

AN ADVANCED PRODUCT RECOMMENDATION FRAMEWORK BY USING MULTIPLE PRODUCT FEATURE ANALYTICS

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ABSTRACT

Online store plays a vital role for product analysis using automatic recommended system to the new customers. Since purchase patterns of traditional approaches considered the overall product rating and website preferences in the recommendation process. Commercial ecommerce recommended system use machine learning techniques to make appropriate decision rules for the customers during real-time sessions. Also, various machine learning techniques depend on the type of product and the number of transactions. It also depends on the customer purchase history whose purchase rules are close to that of new customers. Conventional recommendation techniques generate recommendation patterns similar to products that the target user has computed recommendation by analyzing the products purchased by the customers who are identical to the target customers. In this proposed work, an improved multi-feature based product recommendation system was built on the real time ecommerce sites. In this proposed architecture, multiple web based products are analyzed and ranked by using multi-product based recommender system. In this system, multiple products from different vendors are taken with multiple product features. The proposed work gives the best solution to the users who are interested in comparing the different vendors' products for product purchase. Experimental results show that proposed multi-product system give better user product recommendation compared to traditional single site product recommendation systems.

Keywords: *Online Store, Product Analysis, Automatic Recommendation, Multi Feature*

1. INTRODUCTION

The personalized product recommendation system is becoming increasingly important due to its high utility and availability of a large number of products. Many researchers have tried to implement recommended systems by using content based techniques. Content based techniques, analyzing the similarity between the products to model user's preferences or user behavior. However, such recommending systems cannot efficiently handle all types of cases that might use in real time applications. Traditional techniques describe the user's long term profile by using featured items purchased by the user. The personalized system can use to increase profits to the business to customers, i.e. effective recommendation can raise sales. Shopping online is no longer time consuming process, but rather a convenient mechanism for the online users. The nature of these problems is associated to the historical data, i.e. the lack of interaction between a product and the user and the product

.The effect of the missing data seems more significant than in the information retrieval field.

Recommend frameworks allow automated and rapid personalization and customization of e-commerce sites. Customer loyalty is achieved by displaying user that they take time to understand their requirements and to learn more about the product features.

KDD refers to the data mining, which is used to describe mining of useful patterns from a large dataset. The information can be either explicit or implicit. It is used to extract different ways to optimize the e-commerce sites by finding new ways to display products to users. However, to achieve this goal, recommender systems need to parse a lot of historical data and collect data, and predict how the customer will like the item or web product[4].

2. RELATED WORK

In the literature [2-3], used a time weight technique to assign different weights to historical data and new rating data without implicitly detecting customers' interest. Also an improved Bayesian approach is used to predict the product in the content based recommender system.

Cluster based recommender system and auto similarity measures have been implemented for detecting user interests. Graph based user interests are evaluated in [5], to find the product inter and intra relationship between the products. Different graph based clusters along with product association are shown in Fig2.

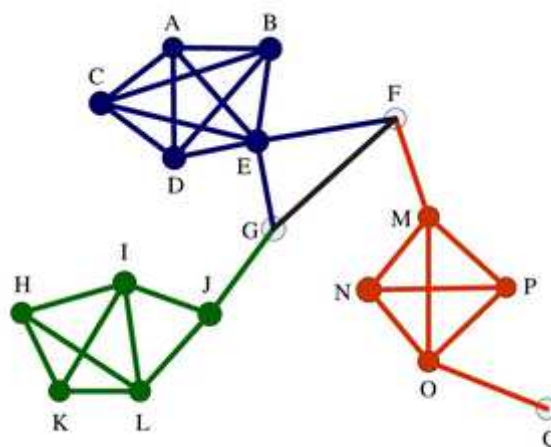


Fig 2: Graph based Product Recommended System

Most of the recommended systems fall into two major types: Content based approach are described by a set of fields or contents of the web products. These systems analyses the product behaviors that a user has selected in the past and recommends products with similar web contents[6-8]. These systems highly depend on a large set of features. Also, it cannot be too small to train the web content. In this system, the quality of the recommended products is affected by the feature selection.

In case of collaborating filtering approach, sparsity problem may exist due to the increase of products information. Traditional collaborating filtering

systems require users to implicitly or explicitly input product preference ratings. Consequently, the product rating prediction degrades significantly due to the increase in users ratings and sparse values[3-5].

