Construction of a Search Engine Based on Feeling Ontology

メタデータ	言語: eng 出版者: 室蘭工業大学SVBL 公開日: 2010-07-20 キーワード (Ja): キーワード (En): Feeling, Ontology, Search Engine 作成者: ABRISHAMIAN, Ali, 魚住, 超 メールアドレス: 所属:
URL	http://hdl.handle.net/10258/526

Construction of a Search Engine Based on Feeling Ontology

(KEYWORDS : Feeling, Ontology, Search Engine)

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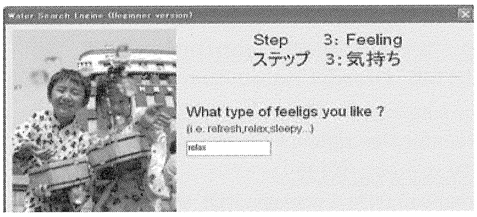
1. INTRODUCTION

The aim of this project is to construct a search engine based on feeling ontology. Ontology is being used in web services to understand meaning of relation between information or objects. Many different search engines have been developed without considering feeling ontology. Feeling ontology is a new thing that can be added to search engines to improve the inference part of systems. For example, now a days users order many different type of goods via the Internet; some of these products deal directly with human feelings such as taste of coffee, softness of a bed or new sense after using a shampoo. Users search entire the Internet to find closest products to their feeling. This project is to enable users to search emotions beside other factors while they are shopping through Internet. In this project we show practical usage of the human feeling ontology in an example of drinking water by use of semantic web methods and finally presenting of best matched to searched keywords. This simple water search engine shows influence and application of feeling ontology in commercial world.

2. PROCEDURE

We divide this project in two versions of water ontology search engine:"Beginner" and "Advanced". In beginner version, user are asked to enter the keywords one by one. For example as we can see in Figure 1, at "feeling step" of the program,we ask user to enter any type of feeling he likes (i.e. refresh, relax, joy) then program check existence of this word that helps users to be sure of each word they entered. When all steps are finished the results will be presented.


Water Search Engine (Beginner version)

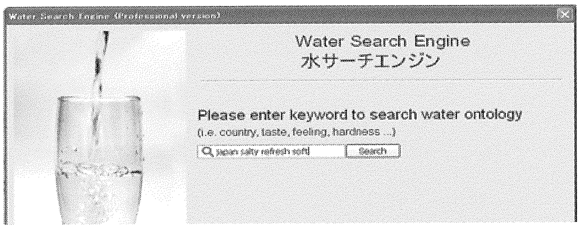
Step 3: Feeling
ステップ 3:気持ち

What type of feeligs you like ?
(i.e. refresh,relax,sleepy...)

relax

Fig.1 User interface of search engine(beginner version)

In advanced version, users are able to search all keywords together like web search engines on the Internet.


Water Search Engine (Professional version)

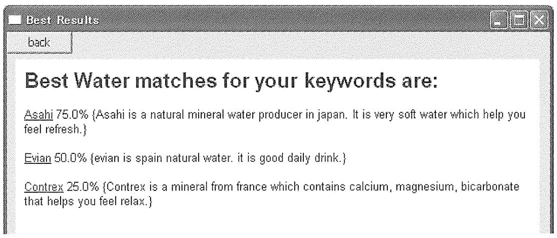
Water Search Engine
水サーチエンジン

Please enter keyword to search water ontology
(i.e. country, taste, feeling, hardness ...)

japan salty refresh soft

Fig.2 User interface of search engine(advanced version)

Figure 2 shows an example of our case "drinking water" while user enters Japan salty refresh soft etc. After entering these keywords, a best results page like figure 3 will presented that contains the name of water as a link to website of producer with relevancy percent and simple description of water points and health benefits.


Best Results

Best Water matches for your keywords are:

Asahi 75.0% {Asahi is a natural mineral water producer in japan. It is very soft water which help you feel refresh.}

Evian 50.0% {evian is spain natural water. it is good daily drink.}

Contrex 25.0% {Contrex is a mineral from france which contains calcium, magnesium, bicarbonate that helps you feel relax.}

Fig.3 interface of best results (for both versions)

3. PROCESS

Figure 4 shows flow chart of our process for two versions of beginner and advanced. Processing of the work consists of two parts. First, searching ontology file (.rdf or .n3) to check availability of input word and gather the result for each keyword. Second, rank all results and present it to user in html format. The difference between two versions is in the first part; in beginner version, program seeks within all labels of the instances which related to this step; for example when we are in "taste" step program check all available taste like salty, sweet or bitter, that means we just check a restricted region of ontology file but in advanced version, program has to search whole of the ontology file to find the appropriate results. Finding the results repeated for each step of beginner version but advanced has only one step. In figure 4 we can see the flow chart of process; the second part, presenting of the best matched water with percent of relevance to keywords is same for both versions.

