HADITH COMMENTARY REPOSITORY: AN ONTOLOGICAL APPROACH

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ABSTRACT. Hadith Commentary are the description of a particular hadith by a scholar and its relations to other parts of the Holy Scriptures including other variations of hadith that has narrated by a different narrator with a different matn. Without it, the lateral meaning of the matn can be understood out to the original scope and could result in an incorrect interpretation. Information on hadiths on the web are scattered and not organized and usually is embedded in text and writing. This information will be hard to analyze and extracted to be kept and referenced. There are applications, websites and portals that provide online information and functionalities related to hadith which includes hadith search, isnad search, term search, hadith classification, narration view and translation. However, all these hadith websites are without any accompanying commentary that will help a common Muslim or the general public to understand and put the hadith into context, thus this situation can result in a misinterpretation of the hadith that leads to the misconception of the deen. We presented the development process of the Hadith Commentary Ontology and tested the ontology against the purpose of the ontology (The ability of the ontology to produce result or answer the requirement questions). The main contribution of this research is that the ontology can support the storage of Hadith Commentary which is not currently available and we foresee that with the availability of the hadith commentary ontology will further help ontological based repositories to integrate and provide a base for an online hadith corpus and linkages among Islamic related ontologies.

Keywords: hadith commentary, hadith sharh, ontology, hadith, misconception, repository

INTRODUCTION

Hadith is one of the two fundamentals bases of Islam besides Al-Quran (Baraka and Dalloul, 2014) and together form the very pillar of Islam: its faith conviction, jurisprudence, knowledge, wisdom and the future. Hadiths are the words and deeds of Prophet Muhammad, Peace Be Upon Him (PBUH) being narrated from the first person that hears or saw to others. Hadiths are narrated in Arabic and once converted to a different language there are some inconsistency in the meaning. Hadith has its commentary given by various scholars. It describes and provides understanding to the hadith especially to non-native Arabic speakers. Without commentary, the lateral meaning of the matn (text of the hadith) can be understood out to the original scope and could result in an incorrect interpretation.

Hadiths are propagating quickly via social media, internet, websites and reaching huge number of Muslims throughout the world. It is important that the general public have a repository to understand correctly the meaning and implication of hadith from an authentic and reliable source with the proper and correct information. The process of verifying the truthfulness of information or news is known as Tabayyun. It is compulsory for a Muslim to perform Tabayyun based on the qur'anic text Surah An Nisa verse 94. With the wide coverage of news and information via internet and social media the importance of Tabayyun is made even bigger. Neglecting Tabayyun, rumors will spread like wildfire and can cause harm to the community and world at large. In the perspective of the dissemination of hadith and its meaning through the internet and social media, Tabayyun is a must, as it will remove any misconception or misinterpretation of a hadith and will ensure that the information being accepted and practiced are authentic and with proper references. Through our survey, all these hadith websites are without any accompanying commentary that will help a common Muslim or the general population to understand and put the hadith into context. This situation can result in a misinterpretation of the hadith that leads to the misconception of the deen (bin Abdullah, I. ,2014). Based on the above situations and requirements there is a need to create or provide the necessary tools to help the Muslim public in general to authenticate, understand and obtain information related to the hadith that a person receives thus the need to create the foundation or repository of the knowledge.

LITERATURE REVIEW

We have identified a few hadith websites that are organized and structured, in which the hadiths were grouped and obtained per the hadith corpus. The Sunnah.com website ("Sunnah.com", 2016) allows the users to search for terms in the hadith matn and it will return any matching terms from all the collection of books it has in the system. The system will return the source of the hadith, the hadith, the chapter of the hadith in the source, the chain of narrator, the hadith matn, and the translation of the hadith in English. Another portal hadith.co.uk is also publishing its collection of hadith online ("The Hadith Library", 2016). The portal allows the user to key in a term that it will search in the online corpus. The user is able to filter the search result based on the book that the hadith are found. The primary search result will display the following information: the source book of the hadith, the chapter number and the chapter heading, the hadith number, the narrator, the English translation and the relevance value of the hadith towards the search term. Alim ("Alim - The World's Most Useful Islamic Software", 2016) is another portal that published online hadith. The portal allows the user to select the book, chapter and hadith number to display a particular hadith and allows a user to browse the hadith in a particular book one at a time. The search facility on the portal is a general one that comprises of all information on the website and there is no specific search for hadith. Halaman mutiara hadith ("Halaman Mutiara Hadis", 2016) also publishes the translation of hadith, and it is published in Bahasa Malaysia. The portal allows a user to enter a search term or strings that will be compared to the content of all the hadith corpus which can be selected to be included in the search. The portal will return match hadith with the search term highlighted, each hadith will include the source book, the chapter, hadith number and the translation in Bahasa Malaysia.