3. PROPOSED ALGORITHM

In this proposed architecture, multiple web based products are analyzed and ranked by using multi-product based recommender system. In this system, multiple products from different vendors

are taken with multiple product features. All the features in the product are cross checked with the user rating, preferences, number of user access, date, product importance and reviews. Initially, all the relevant products are retrieved based on the user's selection criteria. The products along with feature vectors are represented in the form of multi-dimensional objects. Assumption of the traditional recommended systems include, "if the ratings of the web based products rated by one or more users are similar, then the rating of the other products rated by same users will also be similar". In the previous work [1], all the product information in the single eCommerce website is efficiently handled using product features. Conventional product based ranking system considers the product rating or reviews as feature vectors. Since the most of the traditional approaches ignore the user's interest on the product features, it is difficult to predict the exact rank of the product for any recommended engine. In this proposed approach, different products from the multiple eCommerce sites are analyzed and performs feature based recommending system for cross product comparison to the web-users. As the number of products increases, the sparsity problem from the multiple web sites also increases. In order to handle this problem, previously proposed

solution [1] was used to eliminate the sparsity problem. Product filtering technique [1] was used to find the relevant items and predict the sparsity values from the large set of items along

with high dimensional features. Proposed workflow architecture and its steps are shown below:

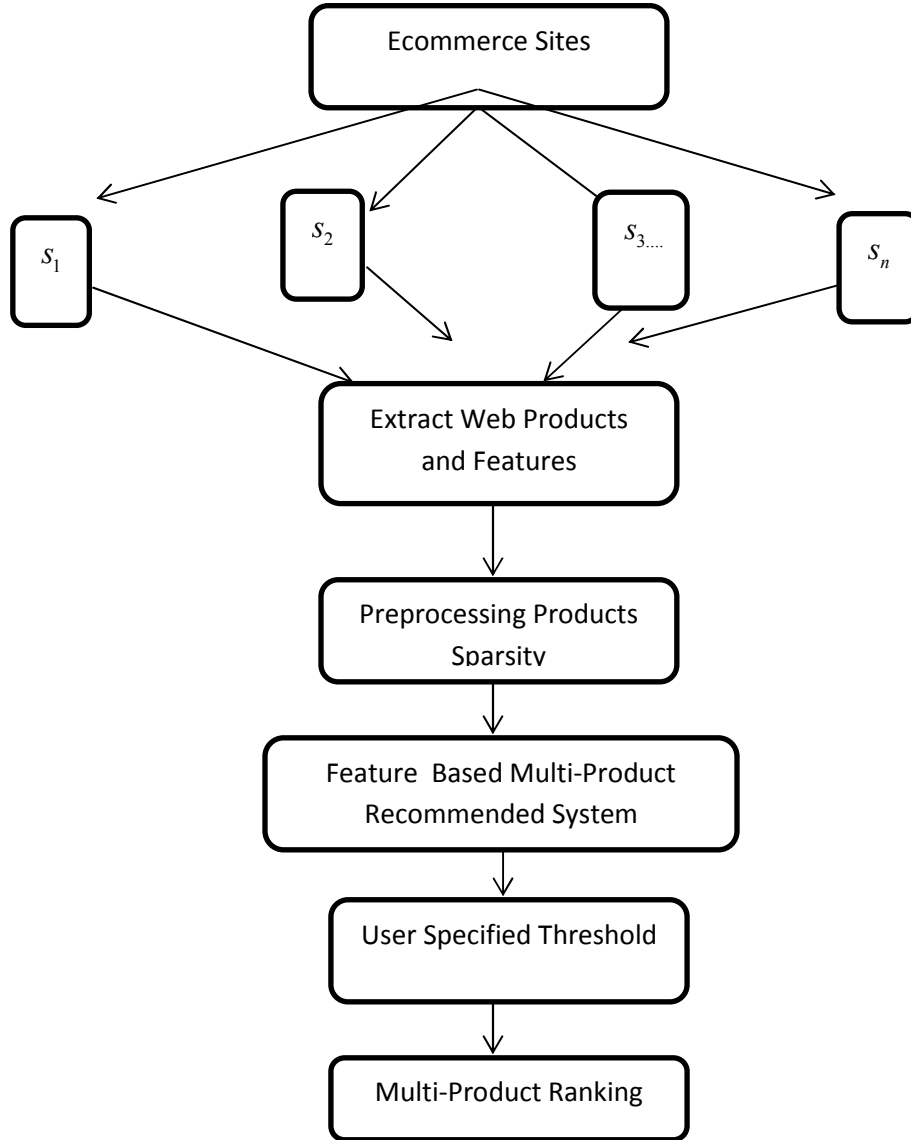


Fig 2: Proposed Workflow

The cross product comparison gives user's to select the optimal product based on product rank and its features. The proposed work gives the best solution to the users who are interested in comparing the different vendors' products for product purchase.

