HEURISTIC IMPLEMENTATION OF NEURAL NETWORK APPROACH IN ONLINE SALES DATA MINING DOMAIN

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ABSTRACT

The implementation of Neural networks includes more steps in the field of data mining. The proper study of online sales domain in our electronic commerce performs the successful implementation of neural network methods which are not directly applied for data mining tasks. The actual real time implementation frequently needs the training datasets for the elaborate study of the entire domain. In this paper we implement neural network learning algorithms that are able to study the purchase characteristics analysis for the online sales domain. The real time implementation of FLIPKART India online sales domain is taken into account for the incorporation of neural network clustering approach which involves extracting symbolic models from stored data mining frameworks. In near future we will implement the neuro fuzzy approaches implementation in real time using neural network conceptual schema.

KEYWORDS: *Data mining, neural networks, reinforcement learning, online sales, clustering*

INTRODUCTION

Neural network usually focuses on the training of neurons; here it refers to the data characteristics[1]. The training and weight adjustments of the inputs are supplied until the final expected result or an optimal result is achieved[2].

Neural networks included the feed forward strategy of assigning the weights based on priority, but without a loop in the network[3]. It includes the supervised learning structure for matching the pattern characteristics along with the observed informations.The sub sequential structure of neural networks focused on the unsupervised learning where no trained data sets are present[4]. Each time a new pattern got identified int the entire process. The Reinforcement learning in neural networks focused o the feedback network constituted as good or bad from the environment remarks[5].

Data Mining is a domain which deals with storing, organizing, associating, matching, extracting and analyzing of data .It's a mixed strategy domain in which the intermediate operations are linked together to form efficient data handling structures[6].

PROPOSED METHODOLOGY

This proposed methodology focuses on the implementation of a neural network strategy to cluster the requested data mining details by implementing the online sales domain computations.
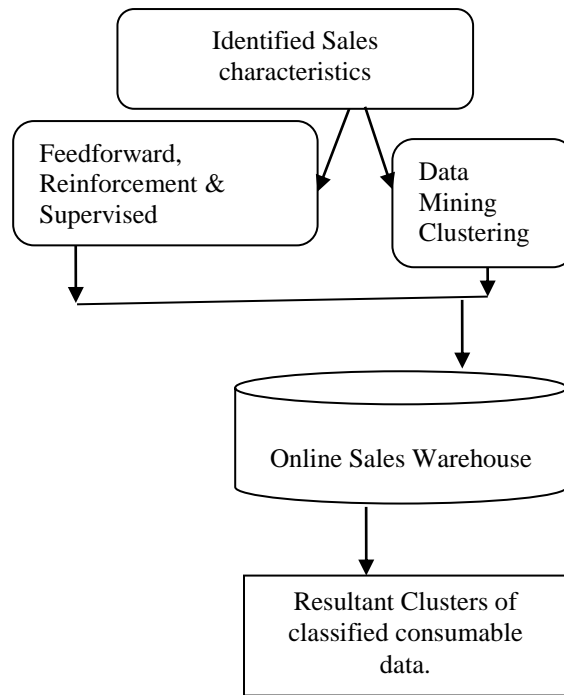
Figure 1 Proposed Neural network based data mining

IMPLEMENTATION

The following steps illustrate the steps to understand the neural network incorporation which is the base for our proposed methodology.
1. Identify the Data Characteristics.
2. Fix all the input attributes and mapping.
3. Train and test the network.
4. Adjust the weights accordingly.
5. Run the tested network.
6. Use the network for online sales domain data mining.

