Dynamic Ordering of Facets for E-Commerce Industries

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***ABSTRACT*: In today's technological world, people are trending to purchase the desired product in an online web shops. These online web shops are designed in such a way that, all the products are listed in the form of Fixed Facets. Different web shops have different fixed Facets based on the wide availability of the range and properties of the product. These fixed ordered facets suffer from two main issues. Firstly, the customer has to spend significant amount of time to select the desired product from a fixed list of Facets, as the technology advances the facet lists are elaborated. Secondly, if all the products match the same facet, the search becomes useless. In this work, we present a framework for Dynamic Ordering of Facets for E-Commerce Industries. The automated algorithm is deployed, which ranks the Facets based upon the number of customers searching the desired product, this results in increasing the rank of the Facet which in-turn acquires the top position in the facet list. As the Technology advances, more people tend to search for upgraded versions of the products. By dynamic ordering of Facets we can provide the most desired products on the top of the Facet List. In a large-scale simulation and user study, our approach was, in general, favorably compared to a facet list created by domain experts, a greedy approach as baseline, and a state-of-the-art entropy-based solution.**

Keywords: Facet Ordering, Product Search, User Interface, Web Shops.

Chapter 1

INTRODUCTION

A brief description to the Introduction of the project is provided here under overview.

1.1 OVERVIEW

From the previous couple of years it is watched that variables other than the value assume an imperative part when the clients choose to pick where to purchase the desired products on the web store. In this way, online retailers provide careful consideration to the convenience and productivity of their Internet shop also called as UIs. These days, numerous Internet shops make utilization of the alleged faceted route UI, which is in writing likewise some of the time alluded to as 'faceted pursuit'. Features are utilized by a few clients as a hunt apparatus, while others utilize it as a route as well as perusing device. One reason why faceted inquiry is well known among Web shops is that clients think that its instinctive. The term 'feature' has a fairly equivocal understanding, as there are diverse sorts of aspects. In this work, facets are genrally reffered as the blend of a property and its esteem, for example, Wi-Fi: genuine or Most minimal cost (e):64.00. Moreover, facets are generally gathered by their property in UIs, keeping in mind the end goal to keep them away from being scattered around different properties instead of the desired product, and, along these lines, confounding the client.

Faceted pursuit is basically useful in circumstances where the correct required outcome isn't known ahead of time. Instead of item look utilizing keyword based searches, facets empower the client to continuously limit the list items in various strides by browsing a rundown of inquiry refinements. Be that as it may, one of the challenges with faceted hunt, particularly in online business, is that an expansive number of facets are accessible. Showing all aspects might be an answer when few features is included, yet it can overpower the client for bigger arrangements of facets.

At present, most business applications that utilization faceted pursuit have a manual, 'master based' determination method for facets, or a generally static feature list. In any case, choosing and requesting faces physically requires a lot of manual exertion. Moreover, faceted scan takes into account intuitive inquiry refinement, in which the significance of particular facets and properties may change amid the hunt session. In this manner, it is likely that a predefined rundown of facets would not be ideal as far as the quantity of snaps expected to locate the desired product. To manage this issue, this paper proposes an approach for dynamic facet ordering in the web based business area. The focal point of our approach is to deal with spaces with adequate measure of unpredictability as far as item traits and qualities. electronics goods (in this work 'cell phones') is one great case of such a space. As a major aspect of our answer, we devise a calculation that positions properties by the significance and furthermore sorts the qualities inside every property. For property requesting, we distinguish particular properties whose facets coordinate numerous items (i.e., with a high impurity). The proposed approach depends on an highest facet impurity measure, with respect to subjective facets in comparative route as classes, and on a measure of scattering for numeric facets. The property estimations are requested sliding on the quantity of comparing items. Moreover, a weighting plan is acquainted all together with support facets that match numerous items over the ones that match just a couple of items, considering the significance of facets. Like existing recommendation framework approaches, our solution means to take in the client intrigues in view of the client association with the web crawler / search Engines.

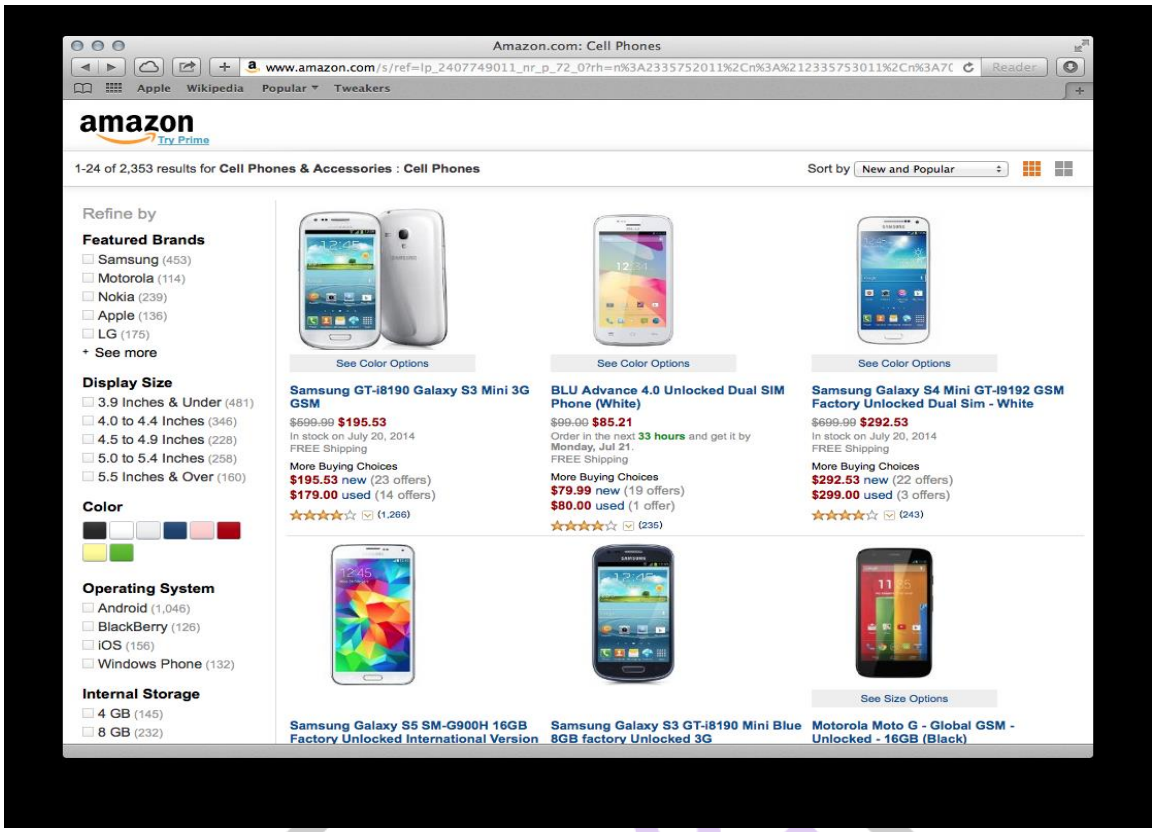

Fig. 1. A screenshot of Amazon.com, showing a typical faceted search user interface in E-Commerce Industries.

