

Conference Paper

Web-Based Information Search System Development Using a Semantic Network

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Abstract

Finding information from a large collection of documents is a complicated task; therefore, we need a method called an information retrieval system. Several models that have been used in information retrieval systems include the Vector Space Model (VSM), DICE Similarity, Latent Semantic Indexing (LSI), Generalized Vector Space Model (GVSM), and semantic-based information retrieval systems. The purpose of this study was to develop a semantic network-based search system that will find information based on keywords and the semantic relationship of keywords provided by users. This cannot be done by most search systems that only work based on keyword matching or similarities. The Waterfall development model was used, which divides the development stages into five steps, namely: (1) requirements analysis and definition; (2) system and software design; (3) implementation and unit testing; (4) integration and system testing; and (5) operation and maintenance. The developed system/application was tested by trying to find information based on various combinations of keywords provided by the user. The results showed that the system can find information that matches the keyword, and other relevant information based on the semantic relationships of these keywords.

Keywords: information retrieval, search system, semantic network, web-based application

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1. Introduction

Searching system or information retrieval is a system that can search and find the information that used by the user [9]. Several models of information retrieval systems include the Vector Space Model (VSM) [1, 2] which weighting every document in the database, DICE Similarity [3] also weighting each document in the database, Latent Semantic Indexing (LSI) [4] which correlates some definition semantically in a number of text using Singular Value Decomposition (SVD) technic, and Generalized Vector Space Model (GVSM) which is a development of the VSM method [5]. The other technic

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that also used to make the information more relevant with the user's demand is the information retrieval system based on semantics [6, 7], and the other researchers complement this method by adding the selection and classification feature [8].

Searching system or information retrieval consists of several components, such as:

1. *User*
2. *Query*, is a word or phrase that are compiled and entered into the system to generate the required information [10].
3. Document, can be a collection of web pages, electronic books, or other digital documents that being entered and organized to the database [11].
4. Document Index.
5. Processing Tools, used to find the information and match the keywords from the user's *query* with the document index that owned by the system [12].

Semantic network is an attempts to make a model about how knowledge is saved and recalled to the human memory [13], and in their use of semantic network sometimes being present into the directed graph, where the knot inside the network shows a concept, object or certain situation which can be a single object or a class that covers a certain theme, and in some of the knot is connected by connecting lines that show the relation of each concept, object or the situation of the knot itself [14].

In this study, a semantic network-based information retrieval system was designed to make it easier for the users to search an information on a Web-Based Open Source Learning Information System. Searching system based on a semantic network will search the information based on the meaning and semantic relations from the keyword that given by the users, where most of the searching system cannot implement the search that works based on matching or the similarity of the keywords.

2. Method

The method that used in this study is *Waterfall* development model [15], which divide the development into 5 steps, such as: (1) *Requirements analysis and definition*, (2) *System and software design*, (3) *Implementation and unit testing*, (4) *Integration and system testing*, dan (5) *Operation and maintenance*.

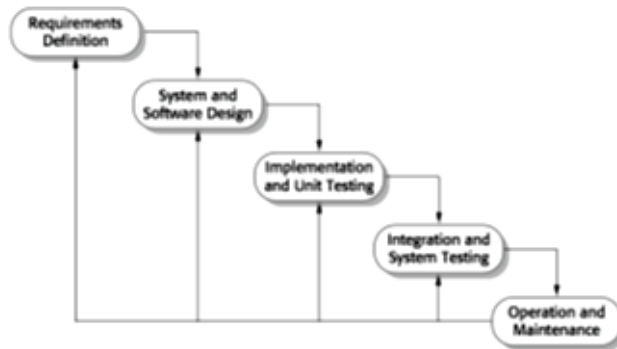


Figure 1: Waterfall Method

3. Results and Discussion

The resulting product is a Semantic Network-Based Searching System on a Web-Based Open Source Learning Information System. The main function is to search a data from a collection of learning resource articles that saved in the database. The system consists of some pages, such as:

1. Main Page, a form to search a data based on the keywords that given by the user. To find the data, the users write the *query* in the form of a keywords that want to be search in the available box, then click the [search] button. Next, the system will process the query and show a number of data based on the keyword, or which have a semantic relation with the keyword.



