Expert Search Engine - A New Approach for Web Environment

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Abstract

This paper develops an expert web search engine for Web Environment and uses Ajax based technology for this. Applications (Search Engine) of this expert Search system will be to give the user a choice of best Search results as per their need/requirement. From organizational point of view this knowledge can be used for devising various enhancements for search engine optimization. It applies a knowledge engineering based technique for the development of this expert system. To understand the basic functioning of search engine, various Web Forums and Blogs have been studied. Present work develops Intelligent Agent and Interaction Agent based knowledge base of Search Engine. The results produced depend upon what type of program it is using and details are produced according to it. This knowledge based Search Engine model thus developed may be useful in knowledge management and knowledge reuse. At user level it can be used for suggesting best Search results to the user and at organizational level it can be used for drawing various conclusions for managing quality database for better application use.

Terminology: Knowledge, Knowledge Engineering, Knowledge Management, Search Engine

1 INTRODUCTION

Search Engine deals with offering search results over WWW. In this paper we have developed knowledge based expert system of Web Search Engine, which simulates functionality of a Search Engine in a Web Environment. To get the information about actual working of concerned system

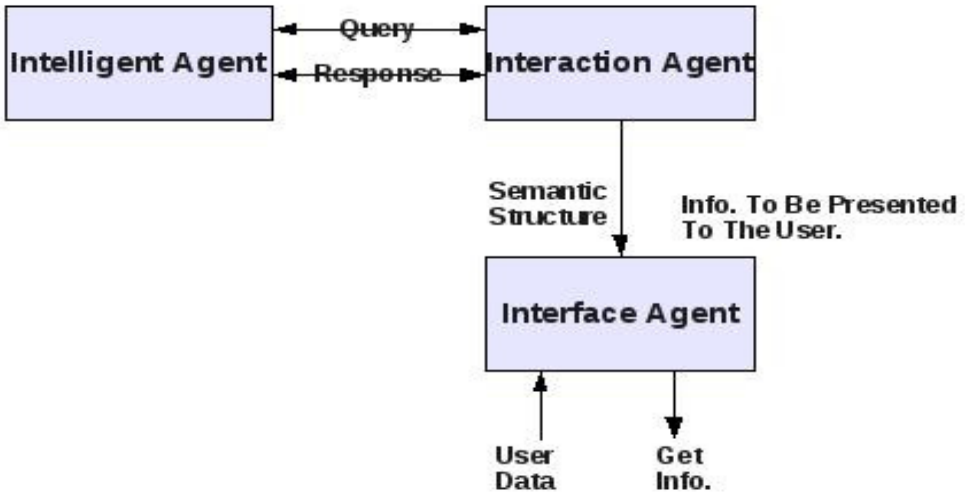

Fig: The Agent Based Diagram of Expert Search Engine

we have checked other search engines and different forums. The model has three components intelligent agent, Interaction agent and Interface agent interacting with each other for the purpose of drawing the decision for a search results. The schematic diagram of simulated model is shown in fig.

In order to develop the Search Engine the offered results found are categorized into different levels. Various offered results are represented in form of a tree called as "offer tree". Part of offer tree is depicted as follows. However the complete offer tree consisting all results detail is stored in intelligent agent. The intelligent agent will consult this tree while suggesting appropriate results to Interaction agent.