1.2 ORGANIZATION OF THE PAPER

Chapter – II **Motivation and Problem Statement:** In this Chapter motivation and problem statement is provided.
Chapter – III **Literature Survey:** Illustration of the Literature survey is mentioned in this chapter
Chapter – IV **Methodology:** The methodologies used to solve the problem statement is more briefly described in this chapter
Chapter – V **Implementation:** Implementation of the project describes a step by step solution to the problem statement.
Chapter– VI Results and Discussion: A complete set of output / results of the project is provided
Chapter – VI Conclusion and Future Work: The project report is concluded with the conclusion and future work.

Chapter 2

MOTIVATION & PROBLEM STATEMENT

We can find approaches in the literature that focus on personalized faceted search. However, these are not discussed as, unlike our approach, it requires some sort of explicit user ratings. Therefore, we only consider related work that does not require any explicit user input other than the query.

2.1 EXISTING SYSTEM

Existing solutions, the framework addresses e-commerce specific aspects, such as the possibility of multiple clicks, the grouping of facets by their corresponding properties, and the abundance of numeric facets. In a large-scale simulation and user study, our approach was, in general, favorably compared to a facet list created by domain experts, a greedy approach as baseline, and a state-of-the-art entropy-based solution. A weighting scheme is introduced in order to favor facets that match many products over the ones that match only a few products, taking into account the importance of facets.

2.2 DISADVANTAGES OF EXISTING SYSTEM

i. Large number of facets are available online in a web shop or any E-commerce Industry. Displaying all facets may be a solution when a small number of facets is involved, but it can overwhelm the user for larger sets of facets
ii. Currently, most commercial applications that use faceted search have a manual, ‘expert-based’ selection procedure for facets or a relatively static facet list. However, selecting and ordering facets manually requires a significant amount of manual effort.
iii. Furthermore, faceted search allows for interactive query refinement, in which the importance of specific facets and properties may change during the search session. Therefore, it is likely that a predefined list of facets might not be optimal in terms of the number of clicks needed to find the desired product.

iv. This method is likely not to be suitable for the domain of e-commerce, where also small data sets occur and statistically deriving interesting attributes is not possible.
v. Approach does not consider numeric facets and the use of disjunctive semantics for values.

2.3 PROPOSED SYSTEM

The faceted search system proposed focuses on both textual and structured content. Given a keyword query, the proposed system aims to find the interesting attributes, which is based on how surprising the aggregated value is, given the expectation. The main contribution of this work is the navigational expectation, a novel interestingness measure achieved through judicious application of p-values. This method is likely not to be suitable for the domain of e-commerce, where also small data sets occur and statistically deriving interesting attributes is not possible.

i. We propose an approach for dynamic facet ordering in the e-commerce domain. The focus of our approach is to handle domains with sufficient amount of complexity in terms of product attributes and values. Consumer electronics (in this work 'mobile phones') is one good example of such a domain. As part of our solution, we devise an algorithm that ranks properties by their importance and also sorts the values within each property.
ii. For property ordering, we identify specific properties whose facets match many products (i.e., with a high impurity). The proposed approach is based on a facet impurity measure, regarding qualitative facets in a similar way as classes, and on a measure of dispersion for numeric facets. The property values are ordered descending on the number of corresponding products. Furthermore, a weighting scheme is introduced in order to favor facets that match many products over the ones that match only a few products, taking into account the importance of facets.
iii. Our solution aims to learn the user interests based on the user interaction with the search engine.

2.4 ADVANTAGES OF PROPOSED SYSTEM

i. In our study, we use the common disjunctive semantics for values and conjunctive semantics for properties and take into account the possibility of drill-ups. This means that result set sizes are expected to both increase and decrease during the search session, either by deselecting a facet or choosing an addition facet in a property
ii. In terms of the number of clicks, our approach seems to outperform the other methods, except in the case of the Best Facet Drill-Down Model, where each approach performs equally well. Furthermore, for the Combined Drill-Down Model, our approach results in the lowest number of roll-ups and the highest percentage of successful sessions.
iii. The relatively low computational time makes it suitable for use in real-world Web shops, making our findings also relevant to industry. These results are also confirmed by a user-based evaluation study that we additionally performed.
iv.

Chapter 3

LITERATURE SURVEY

Unlike previous studies, as discussed in chapter 2, our approach treats numeric facets differently than qualitative facets. When creating facets from source data (e.g., tabular data), every unique property-value combination is converted into a facet. For numeric facets, the same process is applied. However, numeric values can be widely dispersed, especially in large data sets. For facets, However, that would lead to a list of possibly hundreds of different values. One way to deal with that is to create predefined, fixed ranges of values and use these as facets. However, it is never certain whether the predefined ranges will match the user's preferences. Furthermore, fixed ranges can become useless when a result set has only products that fall into one predefined range. For our approach, we have chosen to let the user define custom ranges of values to select. In a product search engine, such custom ranges can be represented using a slider widget. From a technical point of view, However, these custom ranges are considered as selecting a set of facets in one click, i.e., each numeric value is still represented as a separate facet.

3.1 Approximately Optimal Facet Value Selection:

Multifaceted search is a popular interaction paradigm for discovery and mining applications that allows users to digest, analyze and navigate through multidimensional data. A crucial aspect of faceted search applications is selecting the list of facet values to display to the user following each query. We call this the faceted value selection problem [4].

