International Journal of Engineering & Technology, 7 (4.7) (2018) 148-151

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper



Onto Semantic Tourism Information Retrieval

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Abstract

Semantic Search is an area of research which focuses on meaning of terms used in user query. Ontology plays significant role to define the concept and the relationship of terms in domain. Since the understanding of concepts is domain specific, Ontology creation is also domain specific. According to this argument, query interpreted in Tourism domain can have different meaning in some other domain. This paper presents a prototype of information retrieval interface using ontology which can save users time by rendering relevant, precise and efficient search results as compared to traditional search interfaces.

Keywords: *Information Retrieval, Semantic Search Engine, Ontology, Tourism.*

1. Introduction

The amount of the data available on the web is increasing at lightning speed. It is very difficult to get desired relevant information from the huge repository of data available on web. Search Engine (SE) plays very important role to overcome this problem. SE is an application designed by Computer Engineers to search the information on the web based on the keywords given by the user in the query. Browsers are used by SE's to fetch the web information. In general user enters some keywords in the browser, SE perform the search using keywords and provide relevant results as output.

It is tedious job for the common person to understand the working of SE [1]. It is not possible to understand the relationship among terms specific to domain and use these relevant terms for better results [2]. Here Ontology plays very important role which allows user to search concepts rather than keywords [3-8]. This paper contributes to design the novel information retrieval interface by developing Ontology of specific domain using clustering. The remainder of this paper is structured as follows. Section 2 briefs the problem by means of challenges. Sections 3, 4 and 5 are the core of the paper presenting Ontology Generation using Clustering, the Ontological system architecture and performance analysis. Section 6 concludes the paper.

Webster's culture, tourism, or tourism is called a journey where a traveler goes to a destination and then returns to his or her place of residence. In general, travel can not be called tourism. The word travel in the dictionaries is defined as a kind of displacement, but in order to make travel as a tourist industry, a kind of economic value must be created in the light of such activities.

Industrial tourism has a seemingly simple name, but it is necessary to know that there are hundreds of definitions of tourism from the point of view of the experts, each of which in turn provides a good definition of tourism. Due to the multidimensional and interindustrial tourism, It is necessary to consider tourism from different perspectives including economic, sociological, geographic and management. In the competitions that the International Union of Tourism gave in order to obtain a comprehensive definition of tourism, this definition was defined by the definitions presented by the winner: "Tourism is the set of human spatial changes and the activities that result from it, these changes themselves Due to the reality of joining the demands that make people move and each person has a different intensity and weakness. "