Definitions:

User based item interaction matrix can be defined as “user interaction with the item along with rating”.



Product based features interaction matrix is defined as “User interaction with the product along with the features list”.

The general format of the **single site product** and its features matrix is tabulated below.

Features Product	F ₁	F ₂	F ₃	.....	....	F _n
P ₁	P ₁ F ₁	P ₁ F ₂	P ₁ F ₃			P ₁ F _n
P ₂	P ₂ F ₁	P ₂ F ₂	P ₂ F ₃			P ₂ F _n
P ₃	P ₃ F ₁	P ₃ F ₂	P ₃ F ₃			P ₃ F _n
.						
.						
P _m	P _m F ₁	P _m F ₂	P _m F ₃			P _m F _n

Multi-Site product features: (i=12...k sites)

Features Product	F ₁	F ₂	F ₃	.....	....	F _n
S _i P ₁	S _i P ₁ F ₁	S _i P ₁ F ₂	S _i P ₁ F ₃			S _i P ₁ F _n
S _i P ₂	S _i P ₂ F ₁	S _i P ₂ F ₂	S _i P ₂ F ₃			S _i P ₂ F _n
S _i P ₃	S _i P ₃ F ₁	S _i P ₃ F ₂	S _i P ₃ F ₃			S _i P ₃ F _n
.						
S _i P _n	S _i P _n F ₁	S _i P _n F ₂	S _i P _n F ₃			S _i P _n F _n

Each product rating can be defined by collaborating the features hit rate as:

$$S_i P_n F_j = \begin{cases} \text{Rate}_{ij} & ; \text{exists} \\ 0 & ; \text{otherwise.} \end{cases}$$

Where S_iP_n is the product in the ith site , F_j is the features list of the product .

$$Rate_{ij} = (\text{Number of hits or Access rate in each category}) / \text{Total category hit rate} .$$

Feature Based Multi-Product Recommended System(FBMPR):

Input:

$$p_1(1,1), p_1(1,2), p_1(1,1) \dots p_1(n_1, m_1)$$

$$p_k(1,1), p_k(1,2), p_k(1,1) \dots p_k(n_k, m_k)$$

// denotes ith product of jth category in kth site.

$$p_2(1,1), p_2(1,2), p_2(1,1) \dots p_2(n_2, m_2)$$

$$F_i(p_j, s_k)$$

represents ith feature of jth product in kth site.

λ : User specified Threshold

Output: Ranking Based Multi-Product Comparison

Procedure:

Step 1:
 Check internet connection or web access service.

Step 2:
 Connect web service using the specified key pair as authentication.

Step 3:
 For each site s_i

do

List all the available products from the web.

For each item/product in the list.

Do

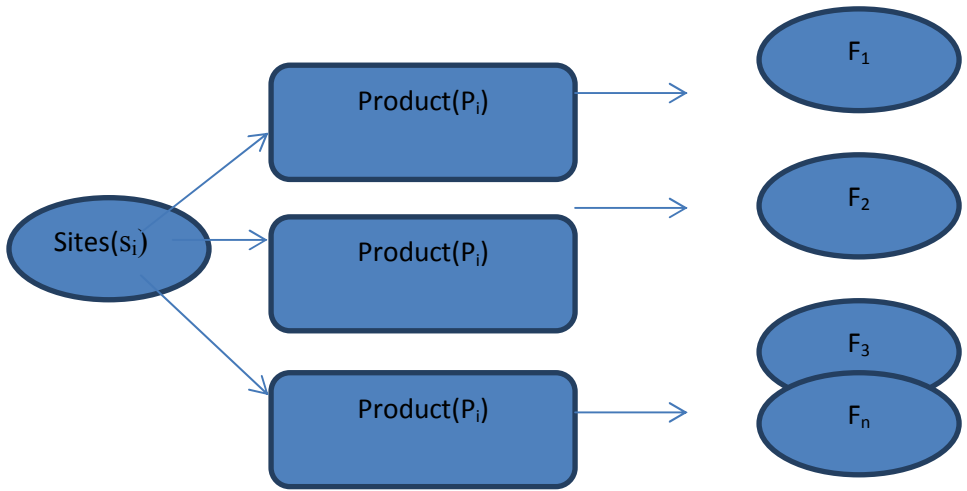
$P(s_i)$:=Extravt product features list as item link, rating, related products etc.