Though many online shopping sites such as Flipkart, EBay, Amazon, Snap deal, rediff shoppy,paytm,zopnow etc are available in India, only few rules the market. The topmost online sales domain in India is Flipkart followed by Amazon in the year 2016.Let us focus on the mobile electronics category alone for this implementation modeling. The following strategies were applied by Flipkart during 2016 sales and the results observed from the viewer side and Flipkart report strategies are as follows,
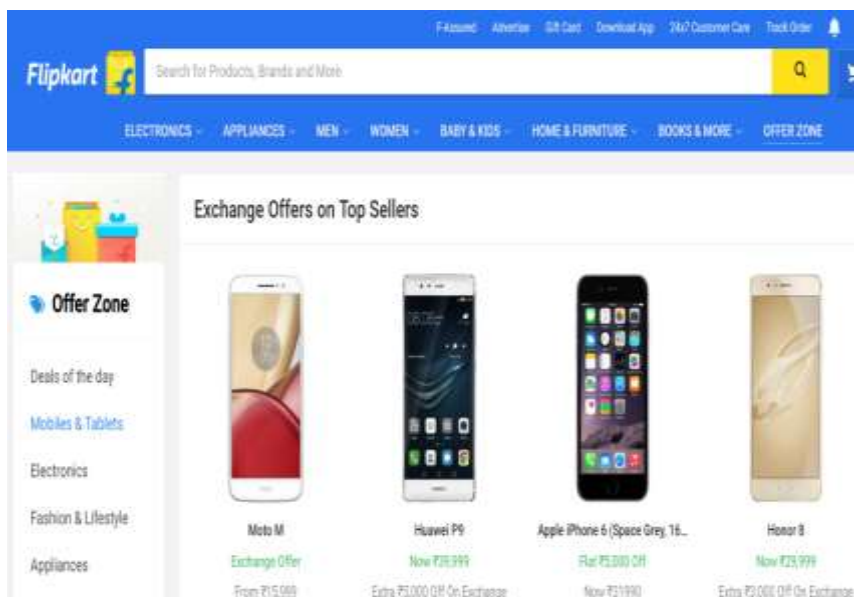
Figure 2. Flipkart-Domain for mobile sales-Exchange offer

The following table shows the basic Flipkart sales offers for attracting the customers[7].

Table 1 Online Domain Data attributes

No	FLIPKART-OFFERS	Sample product
1	Flat discount/ % off	Lenovo vibe K5-Flat Rs.500 Off
2	Extra offer on Regular exchange	Honor-8 Extra Rs.3000 off on regular exchange.
3	Exchange offer	Moto e3 Power
4	Credit\Debit card Offer	Apple-7-HDFC/SBI/Standard Chartered/Axis Bank cards 10% off
5	Accessories offer	Sd Card/VR kit For Lenovo CS
6	Sim card/Data Offer	Jio Sim for all 4G VOLTE mobiles
7	Deal of the day offer	Rs.500 off on Moto G Turbo
8	Discount Exchange	Moto M
9	Discount+Exchange+card	Leeco-Le2
10	Discount+Exchange+Extra exchange+cards+sim/Data	Apple I Phone 6

Additional offerings for promoting the mobile product is also available in flipkart

Figure 3. Flipkart-Domain for mobile sales-Accessories offer

The periodical bank offers in Flipkart is available in flipkart, the sample example is shown below.

Figure 4. Flipkart-Domain for mobile sales-Bank offer

The proposed purchasing strategy for the customer in Flipkart using neural network architectural schema verification in Flipkart online sales domain is as follows[7],
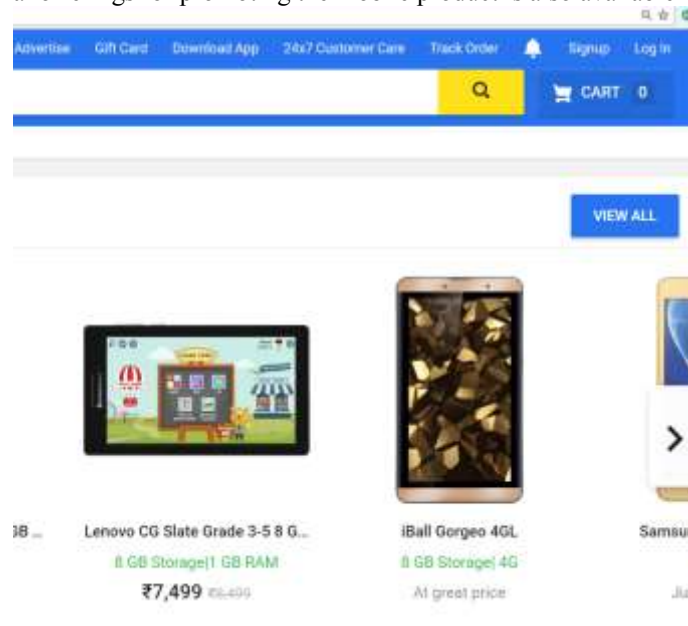
Proposed Neuro conceptual Algorithm:

