ONTOLOGY BASED KNOWLEDGE MANAGEMENT FOR CULTURAL TOURISM

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ABSTRACT

The objective of this research was developed the prototype of the cultural tourism based knowledge management system in case of Dusit district, Bangkok, Thailand. The adoption of ontology technology in the management of cultural tourism information enables the relation to be aligned among various set of information, retrieval and representation to be performed more accurately and in short time. In addition, future enhancement can also be made. The population used in designing the prototype was from two groups, namely, domain experts and users. The survey method was employed and typical statistical analyses, for instance, percentile, mean and standard deviation were calculated to report the finding as follows: both experts and users are satisfied with the results at a good level. Also, this research offers two recommendations; a) as this ontology based knowledge management systems for cultural tourism was for the Dusit district, to enhance and enrich the system, other area can be trialed and if found to be satisfactory can subsequently be integrated and b) the deliverable from this research can later be applied in the tourism based semantic search and querying related systems.

Keywords: *Knowledge Management, Ontology, Cultural tourism, Semantic, and Web base application*

1. INTRODUCTION

Cultural tourism is one of the essential tourisms that concerned with a country or region's culture, specifically the lifestyle of the people in those geographical areas, the history of those people, their art, architecture, religion(s), and other elements that helped shape their way of life [1]. Also Thailand, cultural tourism is rapidly growing and it plays an important role in the Thai tourism industry as a whole. Bangkok, the capital and the most populous city of Thailand, has many tourist attractions and a variety of genres and palace and temples.

Dusit is one of the important districts in Bangkok Metropolis and it is an interesting famous for the commerce, residence, military and historical and cultural tourism. Moreover, Dusit is also the location of parliament, ministries and palaces. It looks like the center of government of the country. The district is also very rich in history and tradition, so the historical and cultural tourism is widely promoted among domestic and international tourists in the area. Collecting as much information as possible to promote cultural tourism is promoted among governmental and private organizations in order to preserve valuable national asset.

However, most information is collected in books format, gathered and given out in forms of brochure, essays, research paper, which can create inconvenience to collect back. Even in electronic form, the information is still all over the place and hard to gather again for further use and improvement.

According to Tom Gruber [2] , "Ontologies are part of the W3C standards stack for the Semantic Web, in which they are used to specify standard conceptual vocabularies in which to exchange data among systems, provide services for answering queries, publish reusable knowledge bases, and offer services to facilitate interoperability across multiple, heterogeneous systems and databases."

Therefore, this research paper is aimed to develop Knowledge based on Web application by creating ontology to implement cultural tourism in Dusit district as the case study. Ontology is a kind of knowledge representation describing a conceptualization of some domain. Ontology specifies a vocabulary including the key term, their semantic interconnections, and some rules of inference [3].

The remainder of this paper is organized as follows. Section 2 presents research methodology in this work. Section 3 we describe the

experimental setup and section 4 shows the results of this experiment. Finally, the conclusion and future research are presented in section 5.

2. RESEARCH METHODOLOGY

To develop the knowledge management in cultural tourism based on Ontology approach, Dusit district was the case study in this research. The researchers divided the process of conducting research into 4 major steps as following:
1. Analyzing the requirement of the system by studying tourism information and creating the system framework.
2. Designing the structure of ontology technique by setting the framework of the ontology based on the knowledge of cultural tourism information in the system.
3. Developing the Web based application by identifying the related terms, specifying class, class qualification and types of class qualification.
4. Reviewing and improving the ontology.

3. THE EXPERIMENTAL SETUP

The researchers conducted knowledge of cultural tourism, in case of Dusit district, which was found to contain 5 sub-districts, and there are a variety of different cultural styles whether it is in the royal palaces and temples, palaces, royal palace and museum. To gather data for analyzing the content, the extent of knowledge (Domain) and the theory of cognitive systems. (Classification Theory) was also used as the basis for grouping and dividing information into primary (Classes), also each group of data was divided into sub-groups. (Sub-classes).
In the design and development of ontologies of cultural tourism, the design phase was includes: indicating the core classes (Classes) or concept and hierarchy of classes (Class hierarchies) divided by sub-class and relationships between classes, determining the properties (Properties or slots) of a class or concept, describing preferences (Facets) of property (Slots) by using features to explain or display such as the type of data (Value type) of the available data, displaying instances of each class or concept and presenting ontologies developed using information technology RDF (RDF) for defining ontologies technology[4]-[7]. Also, Pierpaolo et al [8] presented the recommender system for cultural heritage support both tourists and teachers based on user-centered and collaborative approaches to promote knowledge and using a set of metadata that allows the resources to be contextualized in the culture of a territory.