Done

Done

For each site s_i do

Map each item to the available features in the site s_i .



Multi-Site Product To Feature Mapping.

Done

Step 4:
 Execute product filtering as specified in the paper [1].

$p_i(p(s_i, cat(p(s_i))) := \{p(s_i), cat(p(s_i))\}$

Done

Step 5:
 For each site in s_i

Do

Set product category list as

Step 6:
 Extract each site features list

$f_m(p(s_i)) := \{p(s_i), \{f_{i1}, f_{i1}, f_{i1} \dots f_{i1}\}\}$

Done



Checking the product feature values with user rating and transform the user rating values with the cross product probability θ

Set $U_{rf} := U(p(f_1, f_2 \dots f_n), p(s_i))$ // product features list in i th site.

Set $U_{rp} := U(p_j(s_i))$ // user rating of j th product in i th site.

U_{rp}	s_1	s_2	s_3	.....	....	s_n	U_{rf}	F_1	F_2	F_3	.....	....	F_n
P_1	$P_1 s_1$	$P_1 s_2$	$P_1 s_3$			$P_1 F_n$	P_1	$P_1 F_1$	$P_1 F_2$	$P_1 F_3$			$P_1 F_n$
P_2	$P_2 s_1$	$P_2 s_2$	$P_2 s_3$			$P_2 F_n$	P_2	$P_2 F_1$	$P_2 F_2$	$P_2 F_3$			$P_2 F_n$
P_3	$P_3 s_1$	$P_3 s_2$	$P_3 s_3$			$P_3 F_n$	P_3	$P_3 F_1$	$P_3 F_2$	$P_3 F_3$			$P_3 F_n$
.							.						
.							.						
P_m	$P_m s_1$	$P_m s_2$	$P_m s_3$			$P_m F_n$	P_m	$P_m F_1$	$P_m F_2$	$P_m F_3$			$P_m F_n$

Cross product multi-product rank prediction θ can be defined as

$$\theta(p(s_i), p(f_1, f_2 \dots f_n)) := \left(\sum_{i=1}^n \text{prob}(p(s_i) / s_i) \right) * U_{rp} + \left(\sum_{i=1}^n \sum_{k=1}^{|f|} p(f_k \cap s_i) / p(s_i) \right) * U_{rf}$$

$$\theta(U_{rp}, U_{rf}) := \left(\sum_{i=1}^n \text{prob}(p(s_i) / s_i) \right) * U_{rp} + \left(\sum_{i=1}^n \sum_{k=1}^{|f|} p(f_k \cap s_i) / p(s_i) \right) * U_{rf}$$

Sites Product	s_1	s_2	s_3	.....	....	s_n
P_1	θ_{11}	θ_{12}	θ_{13}			θ_{1n}
P_2	θ_{21}	θ_{22}	θ_{23}			θ_{2n}
....						
P_m	θ_{m1}	θ_{m2}	θ_{m3}			θ_{mn}

Step 7:

// user selected threshold
 Let p_s is the user selected product.
 λ :Threshold to filter the multi-site products.

For each product in s_i
 Do
 If($p(s_i) == p_s$) then
 Compute the product correlation value between $p(s_1), p(s_2) \dots p(s_n)$



```

    Get all sites whose products are correlated to each other.
    RankPList:= max(p(si));
    For each product in RankPList
    Do
        If( λ > RankItem(P(si))
    Then
        Display product to users.
    End if
    Done
    Done
    
```