1. Initialize the weights in the network (often Randomly)
2. Repeat
* For each example e in the training set do
a. F = neural-net-output (network, e); forward pass
b. S = Supervised output for the input
c. Calculate Fi at the output units
d. Compute Fi+Si,delta_wi for all weights; hidden layer to o/p layer ;
backward pass

e. Compute Ri of reinforcement learning_wi for all weights'/p layer to hidden layer ;
backward pass continued
f. Update the weights in the network
g.Now Compute Pi + Max (Fi + Si * Ri)---(1)
* end
3. until all stopping criterion satisfied
4. return(network)

The feed forward weight assignments for the online sales domain based on their priority and importance are as follows[8],

Table 2 Flipkart-Feed fwd weight initializations

Sl.No	FLIPKART-OFFERS	Weight assignments
1	Flat discount/ % off	0.05
2	Extra offer on Regular exchange	0.1
3	Exchange offer	0.15
4	Credit\Debit card Offer	0.2
5	Accessories offer	0.25
6	Sim card/Data Offer	0.3
7	Deal of the day offer	0.35
8	Discount Exchange	0.4
9	Discount+Exchange+card	0.45
10	Discount+Exchange+Extra exchange+cards+sim/Data	0.5

The supervised learning structure data based weight adjustments towards online sales domain are as follows,

Table 3 Flipkart Training weights for supervised data

Sl.No	FLIPKART-SALES-CATCHY	Weight assignments
1	Flash sale	0.05
2	Limited period offer	0.1
3	Exchange offer	0.15
4	Festive Offer	0.2
5	Great Indian offer	0.25
6	New Year Offer	0.3
7	Saturday night offer	0.35
8	Deal of the day	0.4
9	Hourly offer	0.45
10	Exclusive on Flipkart	0.5

The reinforcement learning structure data based weight adjustments towards online sales domain are as follows,

Table 4 Flipkart sales reinforcement learning weights

Sl.No	Customer feed back	No of Stars	Weight assignments
1	Bad with more than 10 comments	*	0.05
2	Bad with more than 7 comments	**	0.1
3	Bad with more than 5 comments	***	0.15
4	Bad with more than 3 comments	****	0.2
5	Bad with 1 ,2 or 3 comments	*****	0.25
6	Good with less than 3 comments	*	0.3
7	Good with more than 3 comments	**	0.35
8	Good with more than 5 comments	***	0.4
9	Good with more than 7 comments	****	0.45
10	Good with more than 9 comments	*****	0.5

The purchase coefficient Pi for purchasing the mobile based on the customer interest survey and NDTV gadget rankings (not always stable but reliable for most brands) are as follows[8][9],

Table 5 Flipkart customer purchase coefficient factor

Sl.No	Mobile manufacturer	Purchase coefficient-Pi
1	Apple/Samsung/LG	0.25
2	Xiomi/Lenovo/Honor	0.2
3	Panasonic/Cool pad/Micromax	0.15
4	Swipe/Leeco/oppo	0.1
5	Rest of the brands	0.05

The following table 1.6 is the computation comparison for the customer for purchasing a mobile from Flipkart using our proposed model calculations.

Table 6 Combinatorial Purchasing model for online sales domain

Mobile preference	Purchase interest-Pi	Feed fwd weights-Fi	Supervised weights	Reinforcement learning	Pi + (Fi + Si * Ri)
Samsung-on Nxt	0.25	0.4(discount+ exchange only available now)	0.15(Exchange offer)	0.4(Good with ***)	0.25+0.4+(0.15*0.4) =0.65+0.06 =0.71
Xiomi-RedMi-3S Prime	0.2	0.35(specific day deal)	0.5(Flipkart exclusive)	0.5(Best feedback)	0.2+0.35+(0.5*0.5) =0.55+0.25 =0.8

From the above results, our proposed neural model identifies the purchase of Xiomi-Redmi-3S Prime mobile purchase is better than purchasing the Samsung onNxt.

