Three Dimensional Distribution of Value Topology Based on Genetic Ant Colony Algorithm

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Abstract. In order to use the advantage of internet to integrate electric value chain, this paper carries out value stream topology, it will itself in the center of the value web formed by value chain, in which mobile phone shopping patterns are studied deeply under the mobile internet driven, this paper puts forward the innovative marketing mode based on users hierarchy demand. Ant colony algorithm is compatible with the genetic algorithm, the network consumer's shopping demands carry out the binary code, and we can get the shopping approximation rule taking the browse as the center data. Finally, through the MATLAB particle swarm calculation toolbox to calculate the network marketing data, we can get the three-dimensional distribution cloud of consumer demand level under the electric business mode, which provides the technical reference for the innovative design of electric marketing mode.

Introduction

With the development of mobile Internet, electric business platform has been based on price as a competitive advantage in the actual market, in which the price of conflict still plagues most brand sales, if people really want to achieve a balance between the two, we must in-depth study of value stream topology to find the key point between the two, making to improve both measures [1-3]. Observation of the entire market, we are not difficult to find some business platform to develop new marketing mode which makes the talent showing itself in the fierce business competition [4,5]. Study on the characteristics of the marketing model, we observe its value flow topology graph, it can be found, its marketing mode is different from other general electric that has been adopted for the marketing transactions mode, however it will be the entire value chain integration by the advantage of using the internet, which will own the chain in the formation of value network center.
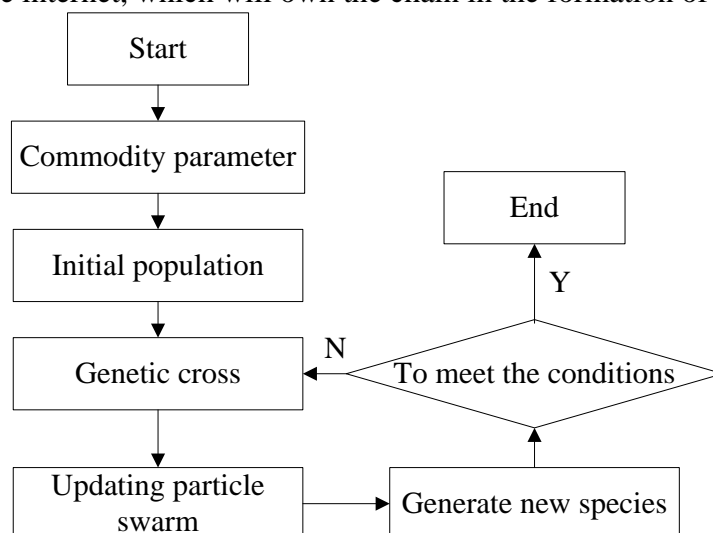

Fig.1: Integration schematic diagram of the mobile internet commodity value stream

As shown in Figure 1, the integration of mobile internet commodity value chain realizes commodity circulation data mainly based on phone shopping mobile networks [6]. The commodity circulation is been as particle swarm, the commodity value stream is integrated by using genetic algorithm, and then using the advantages of mobile internet understands the real needs of the target customers for a large number of market research and network communication, finally using the network data of mobile internet carries out the integration of value chain to grasp the market demand information and innovative marketing mode.

Design of Value Stream Particle Group Topological Relation Algorithm

Electric business value stream is different from traditional market value stream, because electric payment can go through internet banking, and the value stream is relatively hidden [7,8]. If we want to grasp the market information of electric products, we must be combined with modern mobile internet technology to carry out analysis of network shopping preference and data flow, and the particle swarm algorithm is an effective algorithm, the basic model is shown in Figure 2.
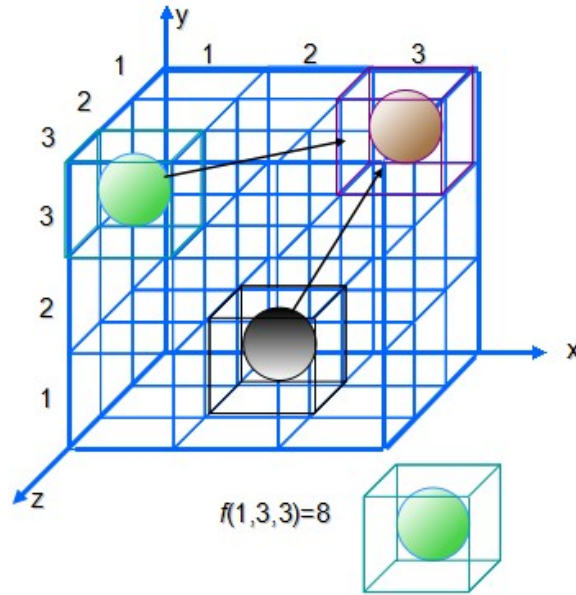