4. EXPERIMENTAL RESULTS

ITEM PREDICTION LOGIN PAGE

Itemid	ItemName	Category	Link	PredictVal
MOBEYZKD YCD6ARQP	Micromax X090 Black	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/micromax-x090/p/itmeyzkdpyvxxz?pid=MOBEYZKDYCD6ARQP	0.586787
MOBEYZKD UTCZ4S3M	Samsung Note 4 Black	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/samsung-note-4/p/itmeyzkd3jggqzgw?pid=MOBEYZKDUTCZ4S3M	0.617035
MOBEYZKD QPZYKSGS	Micromax X245 Grey	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/micromax-x245/p/itme5sjfwhkw2mc?pid=MOBEYZKDQPZYKSGS	0.001149
MOBEYZKD GSZ4NFJY	Micromax X249 Black	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/micromax-x249/p/itme5rm24fqk2npt?pid=MOBEYZKDGSZ4NFJY	0.320368
MOBEYZKD AFGFCZDY	Samsung Note 4 White	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/samsung-note-4/p/itme5gcxqt8uskn5?pid=MOBEYZKDAFGFCZDY	0.134633
MOBEYZFFZ HZNNTDF	iBall ANDI Gold	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/iball-andi/p/itmeyzffz8ffufw4?pid=MOBEYZFFZHZNNTDF	0.103956
MOBEYZC6S 5WJ5HGB	Adcom KIT KAT A35 Plus Black	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/adcom-kit-kat-a35-plus/p/itme5rhqbyk2nfg?pid=MOBEYZC6S5WJ5HGB	0.757594
MOBEYZC6 KZCHNFZF	Adcom KIT KAT A35 Plus White	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/adcom-kit-kat-a35-plus/p/itme5rhqbyk2nfg?pid=MOBEYZC6KZCHNFZF	0.082663
MOBEYZAN TGN2ADMC	Celkon A 35K Black	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/celkon-a-35k/p/itmeyzanj3fswtg?pid=MOBEYZANTGN2ADMC	0.963613
MOBEYZAG 9FG9SYTZ	Panasonic P31 Turquoise	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/panasonic-p31/p/itme5rfexbpjchf?pid=MOBEYZAG9FG9SYTZ	0.62749
MOBEYZ8H AFMTV2TP	Zen Ultrafone 105 sport Black	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/zen-ultrafone-105-sport/p/itmeyz8htrrxxyw?pid=MOBEYZ8HAFMTV2TP	0.841683
MOBEYZ8H A2UU5NSZ	Zen 506 Black	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/zen-506/p/itmeyz8h4gca5hvy?pid=MOBEYZ8HA2UU5NSZ	0.493592
MOBEYZ8GJ GZZRMF4	Intex Aqua Y2 Pro Blue	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/intex-aqua-y2-pro/p/itme5sgnszwavr7?pid=MOBEYZ8GJGZZRMF4	0.312727
MOBEYZ8GE BWEDAVC	Intex Aqua T5 Grey	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/intex-aqua-t5/p/itmeyazn9wrz8nsq?pid=MOBEYZ8GEBWEDAVC	0.277159



		biles	AVC	
MOBEYZ8G4 JWZDGKB	Intex Aqua Star Power Kitkat Grey	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/intex-aqua-star-power- kitkat/p/itmeysnntpsrh5n?pid=MOBEYZ8G4JWZD GKB	0.176756
MOBEYZ8FX 3YC7RST	Nokia Lumia 830 White	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/nokia-lumia- 830/p/itme5vfjze5er5yg?pid=MOBEYZ8FX3YC7R ST	0.996506
MOBEYZ8FV PPAYRHG	Nokia Lumia 830 Bright Orange	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/nokia-lumia- 830/p/itme5vfjze5er5yg?pid=MOBEYZ8FVPPAYR HG	0.074717
MOBEYZ8FG 7XKG4US	Nokia Lumia 830 Black	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/nokia-lumia- 830/p/itme5vfjze5er5yg?pid=MOBEYZ8FG7XKG4 US	0.876605
MOBEYZ5JQ S6GQ9N7	iNew V8 White	Mobiles & Accessories>Mo biles	http://dl.flipkart.com/dl/inew- v8/p/itmeyz5jjz5t8zev?pid=MOBEYZ5JQS6GQ9N7	0.50972

