1. INTRODUCTION

Ecommerce is a business model where selling and buying of products is carried out over the internet. In this environment, the consumer is allowed to enter into the system through various channels like the web, mobiles, store front and so on. The consumer is allowed search for the desired product in product catalogs. Experts such as ‘The World Trade Organization (WTO) defines e-commerce as "the production, distribution, marketing, sale or delivery of goods and services by electronic means". E-commerce is defined as conducting business transaction over telecommunication networks [1].

Then, this request is sent to real time inventory after which, with the help recommendation systems and personalization techniques, relevant products are displayed to the customer in a web interface. The consumer is allowed to add the choices they are interested in into the shopping cart. The payment process is done through payment gateways. Once the money is realized, the product is sent to the customer and transactions are stored in the vendor data base as this is very important information that can be used by the vendors for analytics. A typical E-commerce architecture is given below in Fig1.1

1.1 TYPES OF E-COMMERCE

Ecommerce business is run purely on IT infrastructure and adopts various renowned business models like Business to Business (B2B) or Business-to-Consumer (B2C) or Consumer-to-Consumer (C2C). They are shown in Fig1.2
Fig1.1 Basic E-Commerce Architecture

Business to business (B2B) is a web based business model that is basically characterized as biggest form of E-commerce as it alludes to an expansive scope of intercompany exchanges. B2B additionally incorporates many sorts of monetary exchanges between organizations, for example, reinsurance, business credit and electronic systems for exchanging bonds, securities and other money related resources. B2B exchanges avoid those including families, for example, retail deals, inter-consumer trade, and work [5]. Examples are Alibaba and IndiaMart which are famous for sales among manufacturers to wholesalers. Intel selling microprocessors to Dell is another example.
Business to Consumer (B2C) is a kind of E-commerce in which the consumer is allowed to purchase the products online with the help of the internet. This is the largest kind of Ecommerce among all the models. In this model, the customer searches through various vendors for the required products over the internet and is able to find more search options at click away distance. Examples of such B2C are eBay, Amazon, Flipkart which are famous for sales among consumers vendors to consumers.

![Different types E-Commerce Business models](image)

Consumer to Consumer (C2C) is a kind of ecommerce business model where buying and selling process is carried out among consumers through some third party. Consumer who wants to sell products can put them for auction and those who want to buy it will go for a bid. Consumers who will quote the highest bid amount will get the product or service and they need to pay some service charges to the third party online service provider. Examples C2C are eBay, OLX which are famous for sales among consumers.
Consumer-to-Business (C2B) Another form of e-commerce where a consumer posts his necessities with a set financial plan on-line and companies analyze the consumer's necessities and bid on the project. The consumer reviews the bids and selects the company that will complete the project.

M-commerce Finally, m-commerce refers to the buying and selling of products and services using handheld devices such as mobile phones and personal digital assistants.

1.2 ADVANTAGES OF E-COMMERCE

The advantages of E-Commerce are many and are listed below.

1.2.1 BUY ANYTIME AND ANYWHERE

A consumer has the freedom to purchase products any time, 24x7, 365 days. Unlike physical stores, there is no time constraint for the consumer as he or she can purchase products any time round the clock as they are allowed to search and purchase the products. If the customer is not happy with the product quality or if the commodity happens to be the wrong size or dimension or even defective, he can register a complaint either immediately or as and when possible within a window allowed by the seller and can return the product, to be replaced by a good one or simply cancel the purchase and get refund immediately. The seller arranges a return courier service too if a product is to be returned for any reason.

The consumer need not physically visit brick and mortar stores to purchase products: In this demanding world, people are very much busy with their day to day activities. They can’t even find time to look after their every need in their hectic lives.
1.2.2 BUY PRODUCTS OF CUSTOMER CHOICE

E-Commerce comes as a god sent boon supporting common people as they can get whatever they want from tablets to vegetables, without stepping out to visit a store. Simply by sitting at their home or office, they can purchase products or services as this obviates and eliminates a lot of time, money and effort. A consumer can access a wide variety of products like tea tree oil to doorbells or for that matter, insurance policies etc. with different brands by visiting multiple web stores while still sitting at his or her home or work place anytime.

1.2.3 INSTANT ACCESS TO NEW ARRIVALS

New arrivals which are not found in physical stores can be purchased from online stores: sometimes new arrivals may not be available with every physical store but there is every possibility of finding these products with E-Commerce by browsing multiple web stores available in the market space. French cypress essential oil, for instance, is available only in amazon, and not in the supermarket or with the shopkeeper next-door.

