Ontological knowledge Management System of Islamic Concepts

Hayat Ali

MS Computing

Shaheed Zulfiar Ali Bhutto Institute of Science and Technology

90 and 100 Clifton

Karachi -75600

Abstract— **This study is focused on the conceptual relationship between different ayah of Al-Quran. Let's take an example what Allah says about Muttaqee in the Al-Quran, the Quran say Muttaqee are those "They are on (true) guidance from their Lord" or "Those who got Falah" but when we go in the context of "Falah" we don't find such word related Muttaqee means the relationship is there like if someone ask, who are Muttaqee the answer will be "Those who got Falah"; similarly if it is asked that who got Falah the answer is Muttaqee. There are several examples available in the Quran where we are not aware what will be the next related ayah to it. Another example in surah Al-Baqara Allah says: "The month of Ramadan in which was revealed the Qur'an" but next related ayah which we found in surah Al-Qadr in which Allah says: "Verily! We have sent it (this Qur'an) down in the night of Al-Qadr (Decree)" means the Allah revealed Al-Quran in Ramadan also in next surah it is further explained that it was revealed in lailat-ul-qadr.**

Keywords— *Quranic Ontology, Semantic Web, Classes, Individuals, Protégé, OWL **and** etc*

I.   INTRODUCTION

To study the whole Quran is the challenging task for every person along with the relevancy in different ayah like Aakhirat, Falah, Deen, Rasool, Rah e Hidayat and etc. The ontological Knowledge Management System of the Islamic concepts covers the different topic of Al Quran. The required objective of this study is to find out the relevancy between the different ayah of Al Quran. Like if Allah deliver a message in one ayah, so what are the similar ayah having the same message. This study will cover all aspects of semantic relationship between different ayah.

The information on the web is increasing day by day, Specially when we are talking about Islamic knowledge one thing comes in mind that is authenticity; we may get the relevant information on the but who can assure that that information is correct. The topic of our study is very specialize in the sense of we work with "Tafseer ul Quran bil Quran" means explanation of the verses of Quran from Quran.

II. LITERATURE REVIEW

In 2012 a research has been conducted in Leeds University UK, Computing Department, "QurAna: Corpus of the Quran annotated with Pronominal Anaphora" the topic of corpus of the Quran annotated with pronominal anaphora, the researcher has personated QurAna as language resource for scholars, students and the researcher who are from the computational linguistics community. They have tagged around 24, 00 Quranic pronounce with their antecedence information. According to researcher, the QurAna characterize in two parts: comparatively large number of pronounce tagged with antecedence information and second is the maintenance of ontological concepts list refereeing same pronounce. Initially they have counted total number of 1st person, 2nd person, 3rd person, gender and number wise pronounce. In the annotation process they made the 128,000 words segments of Al-Quran and maintained in a MYSQL database with unique id to performed ontological concept to get desired result. [4]

Another research has been conducted in Leeds University UK 2009-2010, "Quran 'Search for a Concept' Tool and Website" Kais Dukes proposed a solution on Quranic ontology; initially he proposed solutions in two phases: the first one was the key word search module and second was the concepts search module where he as divided Quran into fifteen categories. i.e. Angels, Event, Holy Book, Religion etc. However, in reality there may be many categories in which Quran can be divided. According to the researcher's ontology, when we go in Angel's category it shows 4 different Angles. Similarly when any person wants to search the holy book, 4 different books will appears. By selecting any attribute, that shows the further classification of it. In general there will must be Lots of many categories in Islam beside this we cannot say the developed ontology is wrong this is the perception any person that he/she may think differently. [5]

1, March 2010 "Towards Context-Sensitive Domain of Islamic Knowledge Ontology Extraction" a research has been conducted by Saidah Saad and et al in university of Malaysia, these researcher tried to extract knowledge by designing different methodologies. Initially they have identified the information available on the internet related quran and sahih hadith are in the natural language format. The objective of this study is to explain the Islamic knowledge with the help of methodologies that composed of different rules and techniques. This study has defined some prerequisites to understand the semantic or work with quran. According to their study different Islamic concepts has been describe to understand the semantic of Quran. According to the research the Quran contains many narratives that point out the some important aspects of quran messages like guidance and reminders. This study also discussed the Mohkamat and Mutashabihat; Mohkamat is basically the thing known to Allah only but mutashabihat are those which have different meanings. The methodology that is based on the subject to extract knowledge are al-jahad, religion, science, arts, judicial relationship and etc. the researcher has developed different patterns to identify the concepts but in reality the researcher has gathered all the information on single platform that may create complexity because every ayah of Al-Quran has semantic with other ayah. [6]