SAMPLE COMPUTED FLIPKART PREDICTED ITEMS

id	rule	category	prob
1	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress14.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141419592397?pt=LH_DefaultDomain_0&var=440562998911	CLOTHS	0.337143
2	VINTAGE LOT OF VINTAGE SQUARE DANCE CLOTHES 9 ITEMS SIZE S - M GREAT SELECTION20.5http://www.ebay.com/itm/VINTAGE-LOT-VINTAGE-SQUARE-DANCE-CLOTHES-9-ITEMS-SIZE-S-M-GREAT-SELECTION-/151588410714?pt=LH_DefaultDomain_0	CLOTHS	0.337143
3	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress13.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141502245989?pt=LH_DefaultDomain_0&var=440653890757	CLOTHS	0.337143
4	Mod Cloth Hybrid Genre Dress Size Small New With Tags M.O.D.12.5http://www.ebay.com/itm/Mod-Cloth-Hybrid-Genre-Dress-Size-Small-New-Tags-M-O-D-/151588549526?pt=LH_DefaultDomain_0	CLOTHS	0.337143
5	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress14.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141419592397?pt=LH_DefaultDomain_0&var=440562998912	CLOTHS	0.337143
6	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress15.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141511026234?pt=LH_DefaultDomain_0&var=440662820386	CLOTHS	0.337143
7	NWOT Mod Cloth Taylor Size 14 Dress Orig 94.9914.99http://www.ebay.com/itm/NWOT-Mod-Cloth-Taylor-Size-14-Dress-Orig-94-99-/181666525725?pt=LH_DefaultDomain_0	CLOTHS	0.337143
8	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress9.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141419592397?pt=LH_DefaultDomain_0&var=440562985949	CLOTHS	0.337143
9	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress12.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141419592397?pt=LH_DefaultDomain_0&var=440653471891	CLOTHS	0.337143
10	Anthropologie Cloth & Stone Shirt dress tunic New sz \$45.99http://www.ebay.com/itm/Anthropologie-Cloth-Stone-Shirt-dress-tunic-New-sz-S-/301528694661?pt=LH_DefaultDomain_0	CLOTHS	0.337143

11	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress10.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141511026234?pt=LH_DefaultDomain_0&var=440662820370	CLOTHS	0.337143
12	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress11.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141502245989?pt=LH_DefaultDomain_0&var=440653890771	CLOTHS	0.337143
13	Abercrombie Womens Juniors XS Blue Yellow Plaid Mini Dress Summer Clothes 8.5http://www.ebay.com/itm/Abercrombie-Womens-Juniors-XS-Blue-Yellow-Plaid-Mini-Dress-Summer-Clothes-/331479335318?pt=LH_DefaultDomain_0	CLOTHS	0.337143
14	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress10.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141419592397?pt=LH_DefaultDomain_0&var=440562985970	CLOTHS	0.337143
15	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress10.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141419592397?pt=LH_DefaultDomain_0&var=440562985958	CLOTHS	0.337143
16	NWOT BB Dakota for Mod Cloth "Some Flair Over the Rainbow" Halter Dress 4 Small18.0http://www.ebay.com/itm/NWOT-BB-Dakota-Mod-Cloth-Some-Flair-Over-Rainbow-Halter-Dress-4-Small-/221690992284?pt=LH_DefaultDomain_0	CLOTHS	0.337143
17	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress15.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141511026234?pt=LH_DefaultDomain_0&var=440662820385	CLOTHS	0.337143
18	Hot Women Clubwear Sexy Clothes Cocktail Party Ladies Bandage Bodycon Maxi Dress12.0http://www.ebay.com/itm/Hot-Women-Clubwear-Sexy-Clothes-Cocktail-Party-Ladies-Bandage-Bodycon-Maxi-Dress-/141419592397?pt=LH_DefaultDomain_0&var=440562985972	CLOTHS	0.337143
19	Mod Cloth Boho Chic Embroidered Dress37.99http://www.ebay.com/itm/Mod-Cloth-Boho-Chic-Embroidered-Dress-/221688816973?pt=LH_DefaultDomain_0	CLOTHS	0.337143

