

A Framework for Ontology-based Model of Information Management Assessment Criteria based on Syariah Compliance

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Abstract— The Holy Quran and Hadith ontology models are gaining popularity among researchers due to people's demands in understanding these divine books. Due to this, there are many studies have been conducted in this area to facilitate people's understanding of the Quran and Hadith. From the literature, however, most existing Quran and Hadith applications cover either Quran or Hadith only. Some applications focus on a domain of knowledge, while others only apply term matching and do not provide a semantic interpretation of keyword for a query. Thus, the purpose of this paper is to propose a Quran and Hadith application that covers both prime reference sources in Islam. It will focus on one domain of knowledge that is information management assessment criteria, where there is still a lack of research in this domain. It will also apply the semantic interpretation of the keyword to obtain results that are more comprehensive related to the context of the keyword. Evidence from the Quran and Hadith (Sahih Bukhari) related to the criteria of information management assessment will also be provided. The expected outcome for this paper is a framework of an ontology-based model for information management assessment criteria based on Syariah compliance that will be a useful guide for Muslims and all to assess their daily routine of managing information whether it complies with Islamic rules or vice versa.

Keywords— Quran ontology, Hadith ontology, Information management, Information management assessment

I. INTRODUCTION

Ontology is a knowledge representation of a collection of facts and concepts about a certain domain and describes how those concepts interrelated with each other. It plays an important role in the semantic web, information extraction, artificial intelligence, natural language processing, and knowledge management, etc. [1].

The Quran and Hadith are known in comprising of Arabic scripts, complex structure and the lexicons that convey implicit meanings using different contexts. Most Quran and Hadith systems that have been developed to date use the keyword or term matching and lack in semantic interpretation of Islamic texts. Currently, there are many artificial intelligence models of the Quran and Hadith incorporating ontology to explore its divine knowledge such as [2, 3, 4, 5, 6, 7, 8, 9, 10]. However, there are some limitations of the existing Quran and Hadith applications.

The first issue is coverage of corpus where most applications cover either Quran or Hadith only. For example, applications that cover the Quran only are Islamic Ontology Extraction System [2] and Ontology-based NLP [3], meanwhile applications that cover Hadith only are Latent Semantic Indexing [4], Muhadith [5], Hadith Isnad Ontology

[6], Ontology Al-Shamelah Digital Library [9], Concept Search Tool for Hadith [7] and QAS [8].

The second issue is about the domain of knowledge that covered in existing Quran and Hadith applications. For example, [10] covered Zakat field in Hadith, [9] covered Prophetic Medicine in Hadith, [8] covered fasting and pray in Hadith, and [4] covered Iman, fasting and prayer in Hadith. Other research does not refer to any domain in specific.

The third issue is semantic where most Quran and Hadith applications that had been developed to date use keyword or term matching and does not provide a semantic interpretation of keyword [5, 7]. Therefore, results obtained from the search will not be comprehensively related to the context of the keyword. For example, searching for the words "prophet" and "messenger" will give two different sets of results although the two words are semantically related.

Thus, the proposed framework is conducted to cover all three gaps mentioned above that are coverage, domain and semantic. First, coverage for this framework will be Quran and Hadith (specifically Hadith Sahih Bukhari), where these covers both important reference sources that are important in Islam. Second, the domain for this framework will focus on information management assessment criteria

included in both the Quran and Hadith. There is still a lack of research conducted in this area. Third, semantic where system proposed in this framework will retrieve verses with similar meaning semantically in the area of information management assessment criteria. The ontology-based approach will be implemented for the semantic feature. This ontology-based model of information management assessment criteria will be a useful guide for Muslims and all to determine criteria outlined by Islam for efficient

management of information together with evidence from the Quran and Hadith.

II. PROPOSED FRAMEWORK

This paper is focusing on the framework for an ontology-based model of information management assessment criteria based on Quran and Hadith. Figure 1 shows the architecture of the proposed framework.