When refining a query by drilling down into a faceted value, documents that are associated with that faceted value are promoted in the rankings. We formulate faceted value selection as an optimization problem aiming to maximize the rank promotion of certain documents. As the optimization problem is NP-Hard, we propose an approximation algorithm for selecting an approximately optimal set of facet values per query [4].

We conducted experiments over hundreds of queries and search results of a large commercial search engine, comparing two flavors of our algorithm to facet value selection algorithms appearing in the literature. The results show that our algorithm significantly outperforms those baseline schemes [4].

Chapter 4

METHODOLOGY

The methodology used in this project Dynamic Ordering of Facets for E-Commerce Industries is very easy and convenient method. The approach we propose aims to order properties and facets in such a way that any individual product could be found quickly and effectively.

4.1 SYSTEM ARCHITECTURE

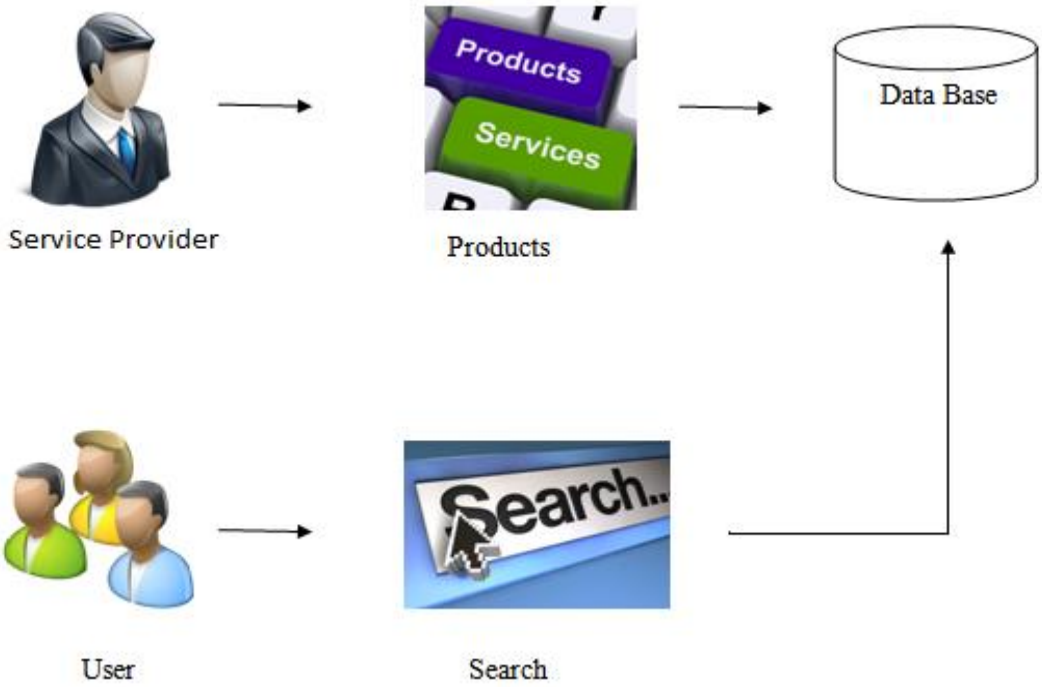

Fig. 2. System Architecture of the proposed system.

Fig. 2. Shows the System Architecture of the proposed system. This method then initiates two processes 1.Computing the property scores and 2.Computing the facet scores when the system finishes, the user view is efficient showing the properties and facets in the calculated order. In the next step, the user estimates the result set size. If the result set size is too large to scan manually the user will continue to drill-down. Otherwise, the user will scan the result set and check if the target product is found. If the target product is found, the search session is completed and considered effective. The user will perform a roll-up in the case that the desired product was not found, which will increase the result set size and the same process repeats again. The approach we propose aims to order properties and facets in such a way that any individual product could be found quickly and effectively. We put the foremost highlighting on property ordering, as we expect that it has the largest impact on the user effort. A direct way to order properties would be by contributing those properties on top that feature equal-sized facet counts for the facets of that property, which is an outcome that is for example perceptible in the entropy-based approach of [6]. However, this would still require many clicks in total, possibly foremost to long search times. Our approach aims to rank more specific properties higher. The reason behind is that we believe that users are to a restricted extent, and possibly intuitively, aware that selecting more unique features of the target product will result in a faster drill-down. Even in situations where this is not true, ranking more specific properties greater will increase the chance that the user will use specific facets for drilldown, resulting in a shorter search session duration.