Sample Ebay Cross Product Computation

Parameters Initialization

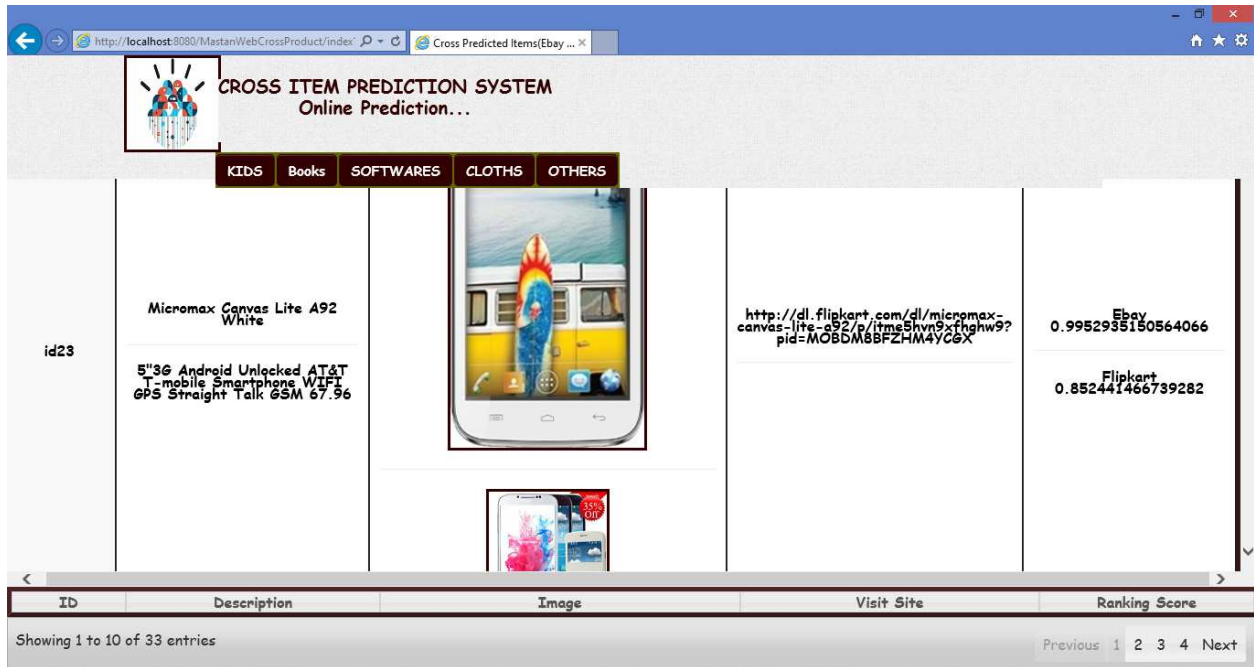
Number of Items


Threshold

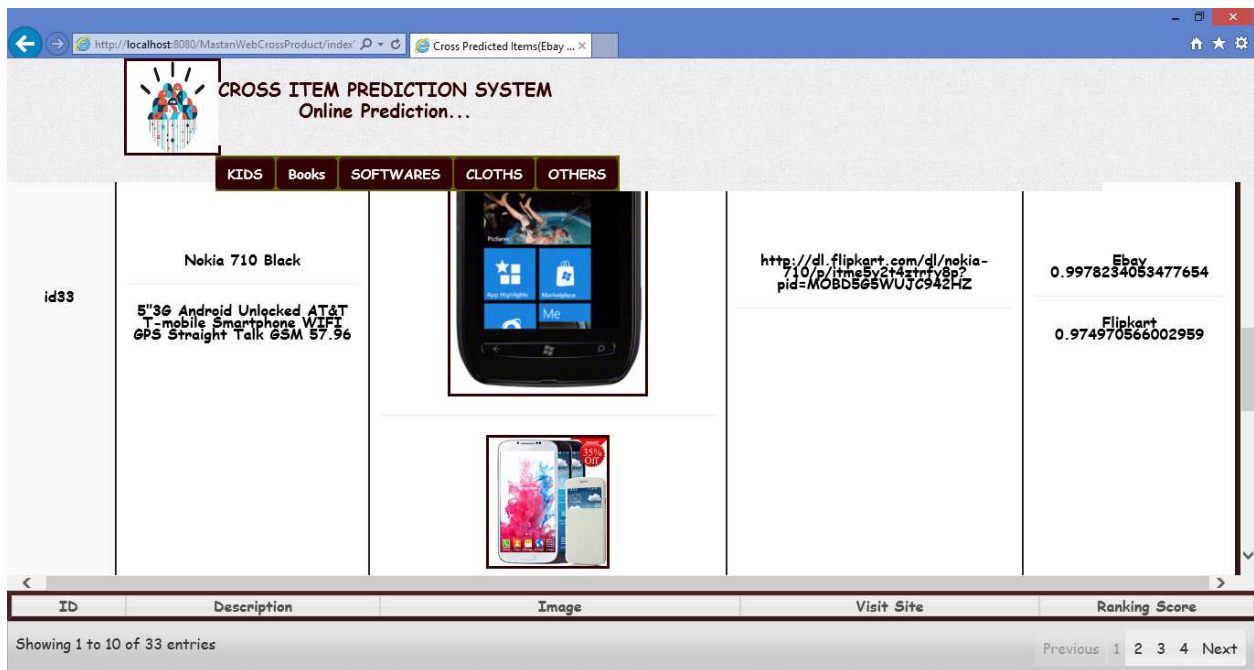
Item Name


Enter Site(Ebay or Flipkart) ×

Parameter Setting



ID	Description	Image	Visit Site	Ranking Score
id23	Micromax Canvas Lite A92 White 5"3G Androïd Unlocked AT&T T-mobile Smartphone WIFI GPS Straight Talk GSM 67.96		http://dl.flipkart.com/dl/micromax-canvas-lite-a92/p/itm5hvn9xfghw9?pid=MOBDM8BFZHM4YCEX	Ebay 0.9952935150564066 Flipkart 0.852441466739282

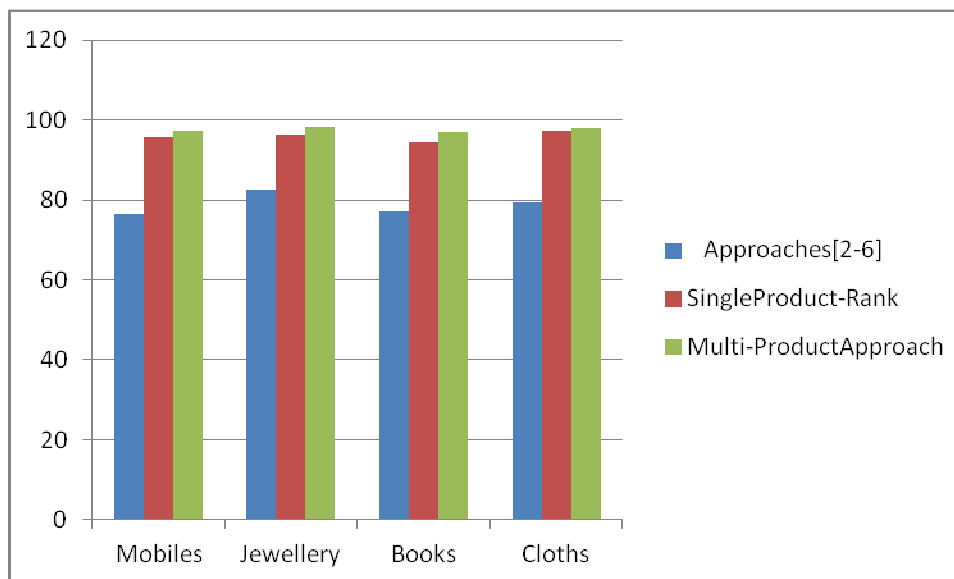


ID	Description	Image	Visit Site	Ranking Score
id33	Nokia 710 Black 5"3G Androïd Unlocked AT&T T-mobile Smartphone WIFI GPS Straight Talk GSM 57.96		http://dl.flipkart.com/dl/nokia-710/p/itm5y2t4zmfy8p?pid=MOBDS6SWUJC942HZ	Ebay 0.9978234053477654 Flipkart 0.974970566002959

Performance

Items	Approaches[2-6]	SingleProduct-Rank	Multi-ProductApproach
Mobiles	76.34	95.76	97.34
Jewellery	82.45	96.32	98.13
Books	77.23	94.54	96.98
Cloths	79.34	97.45	97.99

Accuracy Comparison Between Different Products From Different Sites



5. CONCLUSION

The purpose of implementing a multi-site based recommendation system is to optimize the ability of traditional recommended systems that are unable to find instant recommendation products dynamically to the target users. Our system is capable of effectively identifying a user's interest towards the online products. The proposed work gives the best solution to the users who are interested in comparing the different vendors' products for product purchase. Experimental results show that proposed multi-product system give better user product recommendation compared to traditional single product recommendation systems.

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