There are no geographical limitations for purchasing products online because of internet technology and globalization. A consumer is able to get the best products at the best price. In some cases, some products may available at cheaper price at some locations due the availability of raw materials etc. and that opportunity can be grabbed by any consumer from anywhere in the world.
1.2.4 AVAILABILITY OF COMPLETE INFORMATION ABOUT THE PRODUCT

There is good amount of information available about the product like pricing, reviews, ratings for better decision making. Most of the consumers are in the dark or unsure of the performance of products they are interested in. E-commerce facilitates the choice by providing reviews and ratings by the consumers who already purchased these products, so that decision making of other consumers may be easy by going into those details.

1.2.5 PERSONALISED OFFERS

Better services are being provided by the E-commerce in the form of CRM. CRM technologies includes sending personalized offers, details about new arrivals based on consumer interest etc. These solutions are helping businesses to improve consumer retention rate and help to convert a browser into a buyer.

1.2.6 SEVERAL PAYMENT OPTIONS

Easy Payment methods such as cash on delivery (COD) or card swipe at the time of delivery for goods and services are popular. Sometimes, a consumer may have doubts regarding delivery of products after payment. Most of the E-Commerce giants are providing an opportunity to pay cash after door-delivering the products.

1.2.7 CONSUMER MAY BECOME SELLER

The consumer not only purchases products via online portals but can also sell their products through online methods. E-commerce adopts C2C model where consumers are directly allowed to sell their products to another consumer through some web
interface for that infrastructure providers collect nominal service charges. We have OLX, QUIKER as popular examples.

A consumer can sell his products for a better price. Business models like EBay introduced the concept of bidding through which consumers can get best price for their commodities.

Consumers get guaranteed payments. Nowadays, highly secure payment gateways are available in the market and so there are very few chances of finding problems in the payment process.

1.3 APPLICATIONS OF E-COMMERCE IN BUSINESS PROSPECTIVE

It provides organizations the opportunity to meet consumer demands and incessantly meeting new marketing verticals. Many players are available based on the consumer behavior and can understand demands of consumers. Based on that, they can start new businesses and will be able to follow consumer’s trends.

It enables the business to provide better services to the consumer. Online business analytics are playing a major role based on the consumers’ purchase history data, a business will able to understand their needs, tastes, likes and dislikes and provide better service in the form of Recommendations etc.

Organizations can reach a variety of consumers across the world. Due to globalization, consumers from different locations can purchase the products in a web store that makes the business to meet a wide variety of consumers across the world.
Organizations create Brand awareness to reach consumers through digital marketing and that strategy helps to conduct better business.

1.3.1 USING RECOMMENDATION SYSTEMS TO IMPROVE SALES

These kinds of systems definitely show their impact on purchase decision and the search time is also reduced; apart from that, the consumer can find products of his interest without much of his intervention or effort.

Business performance can be improved using analytics because analytics understand the consumer at deeper level and businesses can sell whatever products are searched for most by the consumers. In many other dimensions, analytics help to understand the consumer in 360 degrees so that a business can grow very effectively.

1.4 GROWTH OF E-COMMERCE

Most of the consumers in today’s world are inclined towards E-commerce. Business reports show that there is tremendous growth and development in this domain. Studies in the ecommerce domain reveal that this will rule the world’s future economy. Recent studies disclose that traditional business can be replaced by E-Commerce largely in the next 5 years in developed countries.

Market statistics show that a tremendous increase in growth of e-Commerce business has happened because of the availability of internet technologies reaching the deepest corners of the world and also because of increased awareness about e-Commerce. Various studies show the growth of internet users in the world and those details are given in the Table 1.1.
Table 1.1 Statistics of internet users across the world

<table>
<thead>
<tr>
<th>YEAR</th>
<th>NUMBER OF USERS</th>
<th>% WORLD POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1,129 millions</td>
<td>17.2%</td>
</tr>
<tr>
<td>2008</td>
<td>1,407 millions</td>
<td>21.1%</td>
</tr>
<tr>
<td>2009</td>
<td>1,596 millions</td>
<td>23.8%</td>
</tr>
<tr>
<td>2010</td>
<td>1,966 millions</td>
<td>28.7%</td>
</tr>
<tr>
<td>2011</td>
<td>2,095 millions</td>
<td>30.2%</td>
</tr>
<tr>
<td>2012</td>
<td>2,439 millions</td>
<td>34.8%</td>
</tr>
<tr>
<td>2013</td>
<td>2,802 millions</td>
<td>39.0%</td>
</tr>
<tr>
<td>2014</td>
<td>3,035 millions</td>
<td>42.3%</td>
</tr>
<tr>
<td>2015</td>
<td>3,270 millions</td>
<td>45.0%</td>
</tr>
<tr>
<td>2016</td>
<td>3,631 millions</td>
<td>49.5%</td>
</tr>
<tr>
<td>2017</td>
<td><strong>3,739 millions</strong></td>
<td><strong>49.6%</strong></td>
</tr>
</tbody>
</table>