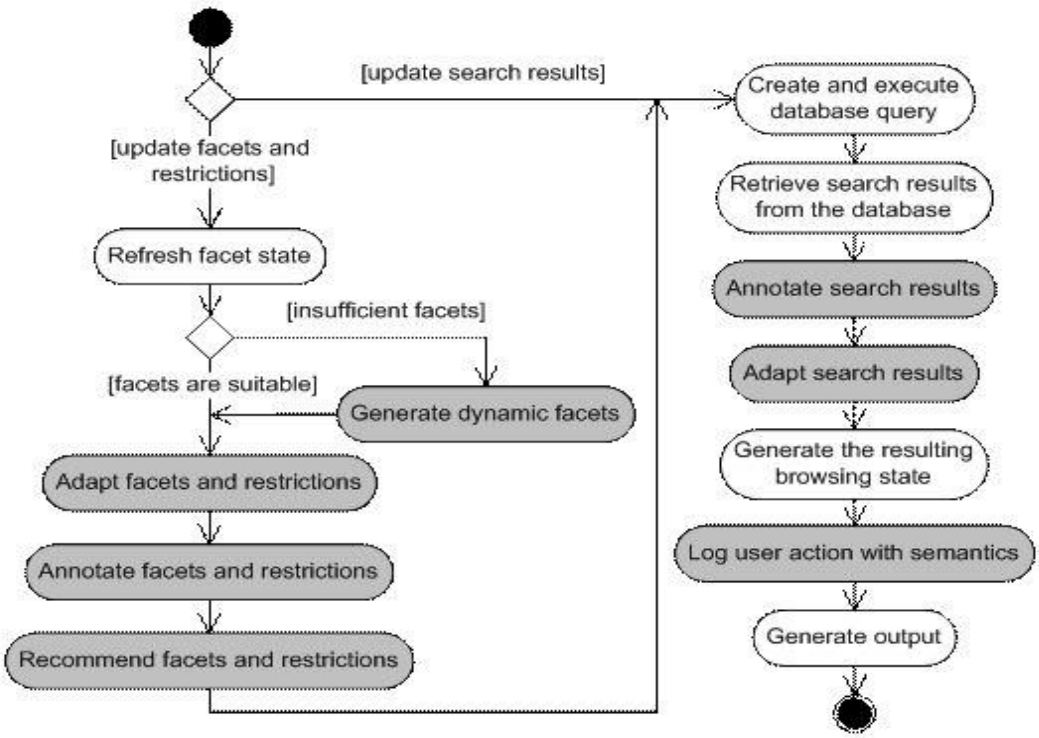

Fig. 3. Overview of the Navigation process

The Overview of the navigation Method is as shown in the Fig 3. The extension of the method over classical faceted browsers are shown in grey colored boxes and include the adaptation and annotation of facets, restrictions and search results, together with support for semantic logging of events.

4.2 DATA FLOW DIAGRAMS

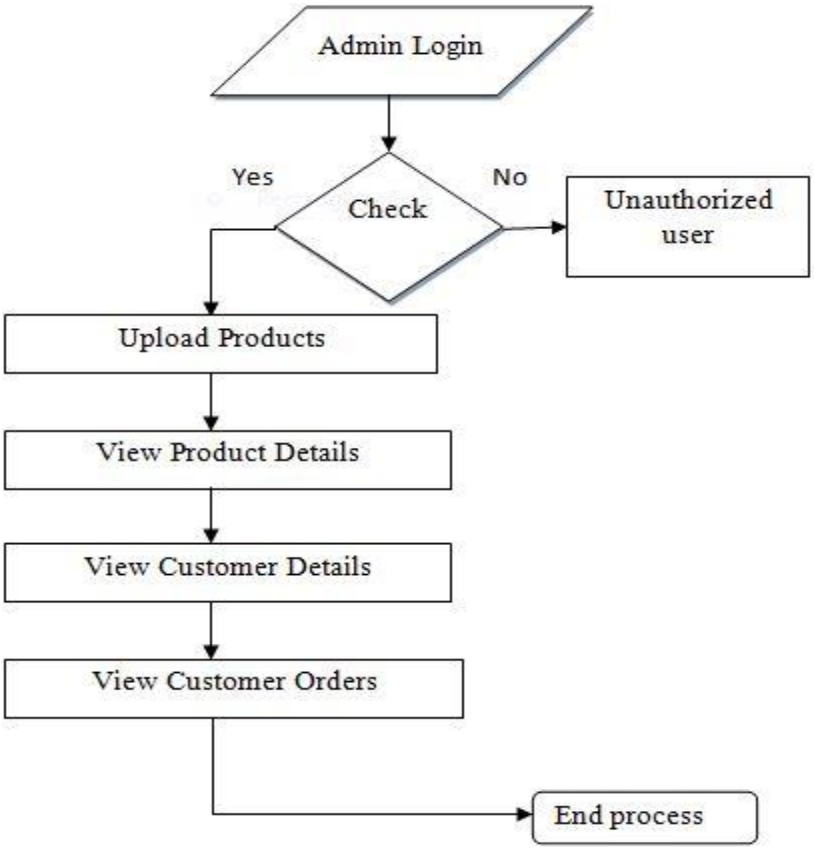

Fig. 4. Data Flow diagram indicating the functions of the Admin

Fig. 4. Shows the data flow diagram of the process and functions performed by the Admin or the administrator of the E-Commerce Industries. The admin is already a registered member of the web page. When a new product has arrived, the admin enters all the product details by logging into the website with an authorized Admin ID and Password. The admin has all the rights to check the customer details such as the products ordered online, payments details, Shipping details, billing details and the balance or the remaining availability of the other products.