In May 2012, a research paper has been presented in National Research Conference (NRC 2012) on "Ontology development of intelligent query answering of the concepts search". In this study the researcher focused on daily routine life activity in the light of Islam with the help of a book called "Taleem ul Islam" by Muftee Kfyat Ullah. This book explains the basic knowledge about the Islam on which ontology has been developed. The objective of this paper is to facilitate peoples who want to study what Islam is; and what are the necessary things to be followed being a Muslim. The researcher has identified the classes and subclasses from the book to developed ontology. Suppose when a person want to know about the Pray (Namaz) so different type of prayes will appear, similarly in case of angels different four angles will appear with their properties or duty assigned by Allah. [3]

In June 2009, International University Islamabad, a paper has been presented with the name of "Quranic ontology and the Status of Al-Haq" this is basically the reply the of critical appraisal of an article "Is Al-Haq" one of the asma ul husna. According the required study the word Al-Haq 227 times in Al-Quran in different forms but reference the study of quranic ontology that consist of three major principles. i.e Allah is the organizer of every thing; Allah is the creator and Amar (command) also ordered by him. Based on these principles the proposed ontology has been divided the whole organization into main categories. [7]

In 201O, International Conference on Computer Design and Applications (ICCDA 2010) a paper has been presented named "Research on semantic web mining" the objective of this paper is to improve web service level and lack of semantic problem. The researcher has defined the seven different layers of semantic web and describe the integration of two web mining based on semantic. According to this study, a semantic web-mining model has been proposed under the framework of agent. This researcher also mentioned that due to immaturity of the relevant technology and different aspect of limitation, this proposed solution is not the concrete realization of the model, which will be covered in future study. [8]

So far, not much research has done on Islamic Ontology, and as far as this topic is concerned, no study has been found that relates to "Tafseer ul Quran bil Quran".

III. METHODOLOGY AND IMPLEMENTATION

A. Methodology

In this, study both the comparative and experimental research has been used to employ this ontology. The comparative research in the sense of keyword search and the experimental research for observing the semantic relationship between different ayah of Al Quran.

B. Implementation

The dataset has been taken from the book "Brief Indication of Al Quran" by Dr. Ather Muhammad Ashraf. This book contains many topic like Azan, Rasool, Aazab, Falah etc and each these topic have multiple ayah that show the same topic belongs to how many ayah.

Due to not availability of the same dataset into English, we have translated every single ayah of the relevant topic into English to incorporate with required ontology. It was very time taking work and the translation has been taken place

from "Dar us Salam" the Islamic community by Dr. Muhammad Taqi-ud-Din Al-Hilali, Ph.D. & Dr. Muhammad Muhsin Khan.

C. Classes and Sibling Classes Identification

After the completion of translation process of the required dataset, the next task to find out classes, subclasses, sibling classes and individual from the dataset as mentioned below.

S.No	Classes	Sub/Sibling classes	Properties / Members	
			Ayah	Ayah No.
1	Aakhirat	Al-Anbiyah	Allah Says: "Draws near for mankind their reckoning, while they turn away in heedlessness"[11]	1
		Al-Lail	Allah Says: "And truly, unto Us (belong) the last (Hereafter) and the first (this world)" [11]	13
		Al-Isra	Allah Says: "And whoever desires the Hereafter and strives for it, with the necessary effort due for it (i.e. do righteous deeds of Allah's Obedience) while he is a believer (in the Oneness of Allah Islamic Monotheism), then such are the ones whose striving shall be appreciated, thanked and rewarded (by Allah)" [11]	19
		Al-Isra'	Allah Says: "See how We prefer one above another (in this world) and verily, the Hereafter will be greater in degrees and greater in preference" [11]	21
		Al-Ankabut	Allah Says: "And this life of the world is only amusement and play! Verily, the home of the	64