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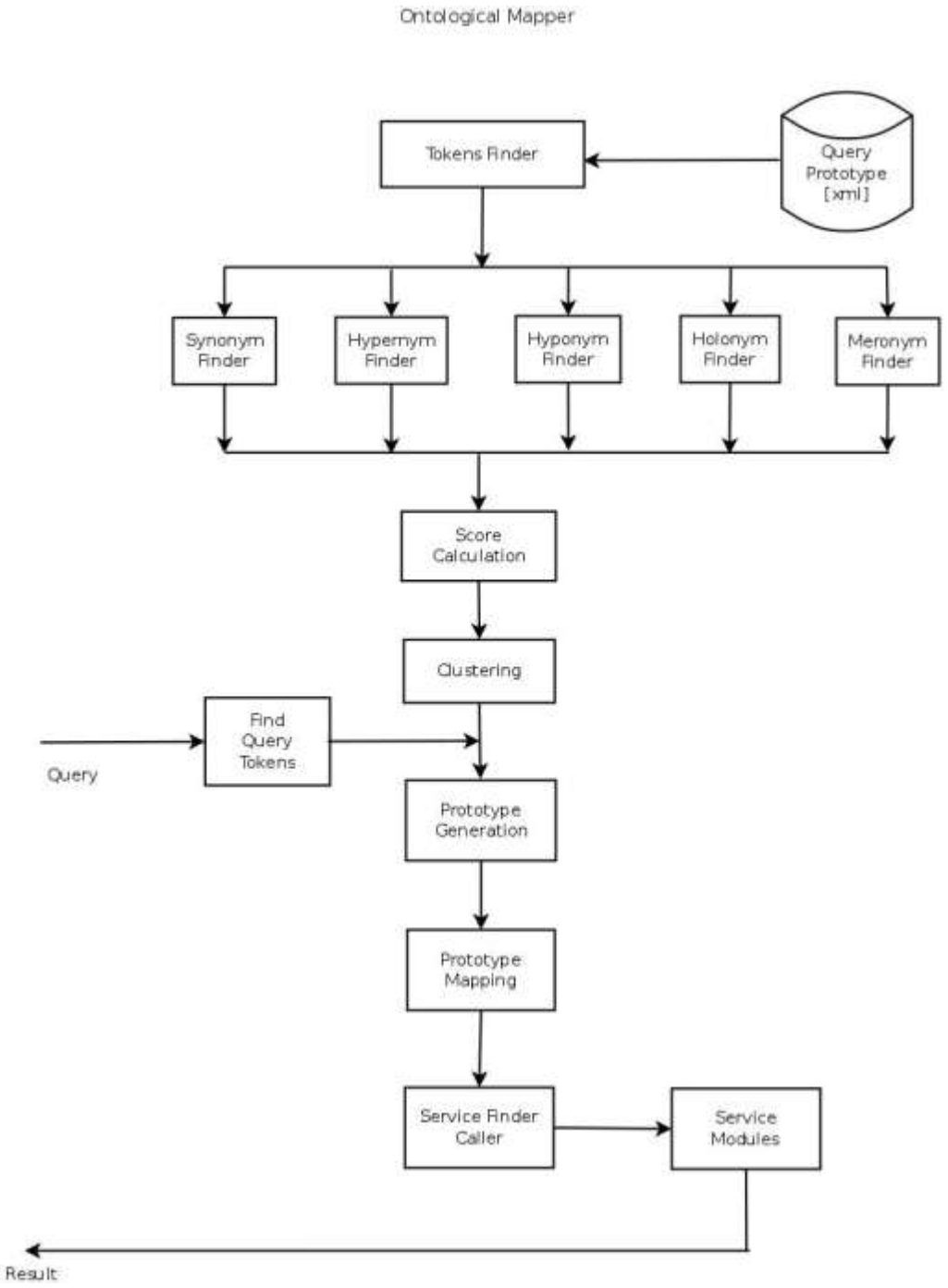


Fig 1: Steps for Ontology Construction

3. Ontology Generation Using Clustering

Clustering is the technique of distributing data points into different groups in such a way that more similar data points are placed in the same groups than those in other groups. In other words, the objective is to define groups with similar characteristics and assign them into clusters. This paper proposed novel approach to create Ontology using clustering. The ontology is domain specific [6-10]. This ontological cluster model is tested on Tourism domain [4].

4. Ontological System Architecture

This paper is the extension of the work published in [3] where the new concept of Query Prototype is discussed. The proposed system is tested on tourism domain of India. The Tourism domain is fixed. The next step is to find out the sub domain or Service about which the information has been asked specifically in the input query. The sub domains called as services identified for the tourism domain are State, About City, Best time to visit, Bus, Cities of State, Distance, Flight, Accommodation, How to reach, Train, Weather etc. The information related to specific service is requested by user by enter-

ing the query in the search interface. Though different user may enter the same query in many different ways, the basic patterns of framing the queries are limited. The novel concept of Query prototype [11][12] comprises of bracket to place ontological tokens, [ ] brackets to place template token like [from-city], [to-city], [state] used frequently in the queries related to tourism domain, stop words and simple tokens called keywords. The query prototypes with respect to each service of the tourism domain are designed. Also the meta-processor is designed to provide the meta information[13].
Steps for ontology creation as shown in Figure 1
Step 1: List Ontological tokens used to define Query prototypes. In this, all possible ontological tokens used for defining query prototypes for all different services of the Tourism domain are fetched in following way.

- Remove Template tokens from-city, to-city, state placed in square brackets in query prototype
- Remove stop words and stop symbols
- Get all Ontological tokens by removing round brackets

Step 2: Separate Ontological clusters are created for each Ontological token which act as cluster head for that respective cluster.
Step 3: Ontological token is given as input to the java wordnet library which provides respective synonyms, hypernyms, holonyms, hyponyms and meronyms for the given ontological token as an output.