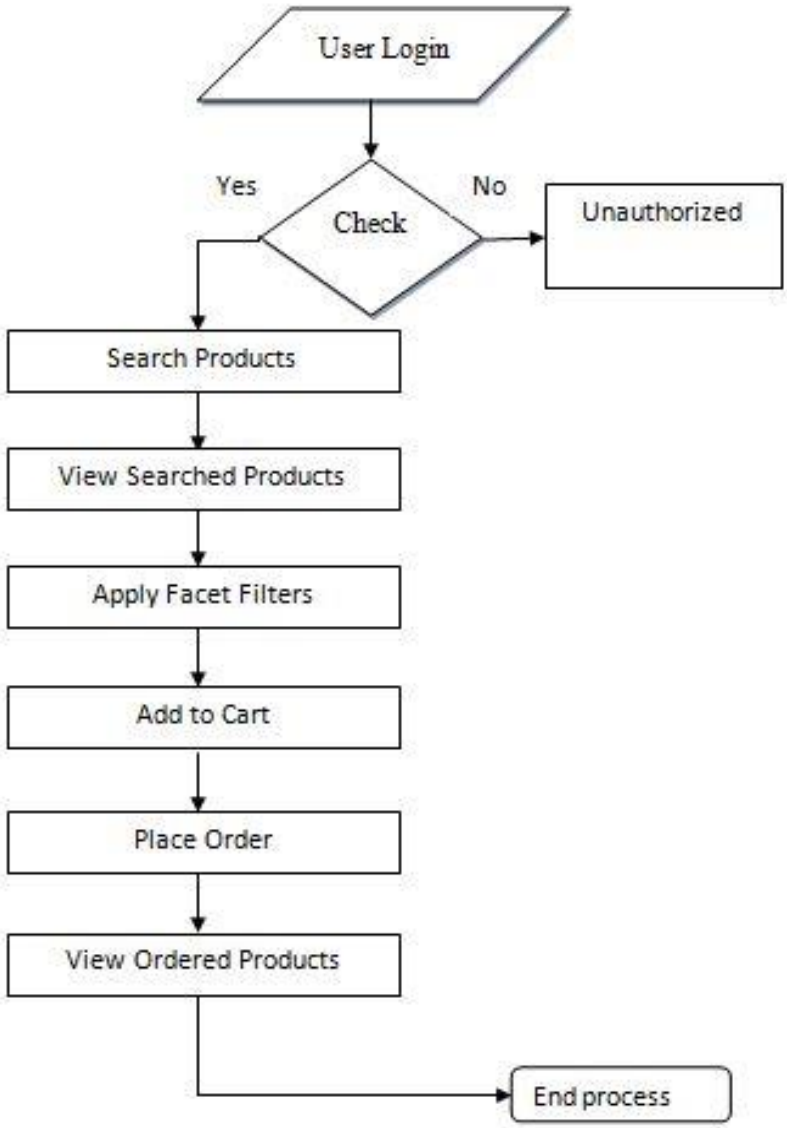

Fig. 5. Data Flow diagram indicating the functions of the User

Fig. 5. Shows the data flow diagram of the user searching products based on the website. The user first needs to register himself on the website by providing all the necessary details. After successful login, the user is able to perform all the operations such searching the desired product out of multiple available products. The user adds the particular product to the cart and places an order for shipping the ordered product. The user can easily view his order, track his order, check the delivery of the product and can also log a complaint if there is an issue with any such use cases. Fig. 5. Shows the simultaneous usage of website by both the Admin and the User performing their own task without disturbing each other during the process of operations. Once the process is completed the user and the admin can log out from the website.

Chapter 5

IMPLEMENTATION

The implementation of this project is based on the following algorithms, which performs multiple drill-down processes to order the facets dynamically.

5.1 FACET OPTIMIZATION

Before discussing the details of our approach, we need to elaborate on the assumptions and the used terminology. From the perspective of user interface design, They distinguish between two main facet types: qualitative facets (e.g., WiFi:true) and numeric facets (e.g., Lowest price (e):64.00). They further distinguish between two types of qualitative facets: nominal facets and Boolean facets. Nominal facets are, for example, those for the property Display Type, and can have any nominal value. Boolean facets are for instance Multi touch, and have only three options from an interface perspective: true, false, or No preference.

Unlike previous studies, as discussed in Section 2, our approach treats numeric facets differently than qualitative facets. When creating facets from source data (e.g., tabular data), every unique property-value combination is converted into a facet. For numeric facets, the same process is applied. However, numeric values can be widely dispersed, especially in large data sets. For facets, However, that would lead to a list of possibly hundreds of different values. One way to deal with that is to create predefined,

fixed ranges of values and use these as facets. However, it is never certain whether the predefined ranges will match the user's preferences. Furthermore, fixed ranges can become useless when a result set has only products that fall into one predefined range. For our approach, they have chosen to let the user define custom ranges of values to select. In a product search engine, such custom ranges can be represented using a slider widget. From a technical point of view, However, these custom ranges are considered as selecting a set of facets in one click, i.e., each numeric value is still represented as a separate facet.

The approach we propose aims to order properties and facets in such a way that any individual product could be found quickly and effectively. We put the leading emphasis on property ordering, as they expect that it has the largest impact on the user effort. A straightforward way to order properties would be by presenting those properties on top that feature equal-sized facet counts for the facets of that property, which is an effect that is for instance visible in the entropy-based approach of [6]. However, this would still require many clicks in total, possibly leading to long search times. Their approach aims to rank more specific properties higher. The reason behind is that we believe that users are to a limited extent, and possibly unconsciously, aware that selecting more unique features of the target product will result in a faster drill-down. Even in situations where this is not true, ranking more specific properties higher will increase the chance that the user will use specific facets for drill-down, resulting in a shorter search session duration. As an example consider a user who is searching for a Nokia smart phone capable of playing his collection of MP3 music, and both features are equally important. We expect the user to start by selecting Brand:Nokia instead of Audio Formats:MP3. The user may be aware of the fact that most smart phones are capable of playing MP3audio, thus selecting that facet will not lead to a quick drill-down. Filtering only Nokia phones will presumably have a much larger impact on the result set than filtering phones that support MP3. The effect of ranking the individual facets (i.e., Nokia vs. Samsung) is assumed to be limited. They expect that popularity is a more suited metric that can be used for this purpose. When the user selects facets from a more specific property, the result set will decrease in size quickly. Since the most specific facets only apply to few products, it would be ineffective to present those on top, as the target product is unknown to the system. Given that they assume that ordering properties has more effect than ordering facets, they therefore compute the impurity of properties as a whole, based on the specificity of its facets. Combined with weighting for the number of products on which it applies, this method will give us those properties and facets on top, that will most likely lead to the quickest drill-down for most of the possible target products. At the same time, the weighting that they introduce lowers the rank of properties with many missing values in the data, as those cannot be employed for drill-down.

5.2 Search Sessions

A query in a search session is defined as a collection of previously selected facets. They have decided to apply disjunctive semantics to a selection of facets within a property. For facets across different properties, we use a conjunctive semantics. For example, selecting the facets Brand:Samsung, Brand:Apple, and Color:Black results in (Brand:Samsung OR Brand:Apple) AND Color:Black. Several ecommerce stores on the web (e.g., Amazon.com and BestBuy.com) use the same principle, which, from a user experience point-of-view, is very intuitive.

Our approach assumes that users can undertake two types of actions: drill-down and roll-up. A drilldown is defined as an action of selecting one or more facets, leading to a reduction of the result set size. A roll-up action increases the result set size, which is likely to happen when the user notices that the selected facets are too strict. A roll-up action can be achieved in three ways: (1) selecting a qualitative facet from a property for which a selection already exists (e.g., adding Brand:Samsung to a query containing Brand:Apple), (2) deselecting the only selected facet of a property, and (3) broadening a numeric range. From this point on, we use the notations described in Table 1, which will be described in further details in the next few sections.

Fig.6. summarize the complete search session flow assumed in our approach. Throughout the search session, we assume that there exists a single target product d_u that the user wants to find, and that the user will eventually be able to find it. Although the user may not know the name of the product, (s)he will be able to identify it by means of the characteristics of the product (F_{du}). The process starts with a complete result set containing all products from the catalog D and an empty user query q. Our approach then initiates two processes, i.e., (1) computing the property scores and (2) computing the facet scores, discussed in Section 6.1.2 and 6.1.3, respectively. When the system completes, the user view is updated showing the properties and facets in the computed order.

In the next step, the user evaluates the result set size. If the result set size is too large to scan manually $(|D_q| > n)$, the user will continue to drill-down. Otherwise, the user will scan the result set and check if the target product is found. If the target product is found, the search session is completed and considered successful. The user will perform a roll-up in the case that the desired product was not found, which will increase the result set size and the same process repeats again.