No	Category	Surah	Text	Verse
			Hereafter, that is the life indeed (i.e. the eternal life that will never end), if they but knew" [11]	
		Ar-Rum	Allah Says: "They know only the outside appearance of the life of the world (i.e. the matters of their livelihood, like irrigating or sowing or reaping, etc.), and they are heedless of the Hereafter" [11]	7
		Az-Zukhruf	Allah Says: "And adornments of gold. Yet all this (i.e. the roofs, doors, stairs, elevators, thrones etc. of their houses) would have been nothing but an enjoyment of this world. And the Hereafter with your Lord is only for the Muttaqun" [11]	35
		An-Najm	Allah Says: "But to Allah belongs the last (Hereafter) and the first (the world)" [11]	25
		Al-Qasas	Allah Says: "And whatever you have been given is an enjoyment of the life of (this) world and its adornment, and that (Hereafter) which is with Allah is better and will remain forever. Have you then no sense?" [11]	60
		Al-Ma'idah	Allah Says: "Surely, those who believe (in the Oneness of Allah, in His Messenger	
			Muhammad (PBUH) and all that was revealed to him from Allah), those who are the Jews and the Sabians and the Christians, - whosoever believed in Allah and the Last Day, and worked righteousness, on them shall be no fear, nor shall they grieve" [11]	
2	Aadab –e-Majlis	Al-Mujadilah	Allah Says: "O you who believe! When you are told to make room in the assemblies, (spread out and) make room. Allah will give you (ample) room (from His Mercy)" [11]	11
3	Azmaish	Al-Ma'idah	Allah Says: "O you who believe! Allah will certainly make a trial of you with something in (the matter of) the game that is well within reach of your hands and your lances, that Allah may test who fears Him unseen" [11]	94
		At-Taubah	Allah Says: "Do you think that you shall be left alone while Allah has not yet tested those among you who have striven hard and fought and have not taken Walijah" [11]	16
		Ale-Imran	Allah Says: "You shall certainly be tried and tested in your wealth and properties and in your personal selves," [11]	186
		Al-	Allah Says:	35

		Anbiyah	"Everyone is going to taste death, and We shall make a trial of you with evil and with good, and to Us you will be returned" [11]	
3	Assman and Zameen	Al-Baqarah	Allah Says: "The Originator of the heavens and the earth. When He decrees a matter, He only says to it : "Be!" - and it is." [11]	117
		Al-Baqarah	Allah Says: "and sent down water (rain) from the sky and brought forth therewith fruits as a provision for you" [11]	22
		Al-Anbiyah	Allah Says: "Have not those who disbelieve known that the heavens and the earth were joined together as one united piece, then We parted them?" [11]	30
		Al-Anbiyah'	Allah Says: "And We have made the heaven a roof, safe and well guarded." [11]	32
		Al-Anbiyah	Allah Says: "We created not the heavens and the earth and all that is between them for a (mere) play" [11]	16
		Ale-Imran	Allah Says: "And to Allah belongs the heritage of the heavens and the earth;" [11]	180
		Ale-Imran	Allah Says: "Verily! In the creation of the heavens and the earth, and in the alternation of night and day, there are indeed signs for men of understanding."	190

			[11]	
		Ale-Imran	Allah Says: "Those who remember Allah (always, and in prayers) standing, sitting, and lying down on their sides," [11]	191
		Ar-Rahman	Allah Says: "Then when the heaven is rent asunder, and it becomes rosy or red like red-oil, or red hide." [11]	37
		Ar-Rahman	Allah Says: "And the heaven He has raised high, and He has set up the Balance." [11]	7
		Qaf	Allah Says: "Have they not looked at the heaven above them, how We have made it and adorned it, and there are no rifts in it?" [11]	6
		Qaf	Allah Says: "On the Day when the earth shall be cleft" [11]	44
		Qaf	Allah Says: "And indeed We created the heavens and the earth and all between them in six Days and nothing of fatigue touched Us." [11]	38
		Al-Hijr	Allah Says: "And indeed, We have put the big stars in the heaven and We beautified it for the beholders." [11]	16
		An-Nahl	Allah Says: "He has created the heavens and the earth with truth" [11]	3
		An-Najm	And to Allah belongs all that is in the heavens and all that is in the earth	31
		Ar-Rahman	Allah Says: "And the heaven He has	7