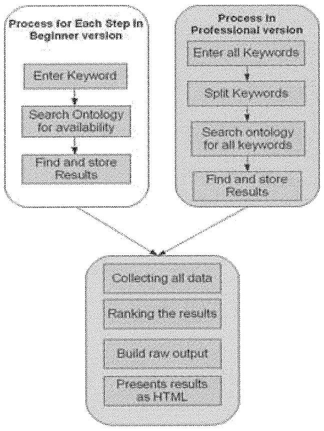
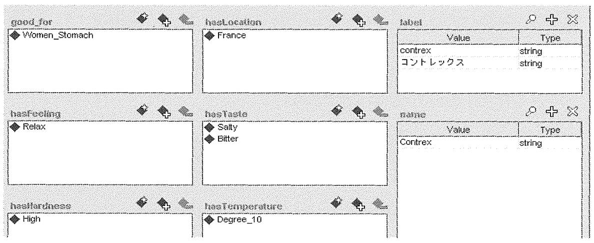


Fig.4 Flow chart of process

4. METHOD

As it was mentioned above the aim of this project is to show how to add feeling ontology to search engines and how

emotional factors helps user to get what really they want. Protégé[1] is a ontology editors which is applied in this project to create the ontology file of water consists of classes, properties and instances. Protégé can export ontology into many different formats that helps us to work more flexible.
Figure 5 shows definition of a new water instance like “contrex” in Protégé. Water properties such as taste, hardness is defined beside human feeling and health benefit of this water.



good_for
◆ Women_Stomach

hasLocation
◆ France

label

Value	Type
contrex	string
コントレックス	string

hasFeeling
◆ Relax

hasTaste
◆ Salty
◆ Bitter

name

Value	Type
Contrex	string

hasHardness
◆ High

hasTemperature
◆ Degree_10

Fig.5 Sample of definition of new water in Protégé

After adding all samples of water to ontology file, in next step we start to build main program in Python programming language. We used RDFLIB[2] which is Python library to work with RDF[3] and N3[4] files and create inference part of this system. SPARQL[5] is one of standard query language that supported by RDFLIB so we choose it to phrase all searching algorithms by this language.
Generated ontology file by Protégé is imported separately into program so user can edit this file easily for adding or removing some instances. In this program we define two different type labels for supporting Japanese and English language together; see figure 6, first label is for English and second is Japanese label in Unicode format.

```
<Water_name rdf:ID="Asahi">
    <rdfs:comment rdf:datatype=""
        >Asahi is a natural mineral water producer in japan.
    <label rdf:datatype="">asahi</label>
    <label rdf:datatype="">&#12450;&#12469;&#12498;</label>
    <name rdf:datatype="">Asahi</name>
    <hasHardness rdf:resource="#Low"/>
    <hasFeeling rdf:resource="#Refresh"/>
    <hasLocation rdf:resource="#Japan"/>
    <hasTaste rdf:resource="#Sweety"/>
</Water_name>
```

Fig.6 Sample of water instance in RDF(XML) file.

In another example figure 7 shows definition of a property like “hasTaste” in Notation3 format (.n3 file) for a sample domain “water_name”, in the range of another class like “water_taste”. In other words; for any instance of “water_name” with “hasTaste” property, we have an instance of “water_taste”.

```
default:hasTaste
    a        owl:ObjectProperty ;
    rdfs:domain default:Water_name ;
    rdfs:range default:Water_taste .

default:Balance_Blood_Pressure
    a        default:Water_Health ;
    default:label "balance_pressure" .

default:Refresh
    a        default:Water_Feeling ;
    default:label "リフレッシュ" , "refresh" ;
    default:name "Refresh" .
```

Fig.7 Sample of water's property in Notation 3 file(.n3).

In this project we use feeling and other properties all together. So we can follow semantic web methods for search, find, and result presenting. This system is compatible with any types of search algorithm that exists in search engines through the Internet.

This is a simple example that we have limited number of instances for all classes; by existing complete ontology of each domain we can extend system to large scale easily. For example we use Japan as a location, if we were able to use ontology of all countries with famous cities or just Japanese cities, it helps users to search for distinctive place. This enables users to have extra option to choose the best water they like to drink. That means ontology of any object is similar to one part of a puzzle that can be joint to others and show us more clear view of the whole picture of the picture.

5. FUTURE WORK

We plan to improve the search algorithm based on SPARQL and speed up the inference part. Although our program gives us the result in an acceptable speed of less than 1 second but the actual test search engine has to work faster than 1 second. Also for the new test, we want to complete our database with new samples of waters from different places. In the present program, all the keywords have the same value in the inference part. Verifying these values help us to build a reliable program. For example for a person in Japan (If the user does not enter a name for location), he usually would prefer to drink Japanese mineral water rather than other countries. As it was mentioned in the paper, this program is a standalone version of water search engine, we plan to complete this program to be suitable of using in web services.

6. CONCLUSION

This project shows the simple usage of feeling ontology in drinking water; in this field many search engine classify water based on hardness, country or price of water but actually users want to understand the feeling appeared after drinking water so requirement of feeling ontology is cleared. This type feeling ontology can be defined beside other factors of any object and finally we have a search engine with human feeling sense.

7.REFERENCES AND PACKAGES

[1] Protégé 3.3.1 An Ontology Editor for creation of knowledge based application. (http://www.protege.stanford.edu)
[2] RDFLIB: Powerful Python library for working with RDF a in the simplest way.(http://www.rdflib.net)
[3] Resource Description Framework (RDF) (www.w3.org/RDF/)
[4] Notation3 (N3) A readable RDF syntax (www.w3.org/DesignIssues/Notation3.html)
[5] SPARQL: Query language for rdf supported by RDFLIB. (http://www.W3.org/TR/rdf-sparql-quer/)