Ontology represents the hierarchical structuring of knowledge about things by subcategorizing them per their essential qualities (Laclavík, 2005). Ontologies are defined as the explicit formal specifications of the terms in the domain and relations among them (Gruber, 1993). Every knowledge base, knowledge-based system, or knowledge-level agent is committed to some conceptualization, explicitly or implicitly (Gruber, 1992). This conceptualization must be based on something which is common or known to enable seamless data transfer and facilitate portability. Realizing that ontologies can represent a well-defined, standardized and

straightforward form of knowledge or repositories, researchers have tried to construct an ontology based on Islamic knowledge which comprises of Holy Quran, Hadiths and etc. (Saad et. al (2010), Azmi and Badia (2010), Ali, H. (2013), Khan et. al (2013) and Baraka & Dalloul (2014)).

Saad et. al (2010) identified the framework of Islamic Knowledge in order to develop an ontology, and method to extract the Islamic concept. Their approach was stimulated based on the combination of Natural Language Processing (NLP) techniques, Information Extraction (IE) and Text Mining techniques. In order to obtain the ontology instances, based on the IE systems, they have applied and defined a grammar and extraction rule based on hadiths on solah (prayer). Another research work using ontology in Islamic Knowledge Management has been proposed by Khan et. al (2013). They proposed the concepts of ontology of semantic web that can be applied to carry out semantic search in the Holy Quran. Baraka and Dalloul (2014) have designed a domain-dependent ontology, namely Hadith Isnad Ontology, for Isnad judgement in the Hadith domain. Isnad or Sanad is the chain of narrators attesting to the historical authenticity of a particular Hadith (Baraka and Dalloul, 2014). The ontology proposed by the authors is to support the process of authenticating or judging the Isnad of a particular Hadith. They evaluated the ontology through Hadith example and DL-Queries (Descriptive Logic). The results that they obtained showed that the ontology has successfully represents the knowledge required in judging the Isnad.

ONTOLOGY DESIGN

The design of the ontology to support hadith commentary will be based on the methodology outlined and published by Noy, N., & McGuinness, D. L. (2001). The methodology consists of seven steps to materialize a new or expand an ontology. We have gone through all the steps and presented in the following subsections.

Domain and Scope of the Ontology

The Islamic knowledge domain are vast which includes The Quran, Hadith, Tafseer, Fiqh and many more, we will be concentrating our research toward the Hadith domain in particular as it is one of the main source of reference after the Quran. The domain of the ontology will be to represent the commentary of a hadith; it will be used later to achieve the objective of the research to provide a platform for hadith commentary repository. The ontology should be able to capture commentary of a particular hadith made by a scholar or people with hadith knowledge or a muhadith and it can be from various sources and not limited to books, journals, sermons and lectures which were converted to textual format for archiving purposes. We have come up with a list of questions which is part of the requirement of the hadith commentary that must be addressed by the ontology as shown in Table 1. Requirement question.

Table 1. Requirement question.

Requirements	
What is the commentary of a particular hadith?.	What is the source of the hadith commentary?.
What are the commentaries by a particular commenter?.	What other hadith comes from the same source?.
What other hadith that relates to other hadith.	What hadith the commentator commented on.

Reusing the Existing Ontology

We have seen through the literature review that we could expand the existing ontology to support hadith commentary and to achieve that, we will be adding to The Isnad Judgement System(IJS) ontology, Dalloul, Y. M. (2013). We will be using the existing ontology as the base and expanding the ontology to add new elements for storing the hadith commentary.

Enumeration of the Important Terms in the Ontology

Referring to Noy & McGuinness (2001) this step requires us to list down all the important terms that the ontology will deal with and to facilitate the process; we will answer the following questions: what are the terms that we would like to talk about, what properties do those term have and what would we like to say about those terms.