To evaluate this project, we define a procedure for assessing ontology into 2 parts: the estimation accuracy by experts and users. The statistics were used in this research to analyze the data.

$$\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

(1)
Mean - The mean is the most common measure of central tendency and the one that can be mathematically manipulated.

$$S.D. = \sqrt{\frac{\sum_{i=1}^{n}(X_i - \overline{X})^2}{n-1}}$$

(2)
Standard Deviation - The standard deviation gives an idea of how close the entire set of data is to the average value.

4. THE EXPERIMENTAL RESULTS

In this research, the research team would like to develop the prototype of knowledge management of cultural tourism database by using ontology. The results were separated into 2 important parts.

4.1 The Prototype Ontology of Cultural Tourism

In this section, to develop the prototype of Ontology, Protégé [9-11], a free open-source ontology editor and framework for building intelligent systems, was used in this project and consists of information about cultural tourism as shown in figure 2. From Figure 3 to Figure 4 was presented the results of application. This knowledge web application was developed by HTML and PHP. The web based application was developed by using RAD (Rapid Application Development) technique as shown in figure 1.
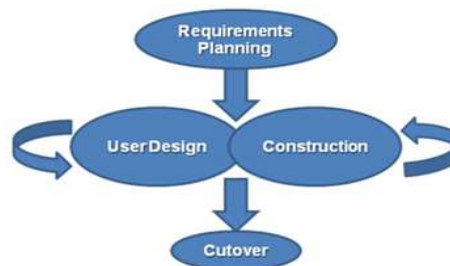
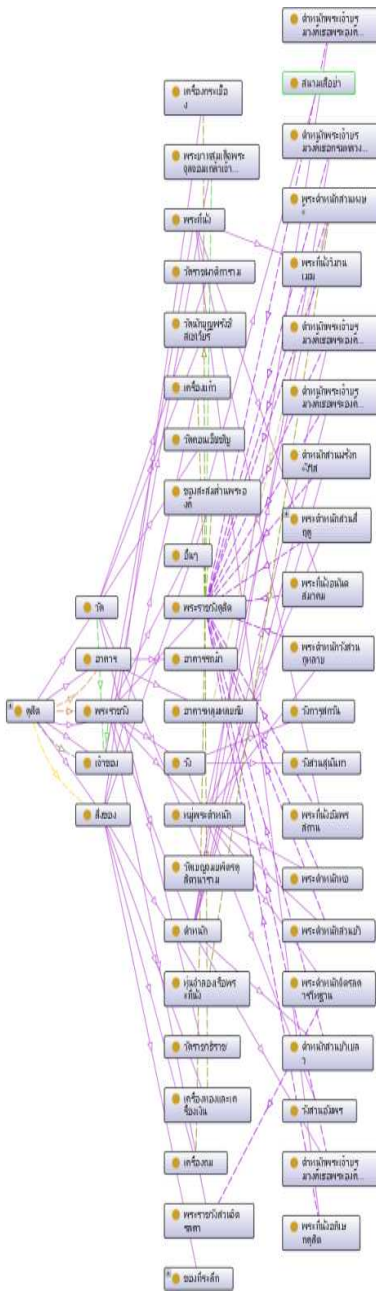

Figure 1: Phases in the James Martin approach to RAD [11]