#	Term	Surah	Ayah	No.
			raised high, and He has set up the Balance." [11]	
4	Aag se Bacho	At-Tahrim	Allah Says: "O you who believe! Ward off from yourselves and your families a Fire (Hell) whose fuel is men and stones" [11]	6
5	Aamdani	At-Talaaq	Allah Says: "Let the rich man spend according to his means, and the man whose resources are restricted, let him spend according to what Allah has given him" [11]	7
6	Ajar	An-Nisa	Allah Says: "And whoso obeys Allah and the Messenger (Muhammad PHUH), then they will be in the company of those on whom Allah has bestowed His Grace" [11]	69
		Al-Mu'minun	Allah Says: "Those who are faithfully true to their Amanat (all the duties which Allah has ordained, honesty, moral responsibility and trusts etc.) and to their covenants; And those who strictly guard their (five compulsory congregational) Salawat (prayers) (at their fixed stated hours). These are indeed the inheritors. Who shall inherit the Firdaus (Paradise). They shall dwell therein forever." [11]	8-11
		Al-	Allah Says: "Save	25
		Inshiqaq	those who believe and do righteous good deeds, for them is a reward that will never come to an end (i.e. Paradise)." [11]	
		Al-Kahf	Allah Says: "Verily! As for those who believe and do righteous deeds, certainly! We shall not suffer to be lost the reward of anyone who does his (righteous) deeds in the most perfect manner." [11]	30
		Al-Kahf	Allah Says: "(He has made it) Straight to give warning (to the disbelievers) of a severe punishment from Him, and to give glad tidings to the believers (in the Oneness of Allah Islamic Monotheism), who work righteous deeds, that they shall have a fair reward (i.e. Paradise)." [11]	2

D. Ontology Development

The identified data set has been converted into the ontological components including classes, sibling classes, individuals and properties for developing ontology. Now, see how ontology has been prepared by this sampling data.

E. Aakhirat

The topic of Aakhirat in Al Quran exist in many chapters, according to the book the "Brief indication of Al Quran" Allah discuss same topic in Al-Anbya, Al-lail, Bani Israil, Akaboot and etc. So from the ontology point of view the Aakhira is the sub class of Al Quran and the super class of those who are related from the topic Aakhirat. i.e.

Figure 2: Aakhirat Ontological Model
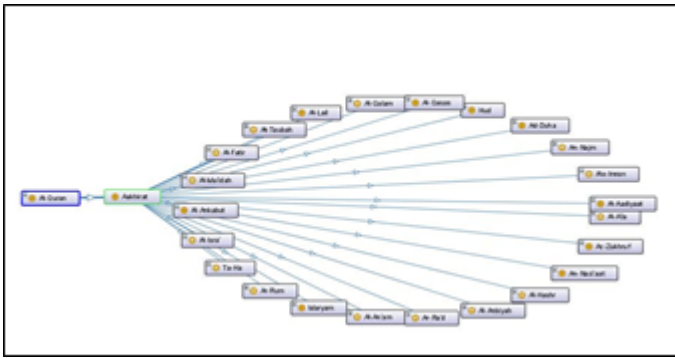
Here we can see that Aakhirat is the super class of a list of chapter like Al-fatir, At-taubah, Al-lait, Al-Qalam and etc with association of "is-a" relationship, and these sub classes are sibling class to each others. Let's take in-depth view of few subclasses of Aakhirat in asserted model.

Figure 3: Asserted Model Aakhirat (Ad-Duha)

Figure 4: Asserted Model Aakhirat (Al-Ankabut)

This is an asserted model that show "is-a" relationship between the subclasses.

F. Azmish

Another thopic Azmish that exist in around four chapters of Al Quran like Al-Anbiyah, Al-Ankabut, Al-Mulk and at-Taubah. Again, this is subclass of Al Quran also having specialization of four subclasses. The ontological model of the required subclass are as follows:
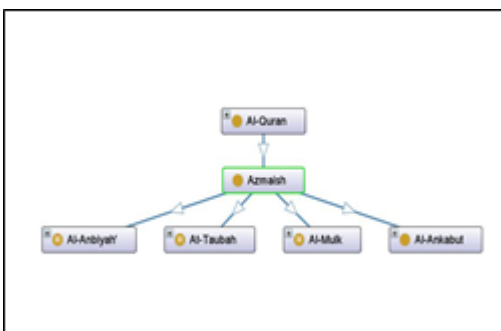
Figure 5: Ontological Model Azmish

The asserted model that of the azmish subclass with the association "is-a" relationship as follow.
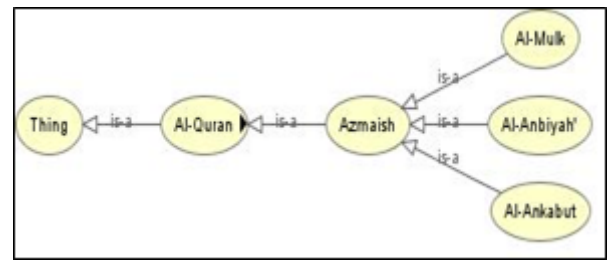
Figure 6: Asserted Model Azmish

Here one thing very import is the chapter Ankabut have 3 subclasses and these subclasses are associated with is-a relationship.