We would like to talk about Hadith, Commentary Source, Author, Commentary, Commenter, Quranic Verse, Book and Chapters. The properties of each terms are presented in Appendix A. The description of the terms are as follows. Hadith: Each will have its own commentary and it could be more than one or maybe none depending on the information within the ontology. The term is an expansion from the IJS ontology however we purposely omit the narrator term that relates to the hadith as it is outside of the scope of the problem area or domain. CommentarySource: Commentary can come from various sources converted to textual form for recording. The term is an expansion of the existing Book term in IJS to make it more general and multipurpose to support the various sources of commentary. Commenter: The commenter is a scale down version of the people as we will not be needing certain properties and we will be adding other properties to accommodate the commentary requirement. Commentary: The commentary term will be the main text of a hadith commentary. It will give a clear elaboration, description and discussion on a particular hadith. Usually a commentary will have quoted hadith and quoted qur'anic verse within its content and this are recorded within the content and as a separate entity to facilitate the relations among the terms in the ontology. We also added the keywords in order to help the commenter to group its commentary and help users search for a particular topic. Author: The term will be used to keep track of commentary source authors. We perceive that it could be the commenter or a different person or a few persons. Chapter: The term will be used to keep track of the chapters in the commentary source and book. The chapters will be the container to link a particular book or commentary source to its content either a hadith or a commentary.

Classes and the Class Hierarchy

The next step is to define the class and we will be using the top down approach as mention by Noy & McGuinness (2001). Analyzing the terms from the previous steps we have created the following classes and the description shown in the following Table 2. Type of Class and Its Description.

Table 2. Type of Class and its Description.

Class	Description
CommentarySource	Represent the source of commentary
Hadith	Represent the hadith matn
Commentary	Represent information on commentary
Commenter	Represent a person that produces commentary
QuranicVerse	Represent a Quranic Verse
Author	Represent the author of the Commentary Source
Person	Represent information about a human

Property of the Classes

The next step is to define the properties of all the classes that we will have in the Hadith Commentary ontology, we have elaborated all the classes and describe each of the tables fields and presented in Appendix A: Property of the Classes. The Appendix A contains all property name and its descriptions for all the classes constructed which are CommentarySource, Hadith, Commentary, QuranicVerse, Person, Author, Commenter, Chapter and Book.

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Facets of the Slots

The sixth step in completing the ontology is to elaborate further the properties created in the previous step to add up more information enabling the ontology to answer the competency questions that was outlined earlier. What most important with each property is the different facets or states of the property that will be defined with the data type, acceptable values, the cardinality of the property and other attribute. We also identified fields which are interrelated that connects the classes both ways. We represent the facets definition using the classes to keep the information in context and easier to understand. The Appendix B: Facets of the Slots contains tables that represent the facets properties for all classes as mentioned in the previous section.

