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A Decision Making System For Customers Of Car Showroom Using Topsis Method

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Abstract: This study aims to utilize the multi-criteria decision-making algorithm called TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) to help the customers to select a car which conforms their criteria. In this context, the criteria are been framed from the past record of sales. On using TOPSIS method, the models of the cars are prioritized.
Keywords: TOPSIS, Multi-criteria Decision Making.

1. INTRODUCTION:

A car showroom has customers from various interest. Some customers will go with cars with good mileage, some require a spacious car, and some will choose the car with more luxury and so on. So, the customer's interest is their criteria. In order to make them choose the cars out of available models, a decision tool is required. To address this requirement, decision-making system is used. If a customer is having more than one criteria, then it is required to use Multi-Criteria Decision making system. One of such MCDM techniques is TOPSIS. TOPSIS is a short form of "Technique for Order Preference by Similarity to Ideal Solution". TOPSIS is used in several applications, some of the literature, explains the usage of TOPSIS is reviewed below.

[1] Clustering of nodes is been done with TOPSIS in order to improve the performance of Wireless Sensor Networks [2] Fuzzy AHP and TOPSIS utilized to sort the solution to the barriers of the reverse logistics system. In order to improve the TOPSIS, a new extension is been proposed in [3]. The method follows the traces of hesitant fuzzy and Pythagoras fuzzy sets [4]. The TOPSIS method improves a lot with some of the hybrid techniques like Intuitionistic Fuzzy [5]. Several fields use Fuzzy TOPSIS such as Parameter minimization in Laser drilling Process uses fuzzy TOPSIS [6]**,** in Manufacturing Systems [7], in Supply chain Management Systems [8], Decision making on Stock exchange [9]

2. METHODOLOGY:

The given dataset has four parameters such as the price of the car, the mileage is given by the car inside the city and in a high way, and finally, the count of people can board (i.e) Number of seats in the car.

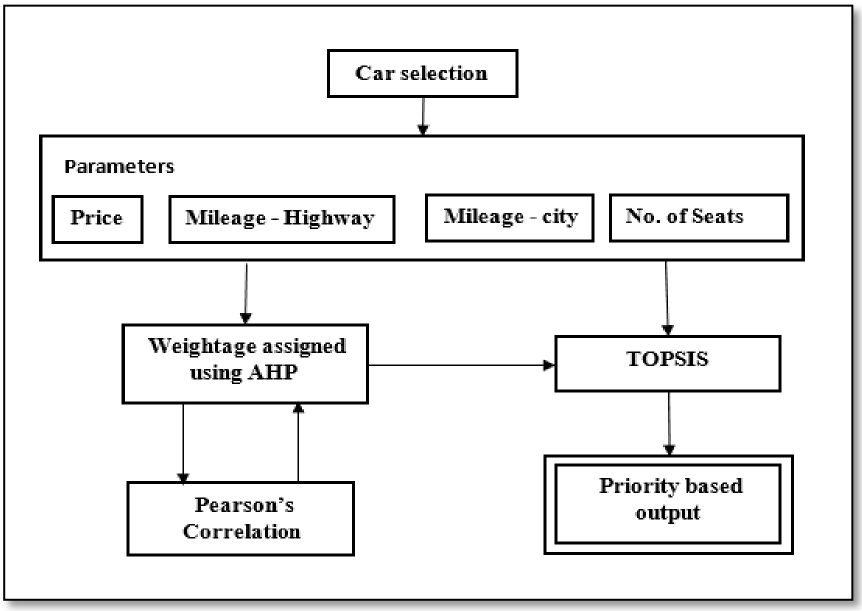

Figure 1: The General structure of the working system

Different people have a different priority, some people would like to choose a car with good mileage, and some used to go with a number of seats and price. Depending on the criteria of the people, the selection of the car can be made. In this study, the past record of sales is been analyzed and the weight for parameters are assigned using AHP [10]. These weights are given as an input to the TOPSIS methodology and processed to get sorted output.

Initially, the dataset is normalized to one in order to make the processing easier. The next step is assigning weights to the parameters. This can be done is several ways depends on the criteria given by the customers. In this study, based on the previous criteria of the customers, using Analytical Hierarchical Processing system the weights are assigned. The Pearson Correlation method is used to organize the parameters for AHP [11] and [12]. In past record of sales, the customers prioritized in such a way that the seating capacity has got first priority, next is, inside city mileage, and next is Highway mileage and finally, the price got the least priority. From these the ranking, it is known that the customers of the particular showroom have afforded the car with maximum luxury. So, the weight assigned to the parameters is given in table 1 below.

Table 1: Weight assigned to the parameters.

ameters	**ightage**
e	76
eage - Highway	46
eage - City	32
of Seats	05

3. ALGORITHM:

Step 1: The data set is assigned in a row-column manner to use it as a matrix.

Step 2: The Matrix is been normalized to one.

Step 3: The correlation is been found out using Pearson's correlation methodology and Weights are been found out using Eigenvector of AHP or any other methodology can be used to define the weights.