Source: Internet World Stats

As per the internet world stats, internet users have increased year by year. In 2007, there were around 1,129 million users across the world which is equal to 17.2% of the world population using internet but now 3,739 million people of the world population are using internet by 2017 which is 49.6% of the world population.

Surely, E-Commerce business going to dominate traditional market as per the predictions as reflected in the total retail sales worldwide. B2C E-Commerce sales shown year wise 2012 to 2017 and region wise in Fig 1.3
Fig1.3. B2C Commerce sales between 2012-17 in Asia-Pacific region

Coming to the Indian context, observable growth can be identified in retail E-Commerce as these details exhibit that boundless upper potentiality is there for retail E-commerce in India in future. Those details are shown below in Fig1.4.

Fig1.4 Retail E-Commerce sales in India between 2013-2018
India is witnessing massive growth in Ecommerce. According to the Central Statistics Organization (CSO) and International Monetary Fund (IMF), Indian e-commerce sales are expected to reach US$ 120 billion by 2020. The role of FDI, GST and other parameters may be the cause for this growth.

1.5 CHALLENGES IN E-COMMERCE

There are myriad challenges depending on the location and they vary from country to country but some of the common challenges in E-Commerce are as follow:

There are misconceptions about consumer support towards services and about warranties, guarantees etc. It means most of the consumers entertain several doubts like after purchasing a product, whether they can get warranties perfectly or not, whether these customer service centers respond to the problems or not and so on. These are some misconceptions in the mind of a typical E-Commerce customer.

Consumers in developing countries are not aware of the laws and regulations of E-Commerce. In most of the developing countries like India, people are not aware of laws and regulations in this domain and so they are hesitating to purchase products through these portals.

There is also a lack of confidence or faith in these portals when it comes to giving personal and financial information to E-Commerce vendors. It is also one of the problems where consumers are having less confidence over the security measures taken by these web shops towards their personal and financial information.
There is no standard specification applied to all countries regarding regulations towards this business varying from country to country concerning taxation, payments etc.

Internet literacy also plays a major role in purchasing products. In some countries, people do not have computer literacy and because of that handicap, they are unable to purchase products online.

Consumers are generally not aware of the importance of E-Commerce in this economic system. Compared to physical stores, in ecommerce, most of the supply chain stages are removed. So, definitely in ecommerce, products can be purchased at lower prices when compared to physical stores but that kind of awareness is not there with consumers. This system is used to the traditional face to face communication in purchase process. Consumers are very much interested to buy products only by having a look and feel experience or personal scrutiny or verification but that is not possible in ecommerce.

There are religious restrictions to use some kind of products. Infrastructure may be not sufficient to consumers in terms of internet, hardware etc. in some under developed countries.

1.6. CURRENT RESEARCH TRENDS IN E-COMMERCE

In the conventional approach, for product purchasing, the consumer used to visit the brick and mortar stores physically and choose a product within a limited availability of products varieties. This style of purchase is consuming the customer’s valuable time and effort as he needs to visit different stores and judge the price and quality of the product he wants to buy. This scenario is cumbersome and at times irritating. Today’s world is
witnessing a paradigm shift in buying as it is using E-Commerce, a facility which is comfortable and easy to purchase products online because of the availability of a wide variety of products with a click.

Forrester Research (a Market research company) predicts the E-commerce spending in the United States will hit approximately $480 billion in 2019, with an expected compound annual growth rate of 10% over the next five years [2].

Nomura predicts that in India, this figure will be $35 billion by 2019. Definitely, in future E-Commerce will be a game changer in the world market.

Statistics show that a tremendous increase in growth of E-commerce business has happened because of the availability of internet technologies reaching the deepest corners of the world and also because of increased awareness about E-commerce [3].