ONTOLOGY EVALUATION

The verification of the design will be based on the ability of the ontology to answer the questions stated in the design section above. By answering the required question, we can assert that the ontology or design can meet the requirement of the Hadith Commentary. Prior to the evaluation of the created ontology we have populated the ontology with minimal but sufficient information that will enable us to execute queries and obtain result or information from the ontology. The ontology has been added with 3 hadith book, 12 Chapters, 11 Hadith, 2 Commentary source, 5 Commentaries, 5 people which comprises of 3 authors and 2 commenters, 4 verse form the Quran. Figure 1 shows the ontology constructed based on the information populated. The figure shows the overall view of the ontology with regard to classes and some data to show the interrelation between the ontological objects. We then execute or ask the ontology based on DL-Query, to obtain the information that will answer a particular question. We present the test case and result in the following manner: The question that requires answer, The DL-Query equivalent to answer the question and the screen shot of the ontology being queried showing the result returned by the DL-Query and a summary of the result obtained. All the test cases are presented in the following tables. Table 3 shows the result for the first question (What is the commentary of a particular hadith), Table 4 shows the result for What are the commentaries by a particular commenter, Table 5 shows the result for What other hadith that relates to other Hadith, Table 6 shows the result for What is the source of the hadith commentary, Table 7 shows the result of What other hadith comes from the same hadith source and finally Table 8 shows What hadith the commentator commented on.
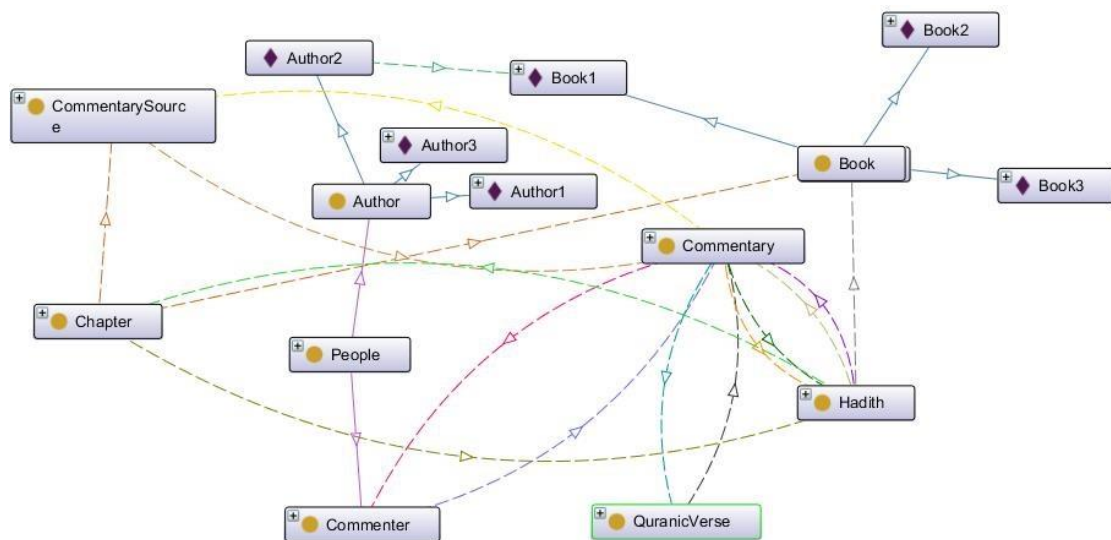

Figure 1. Overview of ontological objects and its interrelations.

Table 3: Test case for what is the commentary of a particular hadith

Question	What is the commentary of a particular hadith
DL-Query	ofHadith value BI-C100-H3
Result Summary	Given a particular hadith in this example hadith with code B1-C100-H3 the commentary of the hadith is with the code Commentary1. The ontology can determine the commentary of a particular hadith.

Table 4: Test case for what are the commentaries by a particular commenter

Question	What are the commentaries by a particular commenter
DL-Query	CommentaryBy value Commenter2
Result Summary	Given a commenter information in this case the commenter with an Id Commenter2 the system returns two commentaries namely Commentary2 and Commentary1. The two commentaries returned are written by the Commenter2

Table 5: Test case for what other hadith that relates to other hadith

Question	What other hadith that relates to other Hadith
DL-Query	hasReferenceToHadith some Hadith
Result Summary	The ontology can return a list of hadith that has relations with other hadith. These hadith are interconnected via the commentary.

Table 6: Test case for what is the source of the hadith commentary

Question	What is the source of the hadith commentary
DL-Query	ContainerOfCommentary value Commentary1
Result Summary	Given a commentary in this example: Commentary1 the ontology can determine the source of the commentary which is CommentarySource1.

Table 7: Test case for what other hadith comes from the same hadith source

Question	What other hadith comes from the same hadith source
DL-Query	hasHadithContainer some (ContainerOfHadith some Hadith) and hasHadithContainer value Book1
Result Summary	The ontology can group and return all the hadith that comes from the same source. In the example Book1 was used and the ontology return all the hadith from Book1

Table 8: What hadith the commentator commented on

Question	What hadith the commentator commented on
DL-Query	hasCommentary some (hasCommentaryContainer some (hasAuthor value Commenter1 and CommentarySource)) hasCommentary some (hasCommentaryContainer some (hasAuthor value Commenter2 and CommentarySource))
Result Summary 1	The question requested all the hadith that a commenter commented on in this case Commenter1 commented on the following hadith: B1-C68-H6, B3-C50-H5714, B1-C23-H1 and B1-C5-H1 and the hadith that the commenter comments on comes from more than 1 sources.
Result Summary 2	The question requested all the hadith that a commenter commented on in this case Commenter2 commented on the following hadith: B1-C100-H3, B1-C100-H6 and the hadith that the commenter comments on comes from 1 source.