Figure 2: Main Page

2. Admin Page, which consists of several pages that used to manage the database. Admin Page divided into some sub pages, such as:

- a. A page to add the article data and save it to the database
- b. A page to display all the article data that has been saved in the database
- c. A page to find the article data based on the writer's name

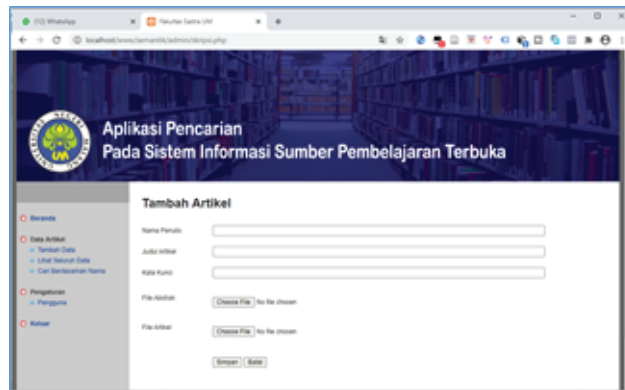


Figure 3: Add Data

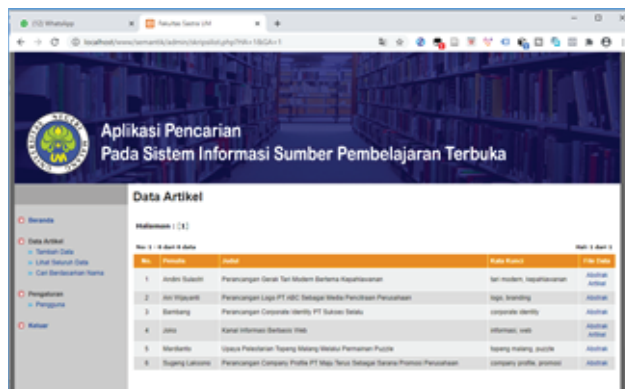


Figure 4: Display Data

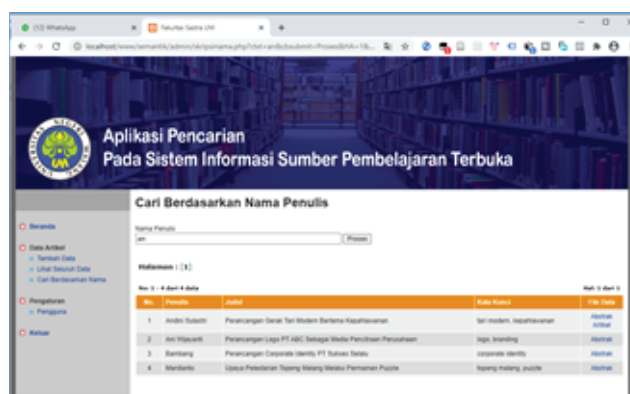


Figure 5: Data Search

d. A page to perform the application user data settings

The application has been tested to find information based on various key word combinations that are typed. The test results show that the application can find information that matches keywords, and other information that has a semantic relationship with these keywords.

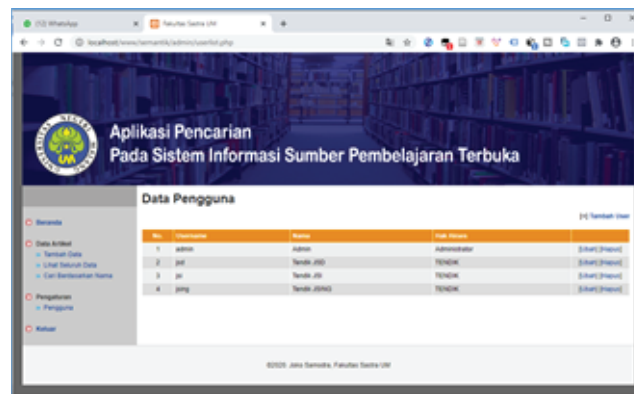


Figure 6: User Setting

4. Conclusions and Suggestions

This research produces a web-based *software* that is a Semantic Network-Based Searching Application on a Web-Based Open Source Learning Information System. The input data is a scientific article as the material in the learning process, and the output is a list of article that occur based on the keywords that given by the users. The test results shows that the system can find the information based on the keywords, and other informations that semantically relevant with the keywords.

Based on the results obtained, the researchers provide a suggestions for further research activities that focusing on developing the semantic database in order to find more and more complete data variations.

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