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Research paper

Efficient Document Clustering for Web Search Result

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Abstract

Clustering the document in data mining is one of the traditional approach in which the same documents that are more relevant are grouped together. Document clustering take part in achieving accuracy that retrieve information for systems that identifies the nearest neighbors of the document. Day to day the massive quantity of data is being generated and it is clustered. According to particular sequence to improve the cluster qualityeven though different clustering methods have been introduced, still many challenges exist for the improvement of document clustering. For web search purposea document in group is efficiently arranged for the result retrieval.The users accordingly search query in an organized way. Hierarchical clustering is attained by document clustering.To the greatest algorithms for groupingdo not concentrate on the semantic approach, hence resulting to the unsatisfactory output clustering. The involuntary approach of organizing documents of web like Google, Yahoo is often considered as a reference. A distinct method to identify the existing group of similar things in the previously organized documents and retrieves effective document classifier for new documents. In this paper the main concentration is on hierarchical clustering and k-means algorithms, hence prove that k-means and its variant are efficient than hierarchical clustering along with this by implementing greedy fast k-means algorithm (GFA) for cluster document in efficient way is considered.

KeyWords: *Document Clustering, Hierarchical Clustering, K-means, Spherical k-means, GFA,Distance for Euclidean, To measure the Cosine, Text data mining, Knowledge discovery in databases*

1 Introduction

There is enormous increase in the web since from its existence. Finding the information that are closely connected to the database which consists of large information is much more difficult scenario[1].Extracting of data takes a important place in such situation. It helps to retrieve the information that is predictively hidden from the large content of databases. It is called discovery of knowledge in databases (KDD). Greatest of the business companies and others focus on information of their databases.

Extracting of data techniques estimate future business trend and help the companies to make knowledge-driven proactive steps according to particular sequence to enhance their business.Extracting of data methods are the resultant of long research process for the development of the product. Data mining evolving process considers a great improvement in accessing of data and changing of proactive information retrieval. Now-a-days Extracting of data text is one of the main concerns for the enormous increase of the high quantity of text documents.

In Internet lot of text flows such as articles, e-mails and wide Documents that are grouped is adding up every day. In sequence to retrieve the valuable high dimensional information for the business organizations from the social media like Facebook, Twitter, this unstructured and ambiguous can be slowly handled by Text mining.

Text analytics plays a key role of handling unstructured data converting to numerical values thatmay be structured data can be linked in the database and is examined by mining of traditional data algorithms [2]. In hierarchical clustering, Nested groups of set are generated in the structure of a tree. The algorithms like agglomerative and divisive are the two hierarchical clustering approaches where in most quiet usage is Agglomerative which treats each object as one single cluster and sequentially combine pair of clusters that are closely related to each other and produce new groups until all the groups are joined finally into one. But clustering of hierarchical algorithm is not appropriate for large datasets.

K-means algorithm is the easiest way of learning algorithm to handle and to solve the generally known problem of grouping. Aims at partition to a group of objects based on their attributes into k groups which is user predefined constant. The main approach is to calculate the k-centroids within each cluster [3].

However large relentless factors suggest it's not good for practical implementation approach [4]. Hence greedy fast k-means algorithms work similar to Lloyd's algorithm but follows in different manner rather not considering each and every point for each iteration but considers the exact or similar point which can benefit by moving to the another cluster [5].Certain experiments prove that this is the correct method for highest dataset clustering.

2. Review of Literature

Grouping the document is nothing but dividing data into certain clusters i) Points belonging to the same group are as similar as they can ii) Points belonging to the different group are as dissimilar as they can. Basically, of a certain group of things or objects, we consider a group based on their similarity.

Similarly grouping is a technique that is useful to arrange some large group document datasets into a meaningful document clusters where in it provides efficient information navigation and browsing [6]. Partition grouping methods are highly suitable to operate on large datasets against the hierarchical clustering. To document the text clustering groups a similar document clusters in orderly manner while the different documents are separated into variety of groups [7].

Usually one scenario is clustering is done on websites by presenting the pages Generally information that is interested on the availability of component pages. I) Document Measure Likewise clustering is measured to consider the degree of closeness or based on the division certain characteristics of the data prescribed. Generally, characteristics are dependent on problem context or data that is particular measure which is best for all clustering problems [8].

Based on the similarly the words that are index shared are simple matching is done. In Jaccard's measure, based on the index words shared by the total no. of words in the two documents. In Dice's measure, based on the index words shared number by the total no. of words in the two documents, when subtracted from 1 the result should to normalized symmetrical difference of the two data objects.

Cosine measure is the no. of shared index words separated in each document by multiplication of square roots of number of words. Overlap measure based on the no. of index words separated by less no. of words in each document. Thebest measures called Euclidean distance for dissimilarity measures.

When data is raw consider it assumes the variable values are not corresponded to each other as it is scale dependent which is a major problem associated with this function. This distance to measure Euclidean has a main limitation to retrieve information which leads to two documents treats them as highly similar in common, despite no of words that share fact in common. So, this distance measure using Euclidean is not very well used in document clustering except in some cases.

II) Document Presentation

Space model of vector is used to present the dimensional data documents that are high. This text mining is widely used and web mining. In this model each documented is treated as n-dimensional vector consisting of keywords mined from the document with associated weights that gives more importance to the document that has keywords and the entire document collection like a modelled query as an order of keywords with the associated weights represents the keywords are important in the query. Each element of value in vector represents the feature of corresponding document.