G. Assman and Zameen

This is one of the most important topic many of people have confusion about it what Allah says about zameen and assman, how these has been created and who created it so there are lots of question rais on this topic. From the ontology point of view, we gathered all the chapters related Assman and Zameen and made as subclass of Al Quran. According to the ontology the specialize class assman and zameen hhave aroung 11 subclasses and these subclasses are the sibling classes to each other. The ontological model of the Asslam and Zameen as follow:
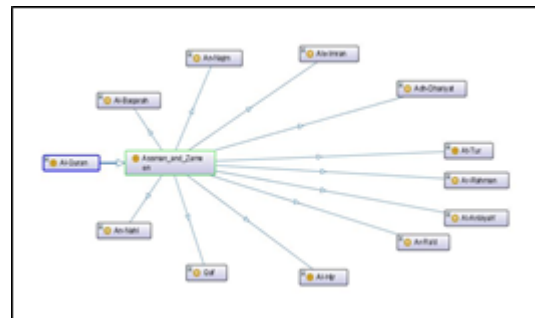
Figure 7: Ontological Model Assman and Zameen

These sibling classes have the same association of "is-a", some of the asserted model of the required topic are as follow.
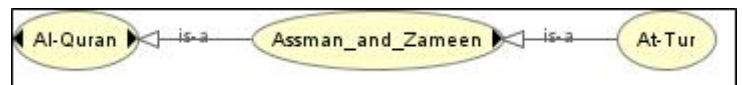

Figure 8: Asserted Model Assman and Zameen (At-Tur)

The asserted model show the subclass at-tur has information about zameen and assman.

H. Ehkamat

According to ontological approach the class ehkamad has different subclasses like Ale-Imran, Al-Fatir and so on. In addition, every of sub class has different individuals that represent the property of that classes.
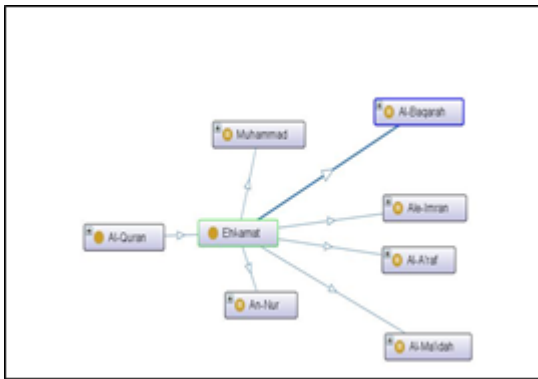
Figure 9: Ontological Model Ehkamat

Similarly if we talk about the chapter Al-Baqarah the associated property with this subclass of the topic Ehkamat are as follow.
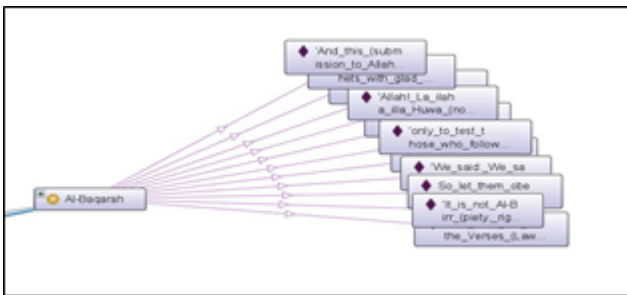

Figure 10: Ontological Model Al-Baqarah (Individuals)

I. Aamal

The topic Aamal is one of the essential topic but it more important to know what Allah says about Aamal in Quran. In consideration of ontology this topic gathered around 6 chapters of A-Quran that explain how to get better you living style. The ontological model of the class Aamal as follow:
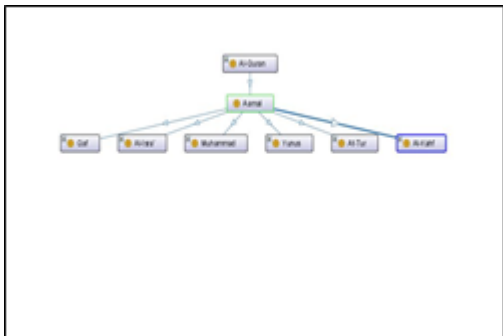
Figure 11: Ontological Model Aamal