CONCLUSION

We have presented herein the Hadith Commentary Ontology. We first presented an overview of current Hadith related portals, and showed that there is lack of information in terms of the commentaries of hadith available. We presented the development of our Hadith Commentary Ontology. Later we tested the ontology against the purpose of the ontology (The ability of the ontology to produce result or answer the requirement questions). The main contribution of this research is that the ontology can support the storage of Hadith Commentary which

is not currently available. The Hadith Commentary Ontology enables the indirect linkages of hadith and quranic verses to be documented and kept in a manner that can be utilized for various other purposes. Hadith Commentary Ontology encourages us to look for ways to increase the scope of this research to include more commentary sources and making the ontology available for researches, users and application developers to benefit directly or indirectly.

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APPENDIX A: PROPERTY OF THE CLASSES

Hadith Class Property

Property Name	Description
Title	The title of the hadith
Topic	The topic that the hadith falls into
Content	The Matn of the hadith
HadithOf	The chapter that the hadith belongs to
hasHadithContainer	The Book that the hadith belongs to
hasCommentary	The commentaries of the hadith
HadithReferBy	The commentaries that the hadith is being referred to

Book Class Property

Property Name	Description
Title	The title of the Book
Publisher	The publisher information
YearOfPublication	The year of publication
NumberOfPages	The number of pages
ReferenceNumber	The reference number for the source
ReferenceNumberType	The type of reference number
PublishingLocation	The publishing location
hasAuthor	The authors information
hasChapter	The Chapter the book has
ContainerOfHadith	The hadith contained in a particular book

Commenter Class Property

Property Name	Description
Id	A unique commenter Id
hasQualification	The qualification of the commenter
CommenterOf	The commentary the commenter creates or is part of

Commentary Source Class Property

Property Name	Description
Title	The title of the commentary source
SourceType	The type of the commentary source
Publisher	The publisher information
YearOfPublication	The year of publication
NumberOfPages	The total number of pages of the commentary source
ReferenceNumber	The reference number for the source
ReferenceNumberType	The type of reference number
PublishingLocation	The published location
DateOfPublication	The date of publication
hasAuthor	The authors information
hasChapter	The Chapter the commentary source has
ContainerOfHadith	The Hadith that the commentary source comments on
ContainerOfCommentary	The Commentary contained within the commentary source

Quranic Verse Property

Property Name	Description
Verse	The translation of the quranic verse
SurahNumber	The surah number of the verse
VerseNumber	The verse number
QuranicVerseReferBy	The commentary that refers to the verse

Chapter Class Property

Property Name	Description
Title	Chapter Title
ChapterNumber	Chapter Number
hasChapterContainer	The Book or Commentary Source where the chapter belongs to
hasHadith	The hadith contained in a particular chapter

Commentary Class Property

Property Name	Description
Id	The unique Id for the commentary
Title	The title of the commentary
KeyWords	The keywords for the commentary
Content	The content of the commentary
CommentaryOf	The hadith the commentary is for
CommentaryBy	The commenter or author Id
hasReferenceToHadith	The hadith that the commenter used or cited in the commentary
hasReferenceToQuranicVerse	The Quranic Verse that the commenter used or cited in the commentary
hasCommentaryContainer	The Commentary Source that contains the commentary

Person Class Property

Property Name	Description
Id	The unique identifier for the person
Name	The name of a person
FirstName	The First Name of a person
FathersName	The Last Name of a person
BirthYear	The date of birth of a person
DeathYear	The date of death of a person
Gender	The person gender

Author Class Property

Property Name	Description
AuthorOf	Commentary Source or Book that a person is an author