Figure 2: The Prototype Ontology

Figure 3: The Main Page of Application

The ontology of cultural tourism consists of class of temples, building, palace, owner, and assets and belongings. The format of searching was done by inputting keyword. The system will look for the desired information, as in figure 3 and 4. For example, when user keys "Vimanmek" into the system, result from the query will be displayed as figure 4.
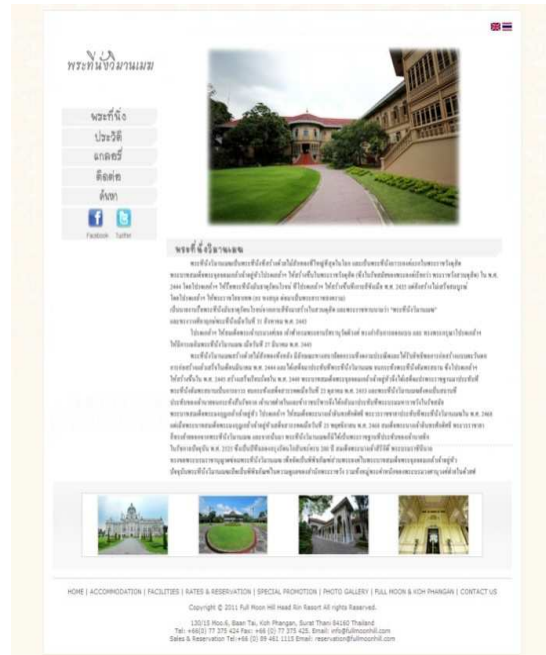

Figure 4: The Example Result Page of Application

www.jatit.org

4.2 The Evaluation of Cultural Tourism Management by Using Ontology

The data collected and gathered in ontology approach in this research was approved by experts and users in computer program, linguistic and cultural management. The research was divided the contents to be approved into 3 parts: the accuracy of the classification and relationship, the usage of the system, and the user interface display.

4.2.1. The Accuracy of the Classification and Relationship

To test the accuracy of the classification and relationship, experts evaluated with the prototype and questionnaires. The result was shown in table 1. This is the strong evident to show that in terms of connection and information categories, the prototype worked very well.

Table 1: The Results of the Accuracy of the Classification and Relationship

	Experts	
	$\bar{x}$	SD
1. Consistent with the scope	4.60	0.55
2. The accuracy of the classification.	4.00	0.71
3. Consistent of terminology	3.80	0.45
4. The accuracy of the data relationships	3.80	0.84
5. The completeness of Tourism and Culture information.	3.80	0.45
Summary	4.00	0.65

4.2.2. The Usage of the System

Table 2: The Results of the Usage of the Application

	Experts		Users	
	$\bar{x}$	SD	$\bar{x}$	SD
1. Ease of use for the search.	4.20	0.84	4.22	0.56
2. Ease of finding information to meet the requirements.	4.00	0.71	4.27	0.64
3. Results responding to the demand of users.	3.60	0.55	4.25	0.59
Summary	3.93	0.70	4.22	0.56

To evaluate the usage of the system, experts and users were tested by using the prototype system. The result was displayed in table 2. This is the strong evident to show that in terms of overall system usage, the prototype program was also

performed the very satisfying result both experts and users.

4.2.3. The User Interface Evaluation

Questionnaires were used to assess in this phase with experts and users. The result showed the efficiency of the system in a satisfying level as presented in table 3.

Table 3: The Results of the User Interface Display

	Experts		Users	
	$\bar{x}$	SD	$\bar{x}$	SD
1. The completeness of the information displayed.	4.5	0.71	4.4	0.52
2. The accuracy of data displayed.	4	0.67	3.8	0.79
3. Clarity of the text displayed on the screen.	4.3	0.82	4.1	0.88
4. Appropriate to use the font color and background picture.	4	0.67	4.4	0.52
5. Suitable for placement of components on the screen.	4	0.82	3.8	0.63
6. The suitability of the information presented in each monitor.	4.3	0.67	4.1	0.74
7. Appropriate for the text field.	4.2	0.63	3.8	0.63
8. The suitability of the overall system	4.5	0.71	4.4	0.70
Summary	4.17	0.68	4.13	0.69

5. CONCLUSION AND SUGGESTION

This research aims to develop the knowledge of cultural tourism information in case of Dusit district based on ontology technique. The research started from collecting all problems and issues to be used in the system. Ontology was taken to be the heart of create knowledge for this project. The results from the development of prototype were found that experts and users have satisfied the performances of the system as well. The result from this research can be the fundamental information of further research about tourism search engine. Moreover, the prototype of cultural tourism information in ontology-based was developed to be used only in Dusit district. It can also be adapted to use in the future in other districts that would like to encourage cultural tourism. As for the future work, we need to explore more reasonable other technologies to

apply in this project to enhance the quality and quantity of services to users.

6.   ACKNOWLEDGEMENT

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