Table 7 Flipkart Mobile Purchase Cluster identification table

Model	Weights-Wi	Cluster Class
Apple-Iphone-7 Plus	> .9	S
Samsung galaxy edge	>.85	A+++
Xiomi redmi-3S prime	>.8	A++
Moto-E3-power	>.75	A+
Lenovo-K6 power	>.7	A
LG-G5	>.65	B
Google Pixel	>.6	C
Micromax canvas	>.55	D
Panasonic Eluga	>.5	E
LYF	<=.5	OK

RESULTS AND DISCUSSION

The cluster of mobiles based on our proposed model computations are as follows, based on Table 1.1, Table 1.2, table 1.3, we obtain the following cluster classes for the different types of mobile brands in India.

TABLE 8 Mobile sector Cluster Class

Mobile Type	Cluster Class
Apple/LG/Samsung	Class A
Xiomi/Lenovo/One plus	Class B
Panasonic/Micromax/Lyf	Class C
Other brands	Class D

The following resultant graph shows the pictorial representation for the neural network based data mining clusters in Flipkart online sales domain using our proposed model.
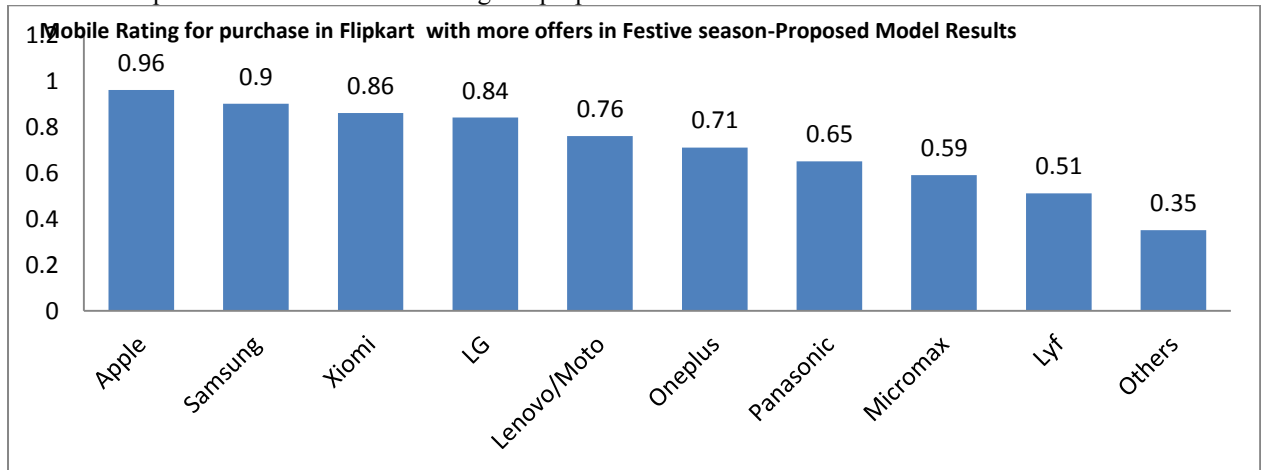

Figure 5. Resultant Flipkart Mobile Purchase structure

The above resultant graph shows that our proposed model identifies the optimal purchasing strategy for a customer in online sales domain.

CONCLUSION

Currently, India has more than 15 branded online sales domain in commercial sector. They have a combined network of over 13000 ware houses and linked with 2,700 Couriers for carrying the products. In this paper, we implemented the neural network based feed forward, supervised and reinforcement learning schema for the online sales data mining clustering technique in the mobile purchasing with our proposed algorithmic strategy which acts as a revolutionary model that will takes place in our real life during the impact of recession and demonetization period clearly., The advantage of such simplifications is that the complexity of identifying the optimal purchasing strategy is reduced when tackling the original problem, and this allows the use of techniques that require evaluating a lot of individuals through the search for the best solution. This approach may include many relationships that can be decisive when searching for a satisfactory decision making. The overall method proves to be highly efficient compared to random probability theory based

approach, dramatically reducing running time and number of features required for the clustering issues. Moreover, the experimental results revealed that the expressiveness of weight adjustment towards the impact influence cluster representatives is significantly higher than that of normal data mining clustering procedures. In our future work, we have planned to propose a fuzzy based neural network purchasing schema method on data mining technique.

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