Here you can see the every subclass of Aalam has their individual / attributes. Like if, we take a subclass Qaf so the model is:
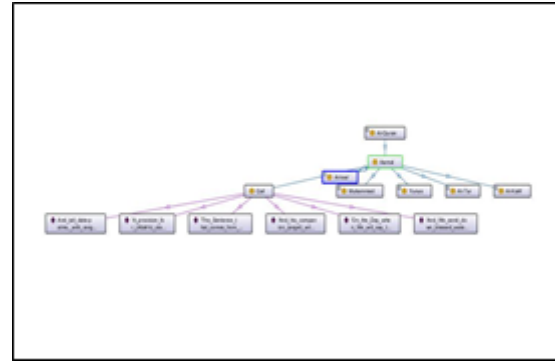
Figure 12: Ontological Model Aamal (Individuals)

The asserted model of the class that show the relationship between the super and subclasses are as below.
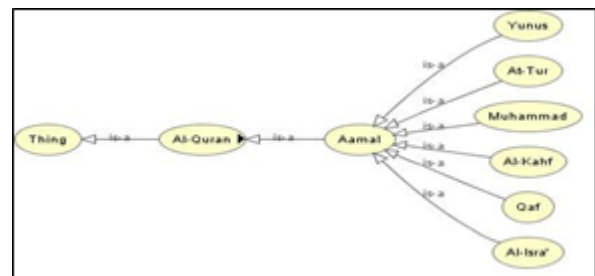
Figure 13: Asserted Model Aalam (Sibling Classes)

J. Ajar

Every good work has regards but regards from Allah not comparable. The topic Ajar is the core topic in the light of Islam and from the Quranic point of view Allah explains about Ajar in different chapters like Al-Burooj, Al Mu'minum, Al-Anshiqaq and etc. the ontology model for the class Ajar is as follow:
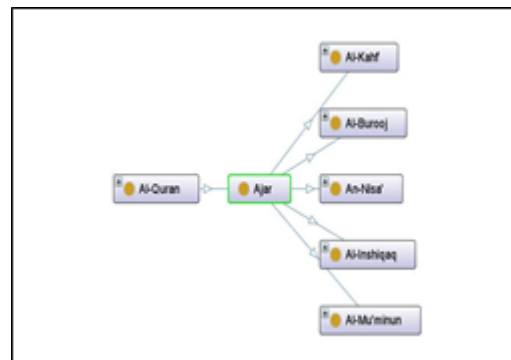

Figure 14: Ontological Model Ajar

The asserted model that of the required topic with "is-a" relation as follow:
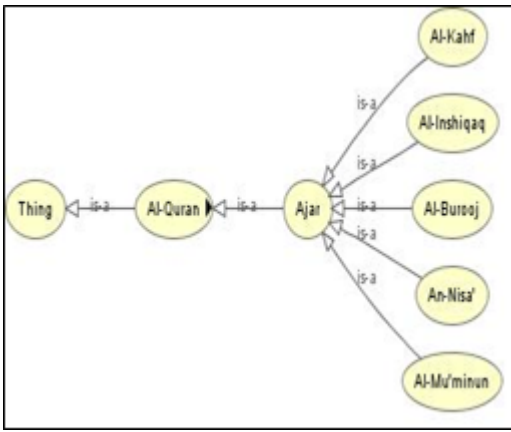
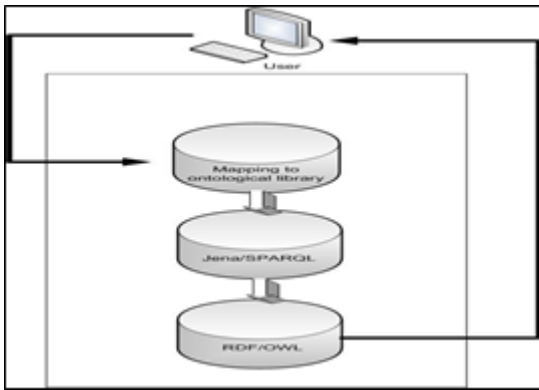Figure 15: Asserted Model Ajar (sibling classes)

IV. ONTOLOGY MODEL

Figure 16: User Model (Ontology)