Step 4: The weight is been multiplied by the values of normalized Matrix. Now the matrix is called a weighted matrix.

Step 5: The distance between the weighted matrix and the zero matrices is calculated and the resultant matrix is called as Negative Distanced Matrix (NDM).

Step 6: The distance between the unit matrix and the weighted matrix is calculated and the resultant matrix is called as Positive Distanced Matrix (PDM).

Step 7: Relative Closeness is been found out using the formula given below.

$$Relative\ Closeness\ value = \frac{NDM}{PDM + NDM}$$

Step 8: With respect to the values of Relative Closeness, the rank is been assigned.

4. RESULTS AND DISCUSSION:

The decision can be made with the priority generated using relative closeness. The model of the cars, their price, mileage, and details of seats, along with their relative closeness values and priorities are been tabulated below in table 2.

Model No.	**Price**	**Mileage - Highway**	**Mileage - City**	**No. of Seats**	**Relative closeness**	**Rank**
M-4	700000	20.3	17.3	6	0.169348	1
M-13	1300000	21.43	18.43	5	0.163164	2
M-11	916000	21.5	18.5	5	0.15717	3
M-6	1381000	22.7	19.7	4	0.149662	4
M-10	2257000	17.2	14.2	6	0.145016	5
M-14	1540000	19.39	16.39	5	0.132434	6
M-3	1386000	17.3	14.3	6	0.130405	7
M-9	968500	21.64	18.64	4	0.123618	8
M-8	765000	17.21	14.21	6	0.117203	9

M-5	600000	20	17	4	0.088383	10
M-12	607160	19.61	16.61	4	0.081782	11
M-1	2500000	15.73	12.73	4	0.050278	12
M-7	436447	17.88	14.88	4	0.048702	13
M-2	2790000	15.06	12.06	4	0.044147	14

Table 2: Final ranking assigned based on relative closeness values.

From the table 2, With reference to the criteria, it can be interpreted that M-4 car perfectly matches the criteria given by the user. The M-2 car gets the least priority as it is at the last of priority range. If the user's criteria changes, then the priority can also be changed.

REFERENCES:

[1] Khan, B. M., Bilal, R., & Young, R. (2017). Fuzzy-TOPSIS based Cluster Head selection in mobile wireless sensor networks. *Journal of Electrical Systems and Information Technology*.

[2] Sirisawat, P., & Kiatcharoenpol, T. (2018). Fuzzy AHP-TOPSIS approaches to prioritizing solutions for reverse logistics barriers. *Computers & Industrial Engineering*, *117*, 303-318.

[3] Liang, D., & Xu, Z. (2017). The new extension of TOPSIS method for multiple criteria decision making with hesitant Pythagorean fuzzy sets. *Applied Soft Computing*, *60*, 167-179.

[4] Liang, D., Xu, Z., Liu, D., & Wu, Y. (2018). Method for Three-Way Decisions using Ideal TOPSIS Solutions at Pythagorean Fuzzy Information. *Information Sciences*.

[5] C. Thirumalai and M. Senthilkumar, "An assessment framework of intuitionistic fuzzy network for C2B decision making," 2017 4th International Conference on Electronics and Communication Systems (ICECS), Coimbatore, 2017, pp. 164-167.

[6] Priyadarshini, M., Tripathy, P. P., Mishra, D., & Panda, S. (2017). Multi Characteristics Optimization of Laser Drilling Process Parameter Using Fuzzy-TOPSIS Method. *Materials Today: Proceedings*, *4*(8), 8538-8547.

[7] Rudnik, K., & Kacprzak, D. (2017). Fuzzy TOPSIS method with ordered fuzzy numbers for flow control in a manufacturing system. *Applied Soft Computing*, *52*, 1020-1041.

[8] Rostamzadeh, R., Ghorabaee, M. K., Govindan, K., Esmaeili, A., & Nobar, H. B. K. (2018). Evaluation of sustainable supply chain risk management using an integrated fuzzy TOPSIS-CRITIC approach. *Journal of Cleaner Production*, *175*, 651-669.

[9] Hatami-Marbini, A., & Kangi, F. (2017). An extension of fuzzy TOPSIS for a group decision making with an application to Tehran stock exchange. *Applied Soft Computing*, *52*, 1084-1097.

[10] Vaishnavi B., K. Yarrakula, Karthikeyan J. and C. Thirumalai. (2017) An assessment framework for Precipitation decision making using AHP. *11th International Conference on Intelligent Systems and Control (ISCO),* Coimbatore, pp. 418-421.

[11] P. Yuvaraj, R. Anirudh, J. Sharmila and C. Thirumalai. (2017) Analyzing user knowledge by Pearson and Spearman method. International Conference on Trends in Electronics and Informatics (ICEI), Tirunelveli, India, pp. 1086-1089.

[12] Ujera, R. Sudha, V. Ragavi and C. Thirumalai. (2017) Analyzing correlation coefficient using software metrics. International Conference on Trends in Electronics and Informatics (ICEI), Tirunelveli, India, pp. 1151-1153.