Due to increase in online shopping, there is a great need for technological innovation so as to present the consumer the best product search results from the best vendor, in the form of search engines and recommendation systems. Massive growth of ecommerce introduces many challenges due to the availability of wide varieties of products sold by different vendors through online systems and portals. The present days’ E-commerce scenario of product search recommendation has introduced different mechanisms to display the products to the consumer by taking his input of required product and perform searches over their database.

The number of choices displayed for a product is very huge due to a large collection of items with varying features sold under different brands by various merchants. This is creating huge information overhead that in turn creates cognitive overload on the
consumer [4]. Many E-commerce vendors have adopted a Range based faceted approach to decrease the information overhead to some extent. E-commerce market space has become very competitive and this has prompted E-commerce vendors to quickly find ways and means to attract customers to sell their products.

In order to solve information overhead problem on consumers to some extent, there are several search engines used by various vendors like Amazon using A9 algorithm, Flipkart using Lucene solar, eBay using Best match algorithms to extract the products from their respective sites. However, these search engines are unable to completely solve the information overhead problem. Moreover, if the consumer wants to perform cross vendor search, these search engines are unable to facilitate such an attempt.

These methods also do not guarantee that the consumer will get the right product information on top of the list. The required product of a brand may not be available with a single E-commerce vendor and the consumer may need to visit multiple vendor sites. Hence, there exists a need for a transparent model to display items to the consumer by considering their interested feature set, priority and extract products available with multiple vendors. In this thesis we proposed a model which includes priority enriched multi vendor facet search for recommending relative products to consumer as per his/her intent. These are detailed in the next section.
1.7 PROBLEM STATEMENT

Building a Search Recommendation System for E-Commerce Products based on priority
Enriched Multivendor Faceted search to Reduce information overhead and recommend
best product to the consumer based on his/her interest.

1.7.1 Proposed solution

For this purpose, we need to do the following tasks.

1. Build ontology effectively for product information extracted from multiple E-
   Commerce vendor sites.

2. Handle sparsity as a missing value to produce quality results from extracted
datasets.

3. Improve existing facet search method to Reduce Information over head.

4. Rank products to recommend best product to the consumer relative to his/her
   choice sold by multiple vendors and brands in a single interface.

The multivendor product search recommendation platform that is proposed performs
automated product information extraction and ranking by taking the user’s interest and
query with multiple E-Commerce vendor sites. Fig1.5 shows the proposed architecture
with various phases.
The architecture focuses on data extraction and preparation, Data Querying, Data Reporting. Data Extraction process involves connecting with multiple vendor sites like Amazon.in, Flipkart.com. The system automatically connects to the vendor sites and extracts info using the web service API provided by the respective vendors. The retrieved data in the form of XML is tokenized. The Feature extraction engine classifies the extracted tokens into feature tokens and other information tokens. In some cases, the value of the feature tokens may not be present or the feature itself may be missing when processing the parsed data. This situation leads to sparsity which is resolved by the sparsity resolver.
A unique feature set engine processes the resolved tokens and identifies the common tokens to build an ontology structure. This ontology structure is used to build a relational model.

Once the product information is populated into the database, our system then provides the consumer with the facets along with priority to make his search more accurate and to eliminate cognitive overload. The combination generator is provided with the user selections to generate all possible combinations. The resulting combinations are fired over the database in order to extract needful combination. These combinations reflect a product with that feature set with different brands available over various ecommerce sources sold by different vendors. The system then uses a weight generator which employs the concept of nearness to assign calculated weights for each of these needy combinations. These needful combinations are then sorted using the weights. Then a rank estimator is used to facilitate recommending the best product. A rank is assigned to each of the available products of a particular brand sold by different ecommerce vendors by considering the ratings and number of users rated for that particular product by using the proposed 40:60 method. The weighted available combinations are reordered brand wise using the ranks generated by the rank estimator. The detailed algorithm for the above procedure is given below

**The Algorithm steps to implement the proposed Architecture:**

**STEP-I:** Input the product the user wants to buy.

**STEP-II:** Connect to e-commerce vendor sites S1, S2..., Sn to fetch Data.

**STEP-III:** Create common ontology


**STEP-IV:** Fill missing values using conditional probability.

**STEP-V:** Read facet values and corresponding priorities selected by the user.

**STEP-VI:** Generate Look up table structure.

**STEP-VII:** Generate combination feature vector based on user input.

**STEP-VIII:** Identify Needful combinations with reference to S1,S2…Sn.

**STEP-IX:** Compute weighted similarity for needful combinations.

**STEP-X:** Compute ranks to the needful combinations 40:60 method.

**STEP-XI:** Recommend the best product to the consumer based on his/her interest.

### 1.8 RESEARCH OBJECTIVES

*The above proposed solution stated as objectives of this thesis are listed below. The results are published in [102][103][104][105].*

**Objective 1. Effectively build ontology from product information extracted from multiple E-Commerce vendor sites**

Most of the E-Commerce vendors such as Amazon, Flipkart, eBay are providing their product information to researchers through APIs under Developers program to promote their product information in other websites. We have taken Amazon, flipkart APIs and extracted product information which is in the form of XML format.