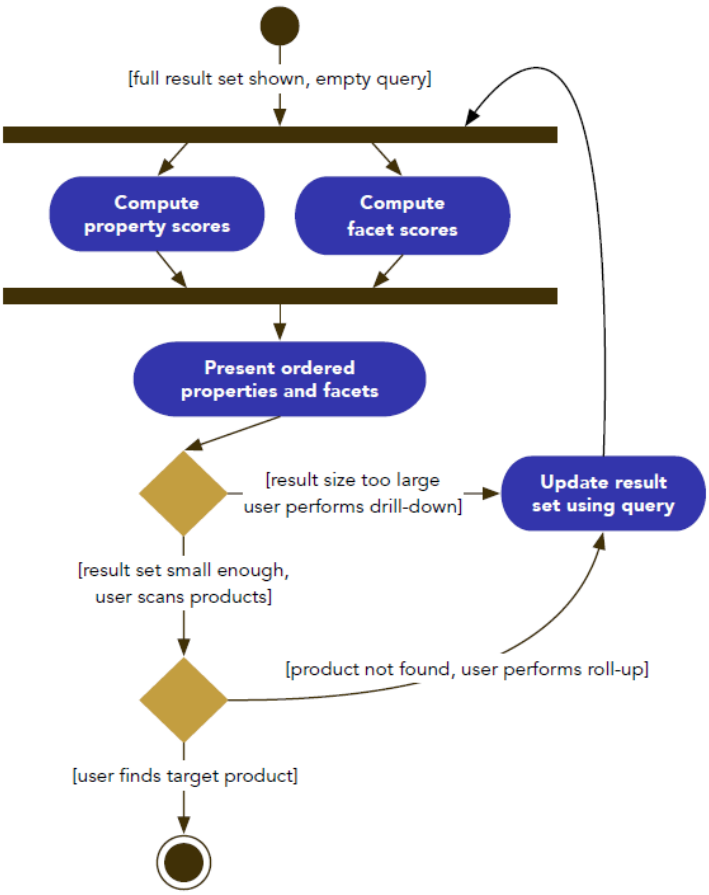

Fig. 6. Activity diagram describing the main flow of a search session.

5.3 Computing Property Scores

We now discuss the details of computing property scores, shown as one of the first two processes in Fig. 6. The outcome of the property scores is used to first sort the properties, after which the facet scores, discussed in the next section, are used to sort the values within each property. In Fig. 7, we zoom into the main steps of computing the property score. As shown by the diagram, the score for each property is computed separately and can thus be done in parallel.

5.3.1 Disjoint Facet Counts

We designed the proposed algorithm in such a way that more specific facets and properties are ranked higher. To support the algorithm in identifying more specific facets, they introduced the disjoint facet count. This metric is used to compute the score for qualitative properties. The disjoint facet count is the number of products from the result set matching each facet *f* of property *p*. The classical facet count for a facet *f*, for a given query *q*, is defined as:

$$\text{count}(f,q) = |D_q \cap D_f| = \sum_{d \in D_q} \begin{cases} 1 & \text{if } f \in F_d \\ 0 & \text{if } f \notin F_d \end{cases} \quad (1)$$

The disjoint facet count is then defined as:

$$\text{disjointCount}(f,q) = \sum_{d \in D_q} \begin{cases} 1 & \text{if } F_p \cap F_d \equiv \{f\} \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

where *p* is the property of facet *f*, $f \in F_p$, and $\{f\}$is the singleton set containing *f*. More general facets such as Audio Formats:MP3 will thus have a low disjoint count, as most products that have this facet also support other audio formats besides MP3. On the other hand, facets from the property Brand are likely to have relatively high counts, as most products are associated to only one brand.

In Table 1 we have defined the different notation used for the calculation of product. The table also shows how the tabular data has been transformed into facets and the corresponding final scores.

Table 1. Summary of Notations

D	Set of products (product catalog)
P	Set of properties
F	Set of facets
$F_p \subseteq F$, $(p \in P)$	Set of facets for property p
$F_d \subseteq F$, $(d \in D)$	Set of facets for product d
$q \subseteq F$	Query
$D_q \subseteq D$	Result set returned for query q
D_f, $(\forall d \in D_f : f \in F_d)$	Set of products associated to facet f
$r_q^O(f)$, $(f \in F_p)$	Rank of facet f for facet ordering scheme O in the result set (dependent on query q)
$r_q^O(p)$, $(p \in P)$	Rank of property p for facet ordering scheme O in the result set (dependent on query q)
$d_u \in D$	Target product for user u
X	Variable indicating user effort
M	Selected drill-down model in user simulation
n	Maximum number of products in the result set the user is willing to scan in the user simulation
t	Iteration indicator (state) of search session

5.3.2 Scoring Qualitative Properties

Fig.7 shows that qualitative properties are partly treated differently compared to numeric properties. For qualitative properties, they employ the Gini impurity to assess their 'uniqueness' or specificity in terms of describing certain products. They could have used Shannon's entropy for the same goal. Various studies have investigated this choice. In [8], the authors find that these two methods produce tree splits that are not significantly different from each other. One of the few differences that tend to be present, is that the Gini impurity tends to produce the most pure nodes [4], which is why they chose to use it.

