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Product Evaluation Model based on Big Data

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Abstract

In this paper, we firstly clean the data and then analyze the data. As a result, we can obtain a relationship model of Star Ratings, Reviews, and Helpfulness Ratings, and build an effective product evaluation model based on these relationship models.

Keywords

Correlation analysis, Linear fitting.

1. Introduction

In recent years, many companies' products need to be promoted through some good reviews. Therefore, if we want to promote a new product, it is very important that the product is evaluated well at the beginning.Therefore, the relationship between comments and products will become the focus of research in recent years, and it is urgent to solve how to establish the product evaluation mechanism through various objective data of comments.

2. Product Evaluation model

2.1. The Data Processing

However, in the data category of each product, due to the different base of comment, the number of votes of helpful_votes and total_votes cannot well represent the relationship between the evaluation and these votes. Therefore, we use the percentage of helpful_votes in total_votes as the data of helpful_votes to explore the relationship between the factors affecting the evaluation and the evaluation.In addition we also found that different star helpful_votes total_votes percentage is different also, in response to better star and the percentage of relationship, we will be 1 to 3 star rating as the poor, will be 4-5 star rating as a good rating, and respectively calculate travel good ratings and ratings helpful_votes total_votes of percentage, so that we can better to reflect the relationship.We will each product all comments after star_rating weighted average for each product the final rating, and use statistical methods to find the verified_purchase amount of data, because we know the general review good basic will buy the products, so we are expressed as a percentage of the total number of comments and verified_purchase review, hair dryer, the pacifier, microwave oven is obtained that 3 kinds of products of the data processing results are as follows:

2.2. Relationship Analysis

Next, we need to analyze the relationship between star_rating and verified_purchase (%), helpful_star_rating (%), helpful_votes of good star_rating (%), and helpful_votes of bad star_rating (%).

We first carried out correlation analysis of the four data types of microwave oven, and obtained the following results:

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Table 1. Processing of microwave data

star_rating	verified_purchase	helpful_votes of good star_rating	helpful_votes of bad star_rating
3.75	90.27%	90.27	89.92%
3.55	60.81%	60.81	86.69%
4.50	98.65%	98.65	92.63%
2.53	55.10%	55.10	73.33%
4.27	82.22%	82.22	95.50%
3.93	60.00%	60.00	87.74%
2.82	45.45%	45.45	81.17%
3.90	66.67%	66.67	100.00%
2.07	25.93%	25.93	94.46%
1.69	3.85%	3.85	69.57%
1.56	8.00%	8.00	87.42%
1.96	20.83%	20.83	0.00%
1.05	0.00%	0.00	61.11%

Correlation Matrix

		star_rating	verified_purchase (%)	helpful_votes of good star_rating (%)	helpful_votes of bad star_rating (%)
Correlation	star_rating	1.000	.953	.513	-.271
	verified_purchase (%)	.953	1.000	.481	-.233
	helpful_votes of good star_rating (%)	.513	.481	1.000	-.406
	helpful_votes of bad star_rating (%)	-.271	-.233	-.406	1.000
Sig. (1-tailed)	star_rating		.000	.037	.185
	verified_purchase (%)	.000		.048	.222
	helpful_votes of good star_rating (%)	.037	.048		.084
	helpful_votes of bad star_rating (%)	.185	.222	.084	

Fig 1. Microwave oven correlation matrix

As you can see from the figure, star_Rating has a significant correlation with verified_purchase (%), as well as with the other two types of data.The analysis of the other two products was similar to that of microwave ovens.

3. Simulation and Experiments

Then, we used various models to fit the relationship between the four types of data. First, we fitted the relationship between star_Rating and Verified_Purchase (%). The fitting results are as follows:

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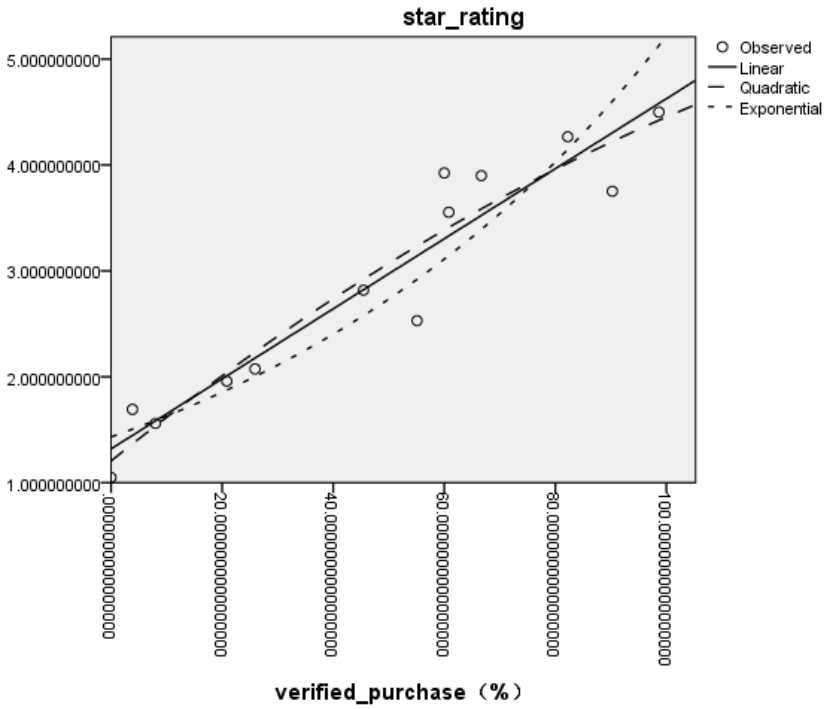