The XML data is processed using DOM parser to build the tokens. These tokens are classified into feature tokens, other information tokens. Feature information describes the product whereas other information may include the product price, consumer ratings,
number of users rated. For example, if a consumer wants to search for ‘laptop’ the features of the laptop such as RAM, DISPLAY and PROCESSOR are extracted into the feature tokens. The features such as user ratings, number of users rated are extracted into other feature tokens. Each feature token holds the feature’s name and feature’s value. Different vendors represent product information in different ways hence we need a common taxonomy [5] to correlate the information extracted from multiple vendors, ontology is one such option. Ontology is a formal naming and definition of the types, features, and correlation of the products that exist for a particular domain. The feature tokens extracted from different vendor sites are searched for commonality in feature tokens and these common tokens are used to build as ontology for a product category i.e. laptop in this context. This ontology is used to build a relational schema. In this thesis, we propose an algorithm to extract information from multivendor sites and build ontology and create relational schema for product and populate the extracted data.

**Objective2. Handling sparsity as a missing value to produce quality results from extracted database**

Data cleaning plays a vital role in producing quality results in any data analysis process. In some cases, the value of the feature tokens may not be present or the feature itself may be missing when processing the parsed data and so this situation leads to sparsity. In the context of ecommerce, for example, let us consider a mobile product such as Samsung Guru Music 2 SM-B310E which doesn’t possess a camera feature. Our ontology for mobile product will have a feature called camera in it. While populating the database with this product information a NULL value will be placed in the corresponding feature column. Let us consider a different scenario for a mobile product such as Samsung
Galaxy J7 which has a camera feature. While extracting information from multiple vendors due to some anomalies either in the network or in the server hardware the feature value may be missing. While populating the data base with information for this mobile product, the feature in the database will be filled with a null value. In both of the situations described above, a feature in the database will be filled with null value even when the feature is not present or may be missing. The missing value for the feature will not list the product to the consumer in top position when he is searching with the camera as a feature. The above situations are to be addressed to effectively build search recommendation engine. In this thesis, we have proposed an algorithm to judge the null value as either a missing or no feature. If it is judged to be missing value, the proposed algorithm will replace the null value with relative value for the feature.

**Objective3. Priority Enriched facet search method to Reduce Information over head.**

In earlier days of ecommerce business, vendors used to provide the consumer a chance of giving the product category for searching, displaying all the products in that category. This situation created cognitive overload on the consumer by creating confusion in choosing the right product within the large list. Over a period of time, the E-commerce market space became very much competitive; this situation demanded that the E-Commerce vendors improve the services to consumers, one of which is to reduce the cognitive overload on the potential buyer. This has introduced the concept of facet search which has reduced the search list to some extent. Facet in ecommerce domain is generally referred to as combination of property and its value. For example, let us consider a mobile product with feature set such as Camera:16MP, RAM:4GB, DISPLAY:5.5INCH.CAMERA, RAM and DISPLAY are the properties and
16MP, 4GB, 5.5 INCH are values of the respective properties and these are the facets of a mobile product. There can be many facets for a product and all these facets may not be displayed in the user interface, because it will again create cognitive overload in terms of time taken by the consumer, choosing the facet values. In this thesis, we have proposed a method of introducing the consumer priority to the facet which can drastically reduce information overhead problem.

**Objective 4.** Rank products to recommend best product to the consumer relative to his/her choice sold by multiple vendors and brands in a single interface.

In most of the existing ecommerce vendor sites, the search results ordering depends on subscription policy of the seller with vendor as vendors are adopting different recommendation methodologies to display their products based on the merchant subscription polices. These methods do not guarantee that the consumer will get the right product information on top of the list. The consumer requirement of a product of a specific brand may not be available with a single e-commerce vendor and the consumer may need to visit multiple vendor sites.

