Optimal Sales Strategies for Electric Vehicles Based on Big Data Analytics

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Abstract

This paper provides optimal sales strategy advice to the sales department using customer data from a vehicle company. We comprehensively analyze the sales impact factors for Electric Vehicles (EV) based on the correlation analysis, the Pearson correlation coefficient, and neural network approaches. We first processed the data cleaning to handle abnormal and missing values. Then we analyzed the cleaned data and provided the satisfaction value for various brands. We filtrated the potential customers for EV. Based on correlation analysis, we extracted valuable features that may influence the sales of various EV brands from impact factors that determine whether customers would purchase EVs using the Pearson correlation coefficient. Improving data and optimizing the customer mining model is critical because improving services may increase 5% of target customers' satisfaction value. In addition, we provided specific sales strategies for every brand about target customers who have no desire to buy an EV.

Methodology

My methodology is separated into five steps.

1. requires us to clean the data and point out the final abnormal and missing data.

2. requires combining the self-factors of EVs and the self-factors of target customers to study which factors will impact the sales of EVs of different brands.

3. requires us to establish an effective customer mining model based on the previous research results.

4. maintains that the satisfaction value is a feeling of the target customer's experience.

5. Finally, according to the previous research conclusions, we can provide appropriate sales strategy suggestions to the sales department.

Modelling

The symbols used in this paper are shows in Table I.

TABLE I
SYMBOL DESCRIPTION.

Symbol	Meaning
a1	Battery technical performance
a2	Comfort (environment and spatial seats)
a3	Economy
a4	Safety performance (braking and driving visibility)
a5	Dynamic performance (gradeability and acceleration)
a6	Driving handling performance
a7	Entirety for exterior and interior
a8	Configuration and quality

A. Solution for Step 1

According to the analysis of step 1, we know that the first goal is to clean the data. And the second goal is to conduct a statistical analysis of satisfaction value for each brand.

B. Model and Solution for Step 2

According to the analysis of step 2, correlation analysis can analyze the factors that have the most significant impact on the purchase of EVs.

C. Model and Solution for Step 3

According to the problem analysis, the main goal of step 3 is to establish a customer mining model and finally predict whether 15 specific customers will buy or not. Then, Building the BP (Back Propagation) Neural Network solves this.
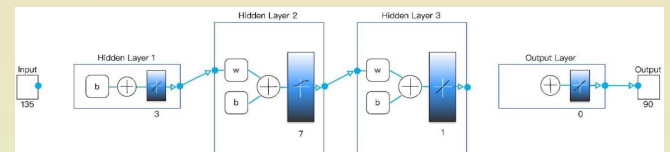

Fig. 1. A schematic diagram of the built neural network.

D. Model and Solution for Step 4

The model established in step 3 mainly considers factors B13, B14, B15. In this step, we also need to consider a1-a8.Therefore, we can optimize the neural network model of step 3 to a model of 11-N-1, shown as Fig. 2.
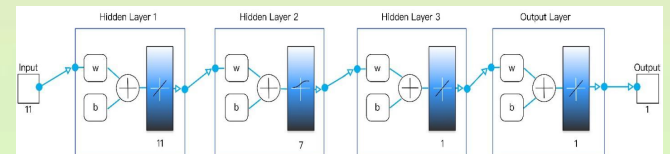

Fig. 2. A schematic diagram of 11-N-1 neural network.

Model Evaluation

Step 4 optimizes the customer mining model based on step 3, and the factors considered are more comprehensive. In general, some formulas of the basic model are simple and easy to understand, easy to generalize, and efficient. Although the Pearson correlation coefficient is used to study the corresponding relationship of each index, the problem that the Pearson correlation coefficient cannot be used when the sample data is not normally distributed cannot be avoided. The neural network in the customer mining model is prone to data overfitting.

Conclusions

In this paper, we propose practical sales strategies advice to the sales department relying on customer data from a vehicle company. We comprehensively analyze the sales impact factors for Electric Vehicles (EV) based on the correlation analysis, the Pearson correlation coefficient, and neural network approaches.

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