5 X4 + 3.5 X5 + 3 X6 + 1.5 X7 + 4 X8
+ 3.5 X9 + 4.5 X10 + 3 X11 <=  50
(14)    5 X1 + 10 X2 + 5 X3 + 5 X4 + 15 X5 + 8 X6 + 7 X7 + 8 X8
+ 10 X9 + 10 X10 + 9 X11 <=  125
```

Table 4
Solution of LPP obtained by Simplex Method

```
SOLUTION:
=========================
ITERATION NUMBER  5

VARIABLE MIX        SOLUTION
------------        --------
Slack 1             611.147
Slack 2              16.905
Slack 3               6.299
Slack 4              16.797
Slack 5              13.853
X3                    4.004
X10                   2.208
X5                    3.420
X8                    0.281
Slack 10             12.089
Slack 11              5.682
Slack 12             19.264
Slack 13             14.957
Slack 14             29.351

 Z                 4987.554
```

Future Work

The result obtained by the above method can be continued to the Casting of the shooting process by the [8] Hungarian Assignment problem. [10] This paper can be implemented in the internal details of a movie recommender system. [9] The scheme can be used to drag the producers towards economic movie production. There are several ways in which our casting system of Tamil movies can be enhanced.

Conclusion

The Pre-production stage in a movie making is completed meaningfully by the application of LPP. Simplex method using POM leads to the effective production and enriched quality of the movie. Finally, the production unit's profit is maximized as when happened to their previous film production. This method can also be improved to do the film distribution and advertising.

REFERENCES

[1] Wikipedia, the free encyclopedia | [2] M. S. Bazarra, John J. Jarvis, Hanif D. Sherali, Linear programming and network flows, (2005). | [3] B. s. Goel, S. K. Mittal, Operations Research, Fifth Ed., (1982) 2405-2416. | [4] Hamdy A. Taha, Operations Research, an introduction, 8th Ed. (2007). | [5] J K Sharama, Operations Research Problems and Solutions, 3rd Ed. (2009). | [6] Anshuman Sahu, Rudrajit Tapador, Solving the assignment problem using genetic algorithm and simulated annealing, IJAM, (2007). | [7] Shayle R. Searle, Matrix algebra useful for statistics, John Wiley, (2006). IJMA November, 2011 | [8] Hadi Basirzadeh, Ones Assignment Method for Solving Assignment Problems : IJMA July, 2012 | [9] A Content-Based User Model Generation and Optimization Approach for Movie Recommendation Oznur KIRMEMIS, Aysenur BIRTURK Association for the Advancement of Artificial Intelligence | [10] MovieReco: A Recommendation System Dipankaj G Medhi, Juri Dakua World Academy of Science, Engineering and Technology 4 2005 | [11] S.Aramutha kannan, P.R.Kandasamy. Effect of Assignment Problem in Casting of the Tamil Movie IJPAMS Volume 6 issue 2 PP -133-142, Feb 2013 | [12] S.Aramutha kannan, P.R.Kandasamy. Revised Distribution Method of finding Optimal Solution for transportation Problems IOSR Journal of Mathematics .pp 42-46 vol 2 ,issu 5 Jan 2013 |