Hence there exists a need for a transparent model to display items to the consumer by considering his interested feature set and priority that are available with multiple vendors. In this thesis, we have introduced an algorithm that facilitates priority enriched faceted search and displays products to the consumer by fetching data from multiple e-commerce vendors’ databases and to recommend consumer a good brand and vendor through an unbiased ranking mechanism in a single interface. The ranking mechanism obtained weighted feature combination product existing with different brands sold by different
vendors. Now, we need to select the right brand and right vendor. We assign rank to the item which helps in recommending a right brand to the customer. The rank is calculated by taking into account the prospective customer ratings and the number of people that have rated the product. For example, if less number of users have given a rating of 5 (on scale of 0-5) to a brand, best rank cannot be given when compared to more users with rating of 4 to another brand for the same product.

In order to overcome this problem, we have considered different weightings to user rating and the number of users that have rated while calculating the rank. Our experiments have shown best ranking results when a weight of 40% to rating and 60% to the number of people who have rated.

1.9 CONTRIBUTIONS OF THE THESIS

The contributions of the thesis are as follow:

First we have build a common ontology in multivendor E-Commerce in that process we attempts to evaluate various E-commerce vendor sites such as Amazon, Flipkart, eBay and identifies that there is no E-Commerce site which can allow consumer to search and fetch results from multi-vendor sites for a product category through a single interface. There is little attention in the literature for such a common platform. A multivendor system as proposed as in, has the drawback as it has to maintain a common shared data base and it is not providing any ranking among vendor products. To address this problem and to eliminate the maintenance of huge data store, we have identified the usage of APIs provided by different vendors such as Amazon, Flipkart, eBay etc. to access consumer desired product information. we have proposed an algorithm to connect with multiple vendor APIs and to fetch the data dynamically and pushed into a temporary data store.
which does not require a huge data base maintenance. Through the APIs, product information is extracted in the form of XML and is processed in order to get data in the form of tokens. Based on the tokens, I have identified the common features for a product in different web shops and built a common ontology. This common ontology is used to build a relational schema to populate each feature as column in the schema.

Secondly, we have addressed the problem of sparsity: once the data is populated into the relational data base, there might be some chances to find a feature with missing value due to any arbitrary error at the process level, system level or at the channel level. Another reason may be that a particular feature may not be available with that product. However, this situation shows serious impact on search results. In the literature k-, the nearest neighbor algorithm mean or mode imputation methods are widely used but they fail to identify whether a feature is valid with the product or not.

To address this problem, we have proposed an algorithm which is based on Bayes classification in order to find the probability of having a feature with missing values to that product. Based on that probability, if it is not required to hold by a product, then it will be ignored or by using the Expectation Maximization Technique, that missing feature will be replaced with an appropriate value.

Thirdly, we have a software to identify needful combinations by introducing priority enriched faceted search because the introduction of facets concept reduced information overhead to certain extent but still consumer is suffering in purchase decision making process because search engines are retrieving all available products with the facets and relative products in the market. However, there are previously proposed algorithms
specially built for ecommerce and they have some drawbacks such as discussed by Li et al. (2011), [7].

In this present scenario, though the consumer is given a choice of selecting the facet, there is no provision of providing his preference to the facet. In this thesis, we have proposed a method of introducing the consumer priority to the facet like high, medium, low. There is no such a method available in the existing literature. In this proposed method, the search process operated based on the given priority input, I have observed reduction in information overhead in the form of number of items listed.

Fourthly, we address the problem of ranking the items. In the existing literature, significant efforts are not identified though some researchers work is done on relevancy of searched results [8]. In this thesis, I propose a novel model to rank the products by combining similarity weights and weight is calculated based on other consumer ratings and the number of consumers rated. we have done significant number of experiments and arrived at a conclusion to choose 40:60 weight age to ratings and number of consumers rated on it respectively. In this algorithm, I am able to rank an item which got highest weight that may exist with different brands for the same product specification given by the consumer.

The next section presents the details regarding thesis organization.

1.10 ORGANIZATION OF THE THESIS

Chapter1 Introduces the research domain and Outlines the overview of the research work.

Chapter2 summarizes the research trends relative to the objectives of my research problem in the form of literature survey.
Chapter 3 Addresses first research objective by proposing a framework to construct ontology for the extracted product information from multivendor sources and also addresses second research objective by proposing an intelligent algorithm to address the sparsity

Chapter 4 Addresses third research objective by proposing a framework for priority enriched facet search

Chapter 5 Addresses my fourth research objective recommending products by proposing a 40:60 algorithm to address the ranking of the items.

Chapter 6 Summarizes the findings, limitation of this dissertation and provides directions for future work.