Fig.2: Schematic diagram of particle swarm optimization

Figure 2 shows the basic particle model of swarm optimization, this kind of mode will consumers as a huge particle swarm, and then it can look for mobile network shopping user preferences through the optimization of particle swarm, which can create reference data for electric marketing mode [9-11]. However, the ant colony algorithm has better compatibility, assuming the ant colony optimization sequence is

$$P_{\text{best}} = (p_{i1}, p_{i2}, \cdots, p_{iD}) \quad i = 1, 2, \cdots, 3$$

(1)

In order to be compatible with genetic algorithm in ant colony algorithm, the binary code is introduced into the ant colony optimization algorithm, in which the formula is as follows:

$$A = X + \sum_{i=1}^{n} a_i 2^{i-1} \frac{X - Y}{2^i - 1}$$

(2)

Among them, X denotes the quantity of stream, Y represents the actual purchase amount, and then through the innovative marketing mode, the Y is approximation to the infinite X. Assume the existence of marketing function $C(x, y)$, it can make the X and Y approximation.

$$C(x, y) = \iint (X - Y) dx dy$$

(3)

The data sample is defined as x_k and y_l, then sample approximation formula is

$$d(x_k, y_l) = \sqrt{\sum_{z=1}^{c} (x_{kz} - y_{lz})}, k, l = 1, 2, \cdots, n$$

(4)

The gathering center of original image samples can be written as

$$M_k = \sum_{l=1}^{n} \frac{d(y_k, y_l)}{\sum_{k=1}^{n} d(y_l, y_e)}, k = 1, 2, \cdots, n$$

. (5)

Based on the genetic algorithm, it will generate a clustering center binary coding.

$$\{x_{t-1}, y_{t-1}^1, y_{t-1}^2, \cdots, y_{t-1}^n\}, x_{t-1} \in R$$

. (6)

The image data sequence $\{x_e^1, x_e^2, \cdots, x_e^n\}$ and $\{y_f^1, y_f^2, \cdots, y_f^n\}$ carry out cross operation:

$$\hat{x}_e^j = u x_e^j + (1-u) x_e^j$$
$$\hat{y}_f^j = (1-u) y_f^j + u y_f^j, j = 1, 2, \cdots, n$$

. (7)

Among them, u is random real and $x \in [0,1]$, then we can get the commodity distribution of user demand, it is

$$\{\hat{x}_e^1, \hat{x}_e^2, \cdots, \hat{x}_e^n\} = \{x_e^1, x_e^2, \cdots, x_e^n\} + V \cdot s$$

. (8)

Among them, V is a big positive, s indicates a random direction, we can use the MATLAB software to realize the algorithm to verify the effectiveness of the algorithm, in which the main program are as follows [12,13]:

```
if(params.isfmopso)
nploc=x(i,:);
npruleloc=[0,0,0];
dnploc(1,1)=0;
tempv=zeros(10,D);
tempx=zeros(10,D);
for k=1:10
tempv(k,:)=w1*v(i,:)+c*rand*(pbest(i,:)-x(i,:))+c*rand*(gbest-x(i,:));
for j=1:D
if tempv(k,j)>vmax(j)
tempv(k,j)=vmax(j);
elseif tempv(k,j)<vmin(j)
tempv(k,j)=vmin(j);
end
......
```

Mobile Internet Marketing Platform Innovation Design

Mobile internet is based on mobile communication network as an access network internet service, in which the mobile communication network access methods includes 2G, 3G, 4G and so on, and mobile internet access method has mainly two kinds of Wap and WWW, the post is called the current mainstream application as shown in Figure 3.
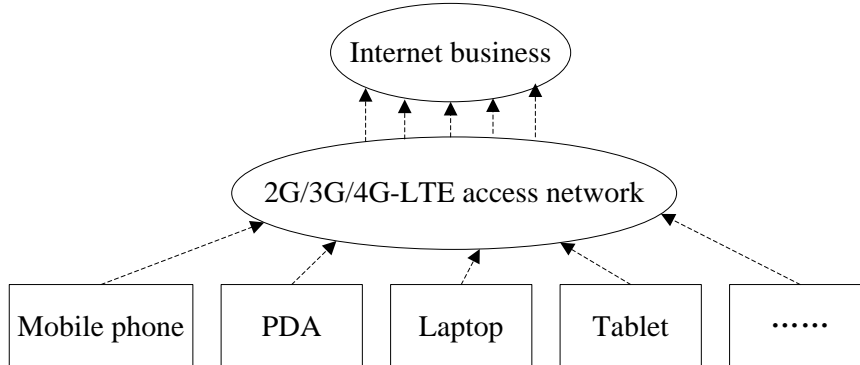