Synonyms are words with similar meaning. Holonyms gives information about whole thing of the part. Eg. If leg is given as input then it gives its holonyms as body, chair, table etc.
Meronyms gives information about part of whole. Eg. Meronyms of word Body are arm, leg, eye, nose etc.
Hypernyms gives information about parent/ancestors. Eg. If rose is given as input, then it gives hypernym as Flower.
Hyponym Eg. Abstract word table refers to study table, dining table etc.
Each Synonym, Hypernym, Meronym, Holonym, Hyponym are placed as cluster elements (data points) of the ontological cluster created with respect to given Ontological token called as cluster head. Each cluster element holds its value, score and relation with respect to cluster head.
Step 4: Assign relationship between cluster head and cluster element based on the type like child, parent, similarity, part etc. The relationship between cluster elements with respect to ontological token is evaluated in following way.
All Synonyms were assigned NEAREST relationship with Integer value=1 and placed closest to the Cluster head as shown in figure 4.2 and the score is evaluated as Score=1/Relationship Score=1/1=1
All hypernyms were assigned NEAR relationship with Integer value=2 and placed closer to the Cluster head as shown in the figure 4.2 and the score is evaluated as

Score=1/Relationship

Score=1/2=0.5

Remaining Hyponym, homonym, meronym were assigned FAR relationship with Integer value= 3 and placed far to the Cluster head as shown in figure 4.2 and the score is evaluated as

Score=1/Relationship

Score=1/3=0.33

In this way Ontological Cluster's are created for all ontological tokens stored in ontological key list with ontological token as cluster heads and the respective synonym, hypernym, holonym, hyponym, meronym extracted from Wordnet as cluster elements along with their score and relation.
The generated Ontological Clusters are stored on server. They are used as and when required for finding the nearest cluster head. The best cluster head is found by comparing the query word with the cluster elements and the score is evaluated. The cluster head with max score is identified, respective QueryPrototype of the cluster head and its service is fetched and executed. The Sample Ontology for the ontological token/Cluster head "Train" is as shown in figure 2.

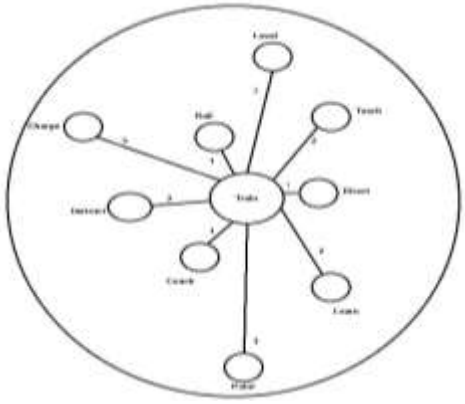


Figure 2: Ontology of "Train" Ser

5. Performance Analysis

The proposed novel approach of ontology construction using clustering improves the performance of the system drastically discussed in detail in [14]. The sample results are as shown in table 1 by providing the results for the user query which uses any synonym of the ontological word in the query prototype. In this way the number of query prototypes are reduced and the performance of the system is highly improved by providing results of exceptional queries. The sample queries for the "Train" service given below uses the ontological approach to give relevant, precise and efficient results.

Table 1:. Performance Analysis

Query	Semantic		Google	
	Execution Time	Precision	Execution Time	Precision/ 1 page result
trains from nagpur to aurangabad	0.185	100	0.59	100
railway from nagpur to bhopal	0.367	100	0.88	100
pune to surat train	0.19	100	0.54	100
train schedule from Amravati to nashik	0.218	100	0.6	90
locomotive from amritsar to Chandigarh	0.368	100	0.43	90
rail engine from delhi to Katra	0.193	80	0.38	0
train from manali to chennai	0.184	100	0.39	10

The query prototypes like (rail) from [from-city] to [to-city] is not defined. It is giving results using existing query prototype (train) from to city. The "rail" matches maximum with the "train" cluster head in the existing ontological cluster wherein the "rail" is stored as cluster element.

rail from nagpur to pune railroad train from nagpur to pune boat train from nagpur to pune boat train from nagpur to aurangabad railway from nagpur to aurangabad railcar from nagpur to pune trail from nagpur to pune

In general, it can be said that tourism includes a series of activities that are carried out during the journey to the destination, residence, return, and even recalling its memories. Traveling even the activities that the tourist performs as part of a trip, such as shopping includes various goods and interactions between the host and the guest. The tourist is also the one who carries out these activities.

6. Conclusion

Usually Ontology is created manually using knowledge of domain expert and stored in xml /rdf. But here the Ontology is designed technically for different services of the tourism domain by extracting related terms from Wordnet and the ontological clusters are created uniquely without using available standard clustering techniques using synonyms, hypernyms, meronyms, hyponyms, holonyms etc. The formula to define the relationship between cluster head and cluster elements and assigning score to each cluster element are derived. The algorithm for ontology creation using clustering technique is designed in generic way such that it can be implemented for generating ontology for any other domain.

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