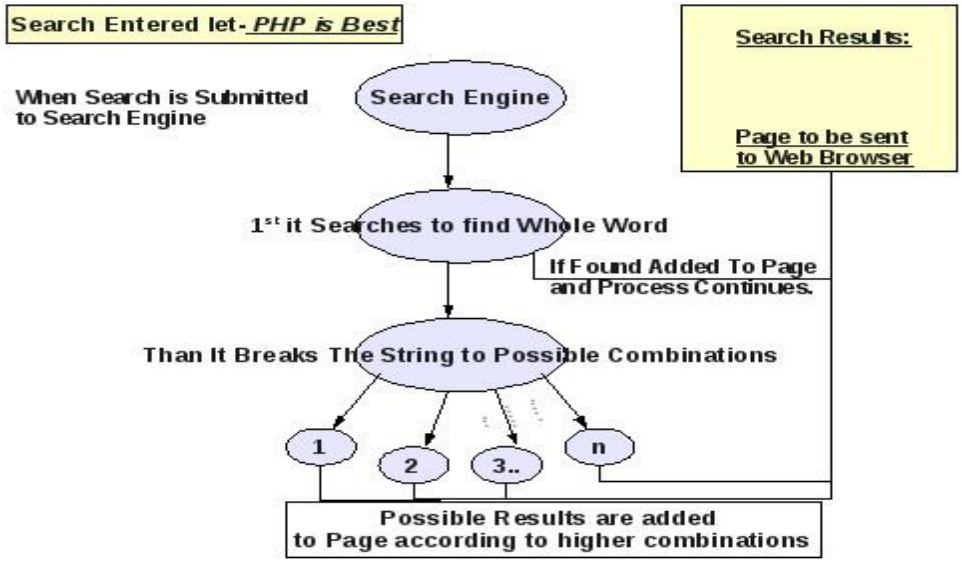

Fig. Part of Offer Tree

The Search Engine functions in two phases namely analysis phase (server-side) and customer interaction phase (client-side). Function performed in these phases is summarized below. Knowledge engineering can be used to develop system (Search Engine) with high level

processing layer that provides reasoning strategy to be considered by Search Engine for search results.

2 ANALYSIS PHASE

The functions performed in this phase are:
Find/identify appropriate Combinations of search results according to user requirements and constraints, considering factors such as client preferences, Meta keywords for a page, relationship between Search term and preference, set of constraints of a string.
Customer interaction phase – The activities performed in this phase are: analysis and management of query based conversation, client profile and the explanation demanded by the server/client. The agent based model of the prototype defined for the system allow the concurrency in distribution of data, information , knowledge, tasks/methods among interface agent, interaction agent and intelligent agent. The agent based model schematic is shown in following diagram:

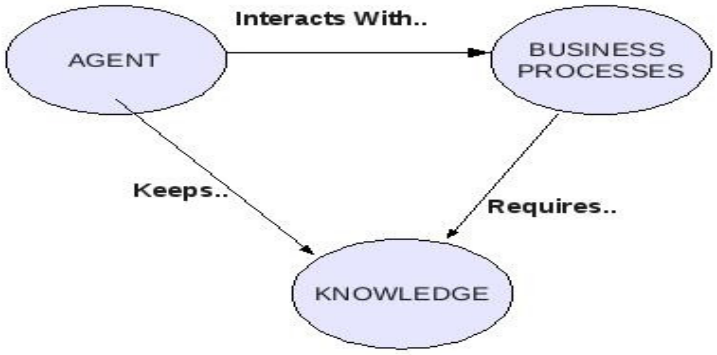

Fig. Agent Interaction in System

It's been analyzed that at present without following systematic approach of acquiring / gathering / manipulating of knowledge, Company is using less than 50 % of available knowledge in the company. This indicates the underutilization of resources and production capacity. In terms of Search Engine the production capacity is defined as "how many new development has been done in it" in the Web Application. The Web Standards are controlled by a Consortium called W3C. One has to validate his source code there. Here Keywords has a vital role in the system. These Keywords causes how right Your Search is? All Meta-keywords are stored in server's database to be matched with user entry.

Knowledge Engineering technology can be of great help in dealing with the complexity of real problems of Searching one's required Web page. It can automate the process of guiding the user to manually check each and every website related and which is best suited according to his requirements and should be used. The efforts of web searches can greatly be reduced if an expert system (Search Engine) can be developed exhibiting the intelligent behavior i.e it will include developing a system with high level processing layer. This leads to the need of improvement at interaction level in the user system relationship. This indicates that the system should be able to recognizing what are the key information required "of the user" (Search String) and then invoke the user adapted information generation process to provide the required information according to their conversation/communication.

This paper tries to give you simulated system which gives user better results to be adapted as per needs consisting of good interface for “Interaction agent". The objective is to design and implement an interface and intelligent computer system based on the analysis of the problem for a Web Application Developing company supporting natural language interface and graphics with the user(through Browser). It will perform a query based interaction supported by different keywords stored in server's database represented in form of “offer tree” provided by Intelligent Agent(as shown before). Intelligent agent is responsible for interaction and will collect user’s query and transform them into semantic structures. The intelligent agent is responsible of the generation of information required by user as well as information required to perform an intelligent decision to improve the best possibility of the interaction.