User model shows how the process may complete on each user request. Suppose when a person issue a command/query to this information management systems the request goes to the ontological mapping process where keyword has been converted to the ontological library. Then send the same request to an API (Framework) for querying the ontological contents. The framework plays an important role that query to RDF or OWL. Once the required query has been completed, the semantic result forwarded to the users.
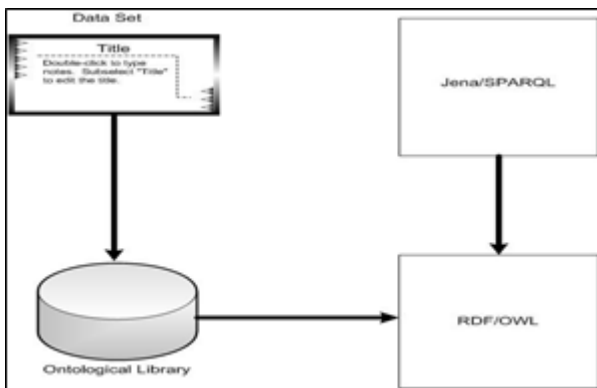

Figure 17: Development Model (Ontology)

Initially a dataset has been prepared for the required study means translation the Urdu verses into the English. Once the dataset has been prepared then it is converted to ontological components i.e. classes, subclasses, sibling classes and

individuals. Now these ontological components used to construct ontology for the required system by using the tool Protégé. The protégé store this information in to a RDF or OWL format and these format are used by the framework called Jena. Jena is a Java supported framework that provide an interface for the SPQRQL to the RDF or OWL.

V. RESULTS

In reality, it is very difficult to understand when Al-Quran was reviled; to know such information, a person must have to study the whole Quran. Allah says in the chapter 1, Al-Baqara "We reviled this Quran in the month of Ramadan" in another chapter Ad-Dukhan Allah says "We sent it (this Qur'an) down on a blessed night [(i.e. night of Qadr, Surah No: 97) in the month of Ramadan" also in the last chapter Al-Qadar Allah says: "Verily! We have sent it (this Qur'an) down in the night of Al-Qadr (Decree)".

See the gap, same message in different chapters. Now see the developed ontology how it get the required result.
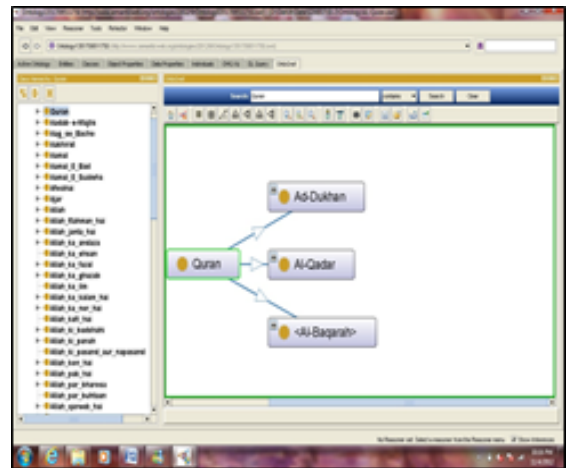

Figure 18: Result (Example 1)

It can be seen that by searching of word "Quran", three different Surah has been appeared that will be having the information about the Quran, now let's further drilldown these surah of Al Quran.
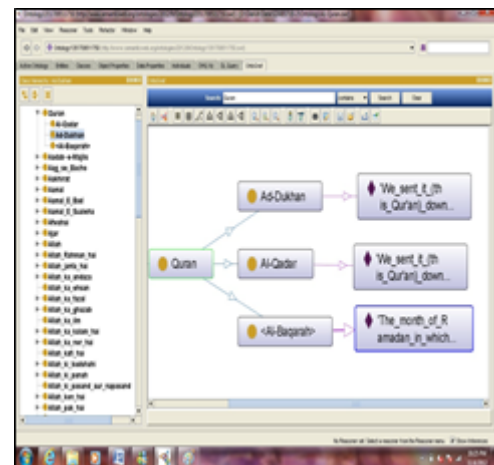

Figure 19: Result (Example 1-a)

We can see that the complete message of revolution of Al Quran exist in different chapters. Moreover, in very short time it is almost not possible to study the whole Quran.

