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# Consumer Coupon Redemption Behavior Prediction on B2C E-commerce

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**Abstract:** How to recognize the tendency of the coupons among the users who receive the coupons and then send the coupon reminder to improve the coupon redemption rate and reduce the marketing cost has become an important issue in the coupon decision-making process. Based on the log data and transaction data in enterprise database, this study combined with the demographics, past purchasing behavior, past coupon usage behavior and the visiting behavior during the coupon validity period to construct the e-coupon redemption behavior prediction model. The model is constructed to help e-commerce enterprises identify the target users who have the coupon proneness after the coupons are issued, so as to send coupon reminders in time and enhance the effectiveness of coupon marketing.

Keywords: E-commerce, behavioral analysis, logistic regression, coupon redemption

## 1. RESEARCH QUESTION

We propose a prediction model of e-coupon redemption behavioral based on user behavior data and transaction data. The model combines consumer demographics, past purchasing behavior, past coupon usage behavior and the visiting behavior features during the validity period.

## 2. MAJOR RESEARCH FINDINGS

### 2.1 Model

We intends to adopt the logistic model as the modeling basis to predict consumer e-coupon redemption:

$$P(Y = 1|x) = \frac{1}{1+e^{-\beta_0 - \sum_{i=1}^k \beta_i x_i}} \quad (1)$$

Where  $P(Y=1/x)$  represents the probability that the consumer who has an access behavior during the coupon validity uses the coupon,  $x_i$  is the extracted  $i$  characteristic variables based on the factors of affecting consumer coupon usage after the combined analysis of literature and experimental data.

### 2.2 Results

In order to optimize the model, the feature variables were screened by a stepwise optimization method. The results of model fitting after feature selection are shown in Table 2.

Table 2. Original model results

	$\beta_0$	GENDER	AGE	N_GETCO P	N_USECOP	COP_AMT _TOAL	PRICE_MA X	N_VISIT_P AGE
Estimate	-2.183037 ***	-0.376732*	0.018942*	-0.655871 ***	5.554697** *	0.043365** *	0.02918**	3.692188** *

In terms of demographics, we can find that women are more likely to use coupons than men, and the older are more likely to use coupons than the younger. This is consistent with existing research results [1].

By analyzing the negative correlation between consumer history coupon acquisition and consumer

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e-coupon redemption, we can hold the opinion that consumer perceptions and attitudes toward coupons can be used as intermediary variables to explore the relationship between the historical coupon acquisition and coupon redemption behavior. Besides, the number of consumer historical coupons usage and the consumer historical monthly average amount of coupon usage have a positive correlation with consumer e-coupon redemption.

In terms of past purchasing behavior, consumers who spend large amounts of money in a single consumption often have a relatively high purchasing power and are therefore more likely to use coupons. Consumers who spend large amounts of money in a single consumption often have a relatively high purchasing power and are therefore more likely to use coupons.

The number of pages visited during the coupon validity period is positively correlated with the consumer e-coupon usage, indicating that the consumers having more pages to visit during the coupon validity period have a relatively higher interest in products and are more possible to use the coupons.

It can be concluded that the e-coupon redemption behavior prediction model is:

$$P(Y = 1 | x) = \frac{1}{1 + e^{g(x)}} \quad (2)$$

$$g(x) = -2.183037 - 0.376732x_1 + 0.018942x_2 - 0.655871x_3 + 5.554697x_4 + 0.043365x_5 + 0.029180x_6 + 3.692188x_7 \quad (3)$$

Where  $x_1$  represents the gender of the user,  $x_2$  represents the age,  $x_3$  represents the monthly average of the history coupon  $x_4$  represents the monthly average usage amount of historical coupons,  $x_5$  represents the average monthly usage amount of historical coupons,  $x_6$  represents the historical purchase maximum price, and  $x_7$  represents the total number of pages visited after standardization.

### 3. CONCLUSIONS

Based on log data and transactional data, etc., we construct a e-coupon redemption behavior prediction model from the level of individual users. The study shows that female consumers are more likely to use coupons than male ones, older consumers are more likely to use coupons than their younger ones. We discuss the consumer's historical behavior and access behavior, which are seldom mentioned in the existing literature. Results found that the number of historical coupons obtained is negatively correlated with the user's coupon redemption, while the quantity and amount of consumer historical coupons used, the total amount of discounts, the highest historical purchase price and the number of pages visited during the coupon validity were positively correlated with the user e-coupon usage behavior. This research is of guiding significance for the study using the access data and other data to predict their behavioral intentions.

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