Figure 2. A fitting image of the relationship between the Star_Rating and verified_Purchase (%) of the microwave oven

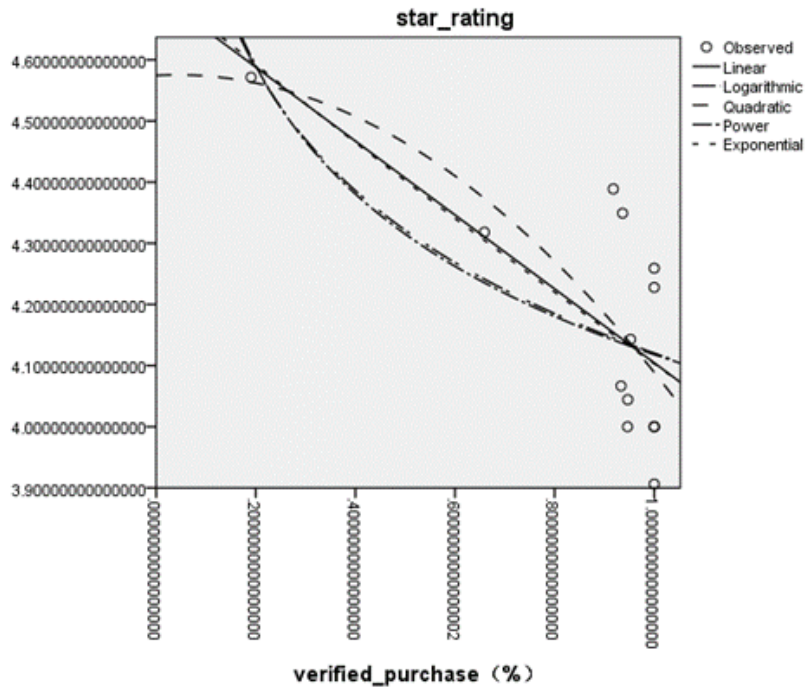

Figure 3. A fitting image of the relationship between star_Rating and Verified_Purchase (%) for a hair dryer

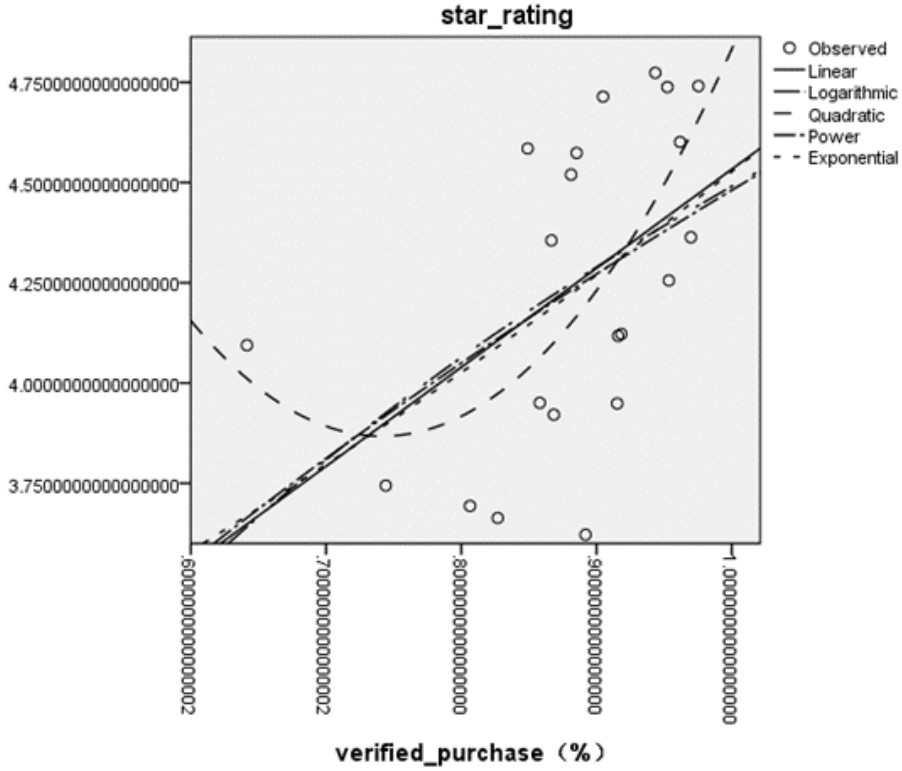

Figure 4. A fitting image of the relationship between the Star_Rating and the verified_Purchase (%) of the pacifier

After comparison, we find that the relationship between star_Rating and verified_purchase (%) of microwave oven and hair dryer is linear. The relationships are as follows:

Table 2. Relational function table

	helpful votes of good Star rating	helpful votes of good Star rating (%)
Star rating (microwave oven)	$y=1.91-0.53x+0.001x^2$	$y=18.41-0.41x+0.003x^2$
Star rating (Hair dryer)	$y=3.13+0.04x$	$y=4.82-0.04x+1\times10^{-3}x^2$ $-2.38\times10^{-6}\times x^3$
Star rating (pacifier)	$y=3.12+0.02x-1.27\times e^{-6}\times x^3$	$y=4.65-0.02x+2.69\times e^{-6}\times x^3$

4. Conclusion

Finally, we have obtained the relationship between microwave oven, pacifier, hair dryer and other two factors through the previous calculation. There are three cubic relations, two quadratic relations and one power relations.

In the future, we can build on these relationships and optimize these functions in better ways.

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