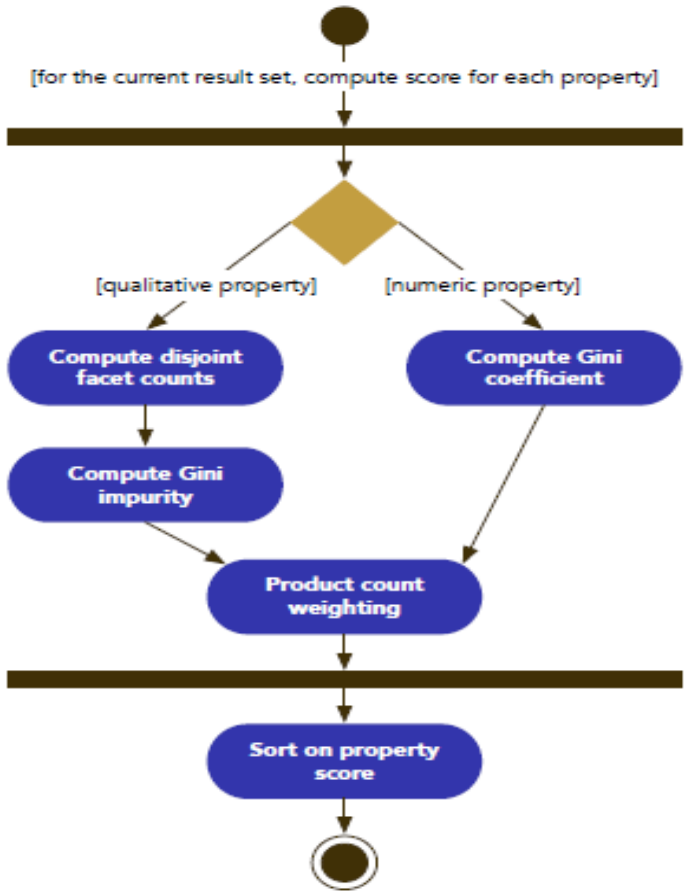

Fig. 7. Activity diagram showing the individual steps in the property score computation process.

Table 2. Parameter Values

Product Name	Property			
	Audio Formats	Brand	Diagonal Screen Size (inch)	Lowest Price (€)
Nokia 6230i	mp3	N/A	1.5	80.33
LG KU990 Viewty	aac, midi, mp3, mpeg 4, wav, wma	LG	3	79.00
Sony Ericsson C902	aac, mp3	Sony Ericsson	2	129.95
LG KF510	aac, mp3	LG	2.2	N/A
Apple iPhone 4	aac, aac+, aax, aax+, aiff, mp3, wav	Apple	3.5	459.95
LG Nexus 4 8GB	flac, mp3	LG	4.7	382.90
Samsung Galaxy S4	aac, ac3, amr-nb, eaac+, flac, mp3, ogg, wav, wma	Samsung	N/A	494.99

In Table 2 we show the tabular product data of a data sample that was taken from our evaluation dataset from [3]. The table also shows how the tabular data has been transformed into facets and the corresponding final scores.

This example uses parameter values |D| = 7, |P| = 4, and q = Ø. The value 'N/A' stands for 'not applicable' (e.g., Gini coefficient is only computed for numeric properties). Looking at the final property scores (last column of Table 3), we can conclude that Brand is more important than Audio Formats and that the LoTheyst Price (e) is more important than Diagonal Screen Size (inch).

In the context of facet properties, we are looking for those properties with the highest impurity. At that point, it becomes desirable to initiate a new 'split', i.e., a facet selection in order to reduce the impurity. We define the Gini impurity for facet selection as follows:

$$\text{giniImpurity}(p, q) = 1 - \sum_{f \in F_p} \left(\frac{\text{disjointCount}(f, q)}{\sum_{g \in F_p} \text{disjointCount}(g, q)} \right)^2 \qquad (3)$$

where $p \in P_{qualitative}$ and $q \subset F$, with the fraction denominator being the total number of products from the result set associated to a single facet from property p. It should be noted that since the relative frequency of products is represented by the fraction in Equation (3), the measure is independent of the number of products associated to values by means of property p.

5.3.3 Scoring Numeric Properties

In the previous section, we explained how the Gini impurity can be employed to score qualitative properties. It would be possible to use the same methods for numeric facets as well, similar to related work in which numeric facets are treated as being qualitative [7],[6]. However, this would lead to a loss of information, as each value would be treated as being a nominal. We could for instance imagine a result set of products in a similar price range. Regardless of the fact that the prices are similar, there is a good probability that most products will still have a unique value for price. In the data they used for evaluation, over 90% of the products has a unique price. However, when they disregard the fact that 'unique' prices may actually be quite similar, this would lead to a very high Gini impurity score. With property Lower Price (€) being used in our example for drill-down, However, selecting a certain range of prices would still include most of the products, as their prices are similar. The property is thus not effective for drill-down. For numeric properties, they have chosen to use the knowledge about the distribution of the numeric values for computing property scores. It is fairly straight forward to imagine that it may be useful to drill-down using a numeric property when the values for the result set are widely dispersed. When the facets are nearly uniformly distributed over the complete range of values, a drill-down using a user-defined range would lead to a large reduction of the result set. On the other hand, when most of the values are similar, such as in the example of having a result set with products of the same price range, drilling down using a numeric property will hardly reduce the result set size and thus be ineffective to use. For assessing the dispersion of numeric facets, they employ the Gini coefficient. They adapt the original Gini index for use in our context:

$$\text{giniCoefficient}(p,q) = \frac{1}{m}\left(m+1-2\left(\frac{\sum_{i=1}^{m}(m+1-i)f_i}{\sum_{i=1}^{m} f_i}\right)\right) \quad (4)$$
$$= \frac{2\sum_{i=1}^{m} i f_i}{m\sum_{i=1}^{m} f_i} - \frac{m+1}{m}$$
$$\text{given } f_i \in F_p^* \text{ for } i = 1 \text{ to } m$$
$$F_p^* = \{f_i \mid f_i \in F_p \cap F_d,\ d \in D_q,\ f_i \leq f_{i+1}\}$$
$$m = |F_p^*|$$
$$p \in P_{\text{quantitative}}$$

where F^*_p represents the values for numeric property p for the products in the result set, indexed in non-decreasing order $(f_i < f_i+1)$, with f_i being the facet ranked at index i.

5.3.4 Product Count Weighting

With the Gini impurity and the Gini coefficient, They now have metrics to score both qualitative and numeric properties. As mentioned in the previous sections, this score is independent from the number of products on which it is based. This could possibly lead to problems, as properties that occur within few products will obtain a relatively high score. To compensate for this, They introduce the product count Weighting. The product count weighting is used to normalize the Gini indices, resulting in the final property score. Additionally, it provides a way to cope with missing values, as properties with many missing associations will be ranked lower. They define the final property score as:

$$\text{propertyScore}(p,q) = gini(p,q) \cdot \sum_{f \in F_p} \frac{\text{disjointCount}(f,q)}{|D_q|} \quad (5)$$

where gini is either the Gini impurity or the Ginicoefficient (depending on the property type). The term with which gini is multiplied is the product count weighting term.