The Interaction Agent is responsible for adequate management of interaction between Interface agent and intelligent agent as well as with the user. This agent will ensure the consistency in conversation and pass the query of user to Intelligent Agent and Interface agent. In this paper we concentrate on the aspect of design of intelligent agent from the perspective of user.

3 DEVELOPMENT OF INTELLIGENT AGENT

It uses a hierarchical tree structure to develop knowledge model which can represent /characterize many classes of problems to be solved or tasks to be performed. The design of knowledge engineering model is based on the actual organization oriented principle. Knowledge model consist of three knowledge area and each knowledge sub areas defines a domain of expertise that explains a specific problem solving behavior, encapsulating both task and domain knowledge.

Every knowledge area is described by specific task domain knowledge and its functionality will be depicted by a set of tasks. Each task is also one descriptive entity that includes problem solving process that incorporates reasoning strategy involved in the problem set to achieve the objective defined by the task.

In our model three knowledge sub areas are :

- System specialist
- Search specialist
- Database specialist

Corresponding to three knowledge area the knowledge will be stored in a model called as domain model because the related knowledge will be specific to that particular domain. Accordingly there will be three domain models, corresponding to each knowledge area. Each area specialist will be expert in their domain.
System Specialist: They handle high level knowledge about the task that is to be performed in Web-application e.g. w.r.t Web Search Engine there is one regulatory body looking after the following tasks:

- Launch of new Features.
- Revision of old Features
- Speed of Search.
- Failure Handling etc.

Search Specialist: they deal with the knowledge required or related to the sector and what kind of Results is needed to accomplish/perform the task (search). Database specialist: They manage/manipulate knowledge about the features/benefits of the meta-keywords and it uses that knowledge to match the requirement/needs of user with the meta keywords for a website in the server's database.

Knowledge engineering approach is used for designing function model that allow the reuse of

knowledge base component. After coding the knowledge in form of three components described in the model, this model can be used for drawing decision to suggest best search results according to user requirement. The process of decision making is described in following diagram.

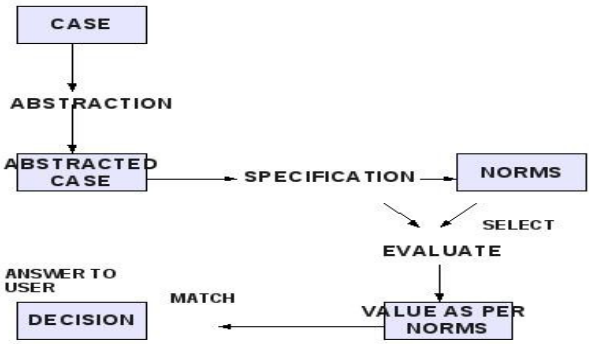

Fig. Dynamics of Decision taking

It is necessary to define a shared vocabulary to have unified schema that will interact with different knowledge are. Definition of generic vocabulary that should be instantiated in respect of a particular concepts, attributes and values of domain problem must be given. We have defined this in terms of generic vocabulary of keywords. In domain model of Search Engine the knowledge is incorporated using many different knowledge representation techniques and distributed between knowledge bases. Each knowledge will have an inference method. In this we can use rule based inference method for case based reasoning strategy. For example a complete model of one Search can be defined with the help of concept, attributes and values.

The rules will be evaluated based on values held by attributes and with the certainty of rule it will be matched. Certainty of rule will be evaluated with the average values. Whenever an Interaction agent sends a request to Intelligent Agent, it will start inference process and gives back a offer tree with the combinations of search results that meets the user requirements. Interaction agent passes information regarding all suitable results to user. User with the help of Interaction agent will prune the tree according to his psychology and will adapt the best result.

4 CONCLUSION

This paper automates the selection process of a Search Engine by developing an Intelligent System for Web Environment. It uses Ajax based technology for it. The objective which system fulfill is to satisfy the user as per their requirements by having query conversation in natural language(through strings). The same study can be used as an asset for the organization. It will also allow the reuse of knowledge. Besides this the knowledge which is maintained and manipulated inside the organization may leads to take better decision about finding a search result, revising some methods, features or withdrawing some features from the application that helps the organization to raise their users.

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