APPENDIX B: FACETS OF THE SLOTS

Hadith Class Facets Property

Property Name	Type	Cardinality	Valid Values
Title	String	Single	Any string literal
Topic	String	Single	Any string literal
Content	String	Single	Any string literal
HadithOf	Instance	Single	Chapter Class (inv hasHadith)
hasHadithContainer	Instance	Single	Book Class (inv ContainerOfHadith)
hasCommentary	Instance	Multiple	Commentary Class (inv CommentaryOf)
HadithReferBy	Instance	Multiple	Commentary Class (inv hasReferenceToHadith)

Book Class Facets Property

Property Name	Type	Cardinality	Valid Values
Title	String	Single	Any string literal
Publisher	String	Single	Any String Lateral
YearOfPublication	Number	Single	Valid Year from 1 to current year
NumberOfPages	Number	Single	1 to 9999
ReferenceNumber	String	Single	Any string literal
ReferenceNumberType	Enum	Single	DOI, ISBN, OTHER
PublishingLocation	String	Single	Any string literal
hasAuthor	Instance	Multiple	Author Class (inv AuthorOf)
hasChapter	Instance	Multiple	Chapter Class (inv hasChapterContainer)
ContainerOfHadith	Instance	Multiple	Hadith Class (inv hasHadithContainer)

Commenter Class Facets Property

Property Name	Type	Cardinality	Valid Values
Id	Number	Single	A unique commenter Id
Qualification	String	Single	Any string literal
CommenterOf	Instance	Multiple	Commentary Class (inv CommmentaryBy)

Commentary Source Class Facets Property

Property Name	Type	Cardinality	Valid Values
Title	String	Single	Any string literal
SourceType	Enum	Single	BOOK, LECTURE, PAPER, SERMON, JOURNAL
Publisher	String	Single	Any String Lateral
YearOfPublication	Number	Single	Valid Year from 1 to current year
NumberOfPages	Number	Single	1 to 9999
ReferenceNumber	String	Single	Any string literal
ReferenceNumberType	Enum	Single	DOI, ISBN, OTHERS
PublishingLocation	String	Single	Any string literal
DateOfPublication	Date	Single	Any date
hasAuthor	Instance	Multiple	Author Class (inv AuthorOf)
hasChapter	Instance	Multiple	Chapter Class (inv hasChapterContainer)
ContainerOfHadith	Instance	Multiple	Hadith Class (inv hasHadithContainer)
ContainerOfCommentary	Instance	Multiple	Commentary Class (inv hasCommentaryContainer)

Quranic Verse Facets Property

Property Name	Type	Cardinality	Valid Values
Verse	String	Single	Any string literal
SurahNumber	Number	Single	Between 1 to 114
VerseNumber	Number	Single	Between 1 to 286
QuranicVerseReferBy	String	Multiple	Commentary Class (inv hasReferenceToQuranicVerse)

Chapter Class Facets Property

Property Name	Type	Cardinality	Valid Values
Title	String	Single	Any string literal
ChapterNumber	Number	Single	Any Number
hasChapterContainer	Instance	Multiple	CommentarySource Class or Book Class (hasChapter)
hasHadith	Instance	Hadith	Hadith Class (via HadithOf)

Commentary Class Facets Property

Property Name	Type	Cardinality	Valid Values
Id	Number	Single	The unique Id for the commentary
Title	String	Single	Any string literal
KeyWords	String	Single	Any string literal
Content	String	Single	Any string literal
CommentaryOf	Instance	Single	Hadith Class (inv hasCommentary)
CommentaryBy	Instance	Multiple	Commenter Class (inv CommenterOf)
hasReferenceToHadith	Instance	Multiple	Hadith Class (inv HadithReferBy)
hasReferenceToQuranicVerse	Instance	Multiple	QuranicVerse Class (inv QuranicVerseReferBy)
hasCommentaryContainer	Instance	Single	CommentarySource Class (inv ContainerOfCommentary)

Person Class Facets Property

Property Name	Type	Cardinality	Description
Id	Number	Single	The unique Id for a person
Name	String	Single	Any string literal
FirstName	String	Single	Any string literal
FathersName	String	Single	Any string literal
BirthYear	String	Single	Between 1 to current year
DeathYear	String	Single	Between 1 to current year
Gender	Enum	Single	MALE, FEMALE

Author Class Facets Property

Property Name	Type	Cardinality	Valid Values
AuthorOf	Instance	Multiple	CommentarySource Class Book Class (inv hasAuthor)