5.4 Computing Facet Scores

In the previous sections, we have explained how they compute scores for properties. We now discuss the details of computing facet scores, shown as one of the first two processes in Figure 7. However, this approach also sorts the values within each property in order to reduce the value scanning effort. This is in contrast to for instance the approach in [7], which consider property ranking but disregards facets ranking. For numeric properties, value ordering is neglected, as these are often represented with a slider widget in user interfaces. The slider widgets, of which an example, give an indication of the minimum and maximum values for a property, and allow the user to freely define a range of facets within these boundaries. For qualitative properties our approach employs the facet count from Equation (1), ranking facets descending on count, per property. As the target product is unknown to the system, this will increase the chance that a facet matching the target product is placed on top.

In the results and discussion, we compare our approach to the one proposed in [7]. To have a fair comparison, they have implemented a version of their method that includes the same facet sorting as our algorithm, as the authors themselves have neglected this facet. The difference in results can thus be completely accounted to property sorting.

Chapter 6

RESULTS AND DISCUSSION

In order to deal with this problem, we suggest an approach for dynamic facet ordering in the commerce domain. The motivation of our method is to handle domains with sufficient amount of complexity in terms of product characteristics and values. Consumer electronics (in this work 'mobile phones') is one good example of such a area. As part of our solution, we devise an algorithm that ranks properties by their importance and also sorts the values within each property. For property ordering, we identify specific properties whose facets match many products (i.e., with a high impurity). The proposed approach is based on a facet impurity measure, about qualitative facets in a similar way as classes, and on a measure of distribution for numeric facets.

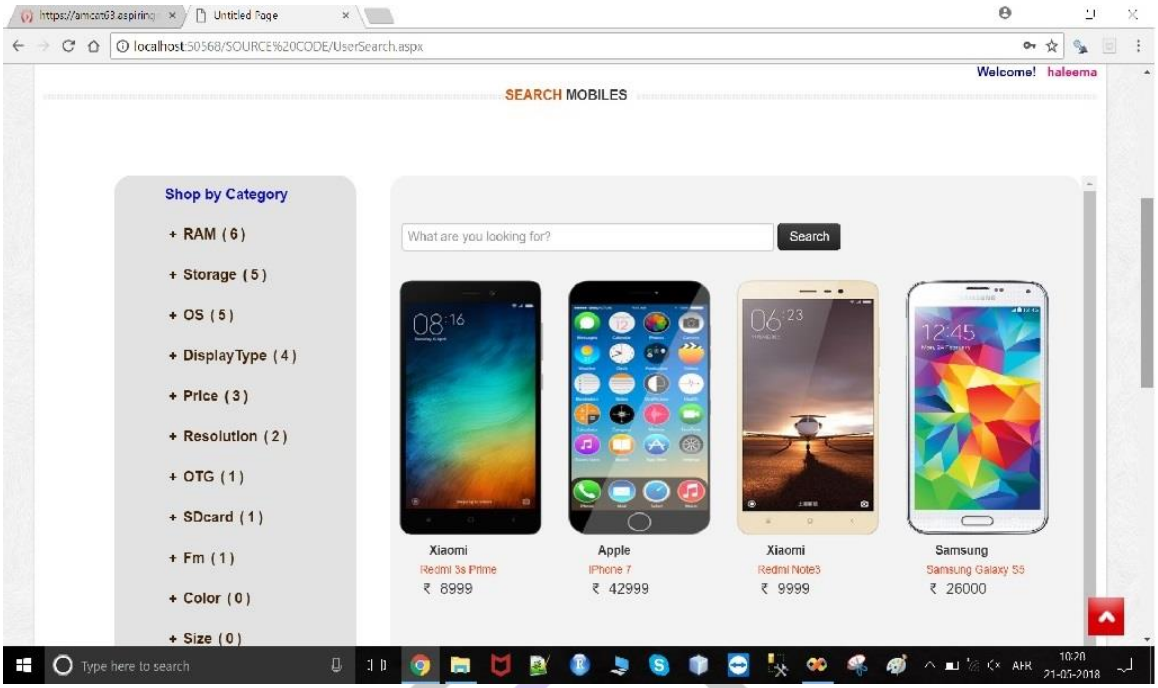

Fig. 8. Home page for registered user with dynamic ordering of Facets

Fig. 8 Shows the home page of registered user. Here we can see that the Facets on the Left side have been rearranged based on the priority of the Facet counts. The highest the number of Facet Count, the highest is the position acquired by that Facet. Similarly other user searches based on different Facets increases the number of counts spontaneously and simultaneously on the Webpage of other users in different locations.

With this project Dynamic Ordering of Facet we can see the results based on the user searches that acquire the top priority in ordering the Facets and making the Efficient for the user to get the desired products easily. We can also see the search results are always with the advancement of technology, so when a user Logins to search a desired product based on the Advanced Technology, The user can easily find the Facets on the Top priority of the Facet Search display.

Chapter 7

CONCLUSION AND FUTURE WORK

In this work, we proposed an approach that dynamically arranges the facets to such an extent that the client discovers its desired product with minimum number of clicks while searching. The primary thought of our answer is to sort properties in light of their facets and after that, moreover, likewise sort the facet features upon themselves dynamically. We utilize diverse kind of measurements to score subjective, qualitative and numerical properties. For property requesting we need to rank properties in the descending order based on their impurity, advancing more specific facets that will prompt a quick drill-down approach with effective results. Moreover, we utilize a weighting scheme in light of the quantity of coordinating items to satisfactorily deal with missing qualities and consider the property of the searched product. We assess our answer utilizing a broad arrangement of simulation experiments, contrasting it with three different methodologies. While breaking down the client exertion, particularly as far as the number of click used by the user / client to search a particular product, we can infer that our approach gives a superior execution than the benchmark techniques and now and again even beats the physically curate 'expert-Based' approach. Moreover, the generally low computational time makes it appropriate for use in true Web shops, E-commerce industries and online website, making our discoveries likewise applicable to advanced technology in the industry. These outcomes are likewise affirmed by a client based assessment contemplate that we moreover performed.

In future we might want to imitate our examination on an unexpected space in comparison to mobile phones, in this manner tending to one of the confinements of the present assessment. Additionally we might want to explore the utilization of different measurements, for example, facet and product popularity, for deciding the request and ideal arrangement of features.

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