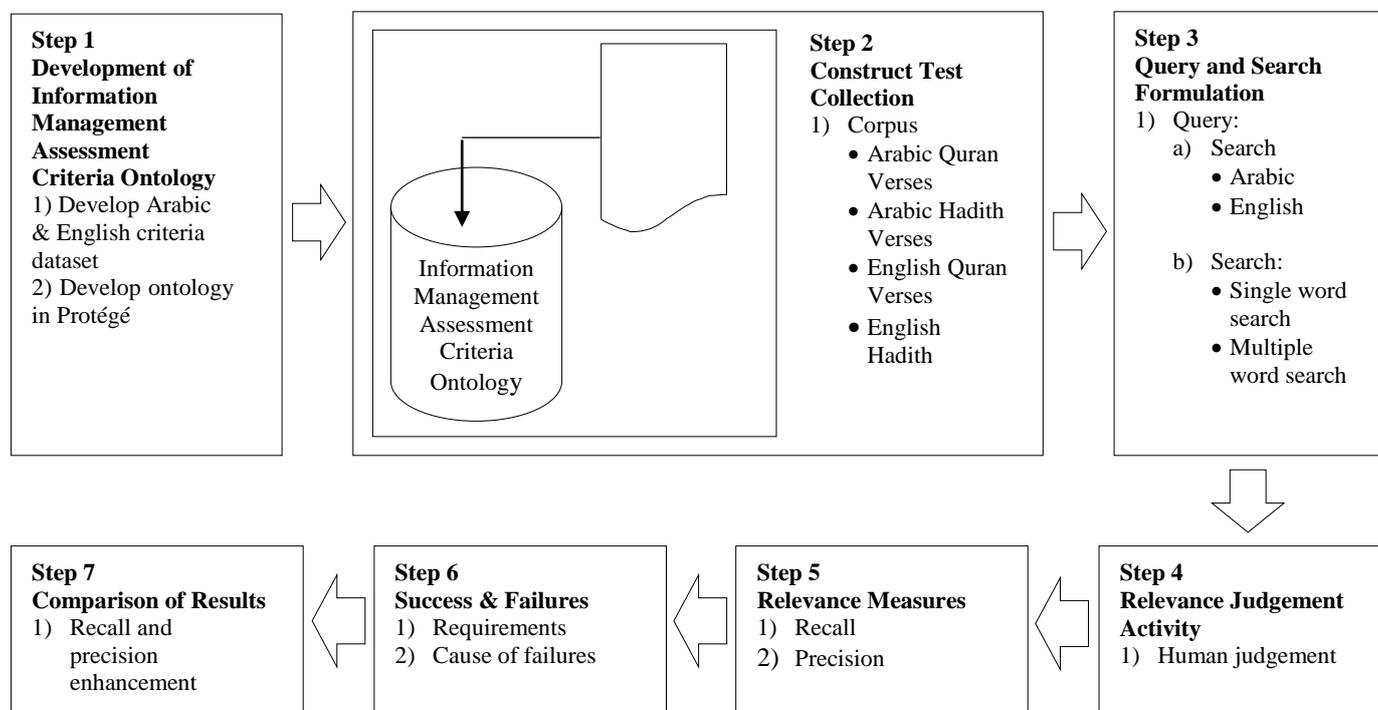


Fig. 1 Proposed framework

Based on Figure 1, there are seven steps proposed for this framework. The first step is the development of information management assessment criteria ontology. It involves the development of Arabic and English criteria dataset that is related to information management assessment, where contexts of these criteria will be extracted from relevant Quran and Hadith (Sahih Bukhari) verses and validated by three experts from Faculty of Quran and Sunnah (FPQS), USIM. These criteria will form a basic ontology tree for information management assessment criteria. Then, information management assessment criteria ontology will be built in Protégé using Arabic and English criteria dataset.

The second step is to construct the test collection that is to include relevant verses from Quran and Hadith about information management assessment criteria in the ontology system. These verses are collected in the first step of this framework and will be in two languages that are Arabic and English.

Next, the user interacts with the system by inputting keywords either in Arabic or English. The keywords are undergoing a set of pre-processing steps. The keywords are then matched with the ontology content. The outputs are the ontology entities which correspond to the user keywords. These entities are then transferred to the SPARQL query generator, which is responsible for building SPARQL queries. It uses the input ontology entities to

generate queries that, when executed, will retrieve results related to the user need. The result retrieved will be the criteria of information management assessment in Arabic and English together with related verses of the Quran and Hadith (Sahih Bukhari).

Results retrieved that are verses of Quran and Hadith will go through human judges, who are users of the ontology system, for relevance judgment activity. This activity involves verification to determine the relevancy of verses retrieved from the system to the user's query about information management assessment. Relevance measures evaluated for this framework is recall and precision based on user's query results on verses of Quran and Hadith retrieved from the ontology system. After that, requirements for success and causes of failures will be analyzed, where the comparison of results is needed for recall and precision enhancement.

III. CONCLUSIONS

This paper has proposed the framework of the ontology-based model for information management assessment criteria in Quran and Hadith. The ontology built to represent the domain of the information management assessment in Quran and Hadith. Thus, this framework produce a system that incorporates ontology to evaluate the information management assessment criteria, where the user will

evaluate the relevancy of result retrieved with their query. These results will be evaluated based on performance using information retrieval metrics of recall and precision. The result will retrieve the Quran and Hadith verse in the area of information management assessment.

This ontology-based model of information management assessment criteria is needed as a useful guide for Muslims and all to determine criteria outlined by Islam for efficient management of information together with evidence from the Quran and Hadith.

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