The document features are unique in terms. After these hard-to-understand documents are converted into mathematical and machine acceptable terms. For measuring the problem of similarity between the documents is changed to the problem of determining the distance between the document vectors. Frequency of document (DF) is a term that number, documents that a particular term occurs. For catching the good terms, we use this document frequency.

The basic approach of this is, if the rare terms that are given fail to catch the related information of that particular category, the global performance does not affect. This DF is simple and effective for selection method. As stated by the Korpimies & Ukkonen, weighting term is necessary for clustering output and term frequency to be in the set.

The frequent and infrequent terms with in the set of documents should be allotted with the small weights [9]. They have given the formula for documenting the contextual that are inverted the frequency is as follows

$$cidf(Q,t_i) = \frac{1}{\sum_{i=1}^{n} w_{ij} \times rel(Q,D_i)}$$

3. Method Choice for Document Clustering

I) K-means Clustering Algorithm

K-means algorithm is an efficient method in grouping large datasets by iterative computations. Macqueen developed that it is the easiest well known unsupervised learning algorithms which can solve main problem of clustering. Algorithm such as k-means is used to divide a objects of sets depending on their characteristics or features into K-clusters, where in k is pre-defined constant of the user [10]. This algorithm is more advantageous for implementing and clustering the local optimal finding in simple way.

The main approach is to find K-centroids, cluster for each one. The cluster of centroid is made by considering the closely related words of same function. Where in similarity is situate on cosine measure, Measure of Euclidean distance and Jaccard coefficient to all objects in that particular cluster. Consider an example, Chain of digital reliance wants to open new branches across the city.

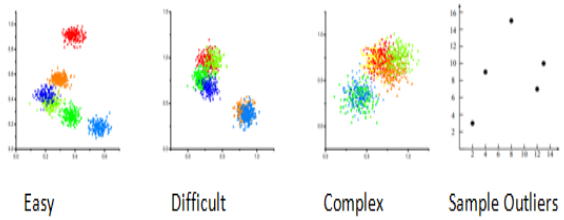
- Particular marketing people of this company should do area analysis where the market high sale can happen situated on the category of people they live.
- They require to understand how many stores can be by covered by opening all the regions in the city by tracing or setting up their delivery points.
- They require to trace out the particular locations for the stores of digital reliance with all the regions in sequence to maintain a distance between the store and the delivery point minimum situated on the store location.
- This is how they can establish their business and can earn their business target.

Now in sequence to fulfil the above challenges a lot of analysis and mathematics is needed. We can now learn how grouping can be useful to solve this variety of challenges in real life in a meaningful sorting manner

The algorithm consists of the below steps.

1. Objects that are divided into k non-empty sets by set to the value of the k grouped centers as seed points.
2. Identify the middle of cluster of the current divisionand allocate a center point and to each and every object or element that is cluster specific and then calculate the length of the space from each point and allocate points to the cluster.where the length should be minimum from the centroid. After the points are re-allocated, locate the new cluster cenroid.
3. Assign a center point and to each and every object or element to a specific cluster.

The algorithm of k-means takes a group of input points and the number k of desired centers or representatives of clusters. By considering the algorithm that takes input gives the set of points as output for which they have center that is defined to each set they belong to and minimize the length between the middle point and search every element in that particular cluster.



II) Spherical k-means algorithm

The algorithm for spherical k-means is a K-means algorithm with cosine similarity for processing high data text dimensional. Each document in this algorithm and each and every group mean is described as length vector aof high-dimensional unit [11]. It is main approach is used in mode of hatch. Only after the assignment of all the vectorsof document each cluster vector is then updated as the vectors of document located to that clusters are normalized. Situated on the certain research of online k-means of spherical algorithm gives best results when compared to general k-means.

III) Greedy fast k-means algorithm

By K-means algorithm approach different cluster centers that are initially done leads to different iterative operations thus brings algorithm of different efficiency.Algorithm like greedy fast is just like Lloyd's that finds best center of gravity from each point that belongs to and with different assignments. When we see Lloyd's algorithm for each and a new center for every point is reassigned Readjustment according to the canters are changed for each and every iteration then repeats. But in greedy fast approach, it does not consider iteration of each and every point rather it locates the certain point which benefit most by moving to anothercluster [12].This algorithm considers the steps that follows for document clustering.

1. It constructs locations of sets for creating new clusters as the locations may act as good candidates for cluster creation.
2. From the mean of all the points in the dataset, the cluster of first is initialized
3. In the iterationof kth, it assumes clusters of k-1 after state of changing of all the locations. It hits the relative position for inserting cluster of new from points of set that is done in step first from which one after the other gives minimum disfigurement.
4. Execute k-means with k groups till changing to the other. If the number of clusters required is not reached, then repeat step 3 until the number gets reached. 1.3.

4. Conclusion

Clustertake part an important role in retrieving information from raw data. It provides users the content overview of document collection. HAC is expensive for computational purpose. K-means algorithm acts as a basic method for retrieving information. To implement it is easy and understand, but it has some certain limitations such as evaluating the quality of clusters. As it suits for data sets of large in clustering the documents. A special method implemented in this paper is proposed by combining the restricted algorithm for filtering and the greedy algorithm in IR systems that search results for improving the user view. Accordingly,this greedy algorithm gives efficient results to search in web for clustering the document and research specifies it can provide best results for lists of ranks and k-means algorithm.

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