Another good approach of the ontology is that we can search in the reverse order. Initially the search was taking place by topic now see the different look of this ontology. Suppose if we want to search Surah Al-Baqarah, that how many topics it covers. See this example below.
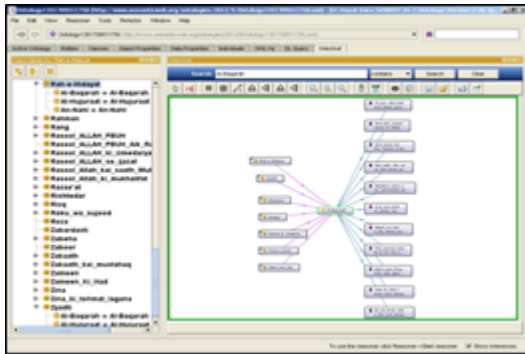

Figure 20: Result (Example 3)

By searching the "Al-Baqarah" list of topic has been appeared that covered in the same surah. Like Al-Baqarah covers Aamale e sualeha, Deen e Islam, Allah kon hy, Itikaf and etc. this is very helpful for those scholars or researchers who what study the Al Quran in a very short time.

Another example of Surah Al-Ma'idah, the same surah belongs to the following topic i.e.

Atta-at

Deen Kamil

Ehkamat

Zyadti

Allah Ka Gazab

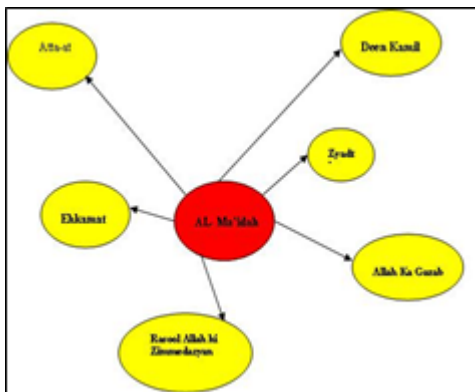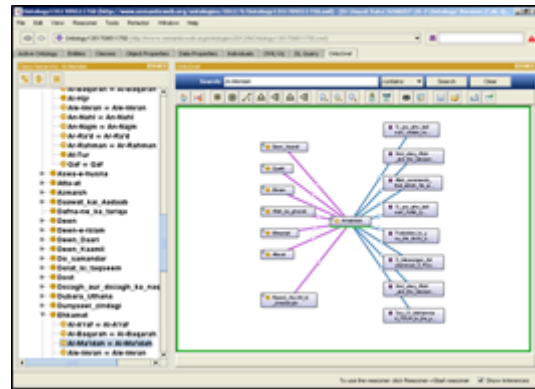Rasool Allah ki Zimmedaryan

Figure 21: Result (Example 3-b)

Figure 22: Result (Example 3-c)

See on the right side of this ontological model attributes are presented of Al-Baqarah.

VI. CHALLENGES

Different challenges has been faced while developing this ontology information management system, the first thing is collection of the dataset. The dataset too large for the required study is from Al Quran and it was very time taking work translate each Urdu ayah into English. There were around 110 to 120 topics and each topic consists of multiple ayah from different surah.

Secondly, lost of effort was done on the topic Pronominal Anaphora to sahih hadith; due to limitation of the time frame we left this topic and went to the ontological information management system. The main problem with this study was the dataset if we take an example of one of the book Saha e Satta (Sahih Bukhari) that has three sets (copies) and the dataset is too long in consideration of this time frame.

VII. CONCLUSION AND FUTURE WORK

The study of Ontological Information Management System of the Islamic concepts is now producing the required objective "Tafseer ul Quran Bil Quran" means the explanation from the versus of Quran from Al Quran. For this problem an ontological approach has been proposed in which a huge about of dataset has been identified from Al Quran. In consideration of the ontology construction we took the help of Urdu book "Brief indication of Al Quran" by Dr. Ather Muhammad Ashraf, the book contain list of topic like Aakhirat, Falah, Deen, Rasool, Rah e Hidayat and etc and in against of these topic there are multiple ayah from different surah of Al Quran. We translated these ayah into English and converted into ontological components like classes, subclasses, sibling classes and individuals and etc. with the help of ontological tool/software we construct the ontology on the required subject.

Truly, the study will facilitate those researchers, scholar and the lover of Islam who really want to study the whole Quran in very short time as the examples mentioned above.

In future, the first priority will be an interfacing to this research because it is very important the required product should come in the public forum so that the people can use it and should get the awareness what guidance and messages are from Allah to the Muslims. The next target will be related to a research studied in the literature review, the researchers has identified the 1st, 2nd, 3rd number and gender wise pronounce from Al Quran; suppose if Allah use any of the

pronounce in Al Quran, the researcher has identified the reason why that pronounce has been used and what that person in against of that pronounce. Ideally, I have targeted that research to sahih hadith, although the dataset is too long but again informative thing.

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