Fig.3: Schematic diagram of the mobile internet architecture

The current mobile internet will mainly use mobile internet 2.0 and 3.0 version, in which 2.0 is the mobile internet of intelligent mobile phone and the internet fully integration, user attributes pluralism, mobile phone terminal processing capacity increased significantly [14,15]. However, mobile internet3.0 is a ubiquitous information services, making the terminal processing capacity and network bandwidth will not become the limit mobile internet business bottleneck based on user unified identity authentication, and its leader is services providers based on customer relationship.
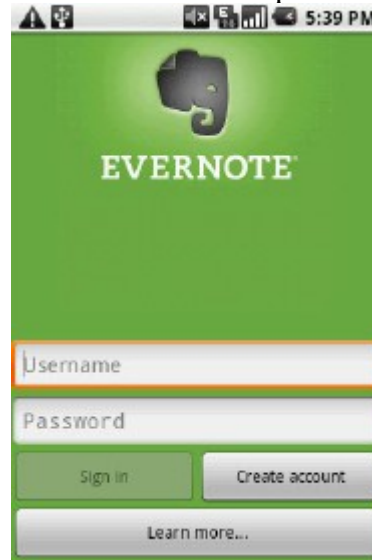

Fig.4: Mobile internet function terminal

Figure 4 shows the function terminal diagram of the mobile internet, using Evernote mobile phone application can integrate mobile internet terminal based on the traditional notepad function, it can carry out terminal internet end to end upload, download, share and other services, to achieve its seamless with internet.

Fig.5: Mobile phone shopping platform

Based on the mobile phone Taobao network shopping platform, the user shopping generates data information as the basis, this paper designs date stream real-time monitoring system, and the system is based on particle swarm algorithm as the basis, to carry on value stream analysis in accordance with the different user shopping interest data.

```
         NaN          0          0

PSO: 1/300 iterations, GBest =  0.65745627156042197.
PSO: 10/300 iterations, GBest =  0.83031095444230951.
PSO: 20/300 iterations, GBest =  0.95249317353341745.
PSO: 30/300 iterations, GBest =  0.97021972057906236.
PSO: 40/300 iterations, GBest =  1.0025995846405769.
PSO: 50/300 iterations, GBest =  1.0025995846405769.
PSO: 60/300 iterations, GBest =  1.0032452823591065.
PSO: 70/300 iterations, GBest =  1.0032452823591065.
```

Fig.6: MATLAB toolbox calculation process diagram

Figure 6 shows the MATLAB particle swarm toolbox calculation process, multilevel user shopping demand data is obtained by making statistics on mobile phone Taobao data, and then using particle swarm algorithm carries out sort data, and when the iteration is 70 step, we can get the three-dimensional cloud of users demand level as shown in Figure 7.
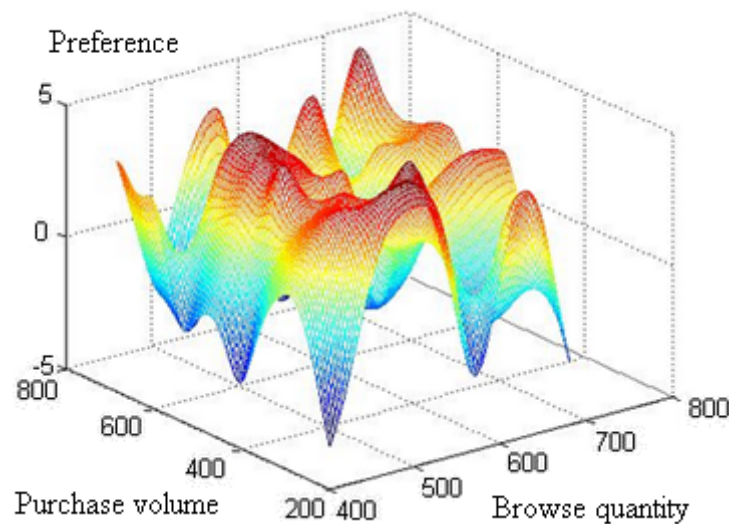

Fig.7: Three dimensional images of user demand level

Figure 7 shows the 3D cloud of user demand level calculated value stream topology by using MATLAB, the calculation method is the actual browse and purchase quantity of mobile phone shopping website commodity as the basis, to carry on commodity preference solution, which provide the basic foundation for the innovation of e-commerce marketing model.

Summary

(1) The use of ant colony algorithm and genetic algorithm carry out mathematical modeling for the network consumer demand, and the use of the binary code designs consumer demand algorithm, at the same time its algorithm is verified by using MATLAB programming form, which obtain a new marketing mode based on user level demand.

(2) The use of particle swarm calculation toolbox in MATLAB verifies the algorithm, it can get the three-dimensional distribution cloud of consumer level demand under the electric business mode, which provide reference data and technical indicators for the innovation of marketing scheme.

(3) Through the integration of internet electric value chain method, this paper obtains value stream topology as the core marketing methods, making their own marketing mode is in the value network center of value chain formation, which provides the theory reference for the study of improving business competitiveness.

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