

Artificial Intelligence and Modern Information Technologies Applications in Islamic Sciences: A Survey

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Abstract— Considering the progress of Artificial Intelligence (AI) and the Information Technology (IT) we witness, during recent years, the spread of the application of these technologies in various fields. The research workflows, and in particular, the researches on Islamic sciences are not excepted from this issue. Several works have been carried out in order to exploit the AI and modern information technologies in the researches on Islamic sciences during recent years all over the Islamic regions and beyond them. It is very important to be aware of the latest developments in this field from different aspects like: 1) Benefiting from the advantages of modern technologies in the Islamic researches, 2) Reorganizing the educational plans in accordance with these developments, and 3) Introducing the new applications of AI in Islamic studies to the academics of computer sciences who may be interested in this field. In this paper, in the first step, a systematic review was conducted concerning more than four thousand international scientific articles related to applying AI and modern IT in Islamic studies, out of which 975 ones were chosen. At the same time, major institutions in this field were identified. In the next step the selected articles were classified in five thematic fields of 1) the Holy Qur'an, Tafsir and other related issues, 2) Hadith and Rijal Sciences, 3) Islamic Law and Jurisprudence, 4) the General Islamic Content in Social Media, 5) Other Subjects related to Islamic Sciences like Linguistics, History, Geography, etc. In the third step, the articles of each category were classified in a number of major subcategories that amount to 73 in total. Finally, in the last step, the distinctive articles in each field were introduced briefly

Keywords artificial intelligence (AI), information technology (IT), digital Islamic sciences, machine learning, intelligent processing of Islamic content, systematic review.

I. INTRODUCTION

With the development of the artificial intelligence (AI) and the information technology (IT), in the recent years we witness the spread of the application of these technologies in different applied ranges.

In many operational and scientific fields, the role of this kind of technology has been – to some extent – intense and effective in such a way that their efficient progress and development cannot be depicted without making use of AI and modern IT. The research processes, and in particular, the Islamic researches are not excepted from this issue; so that in the present age, named 'the Age of Information', the community of the Islamic researchers agree with the effectiveness and proficiency of this kind of modern technology in the research arena.

In line with maximum exploitation of AI and the modern IT in the researches of Islamic sciences during the recent years, and in the farthest spots of the Muslim Community, we witness many efforts in this field. Acquaintance with the

general atmosphere of the latest progresses in this field can be of importance from various aspects.

In the Islamic researchers' point of view, the acquaintance with these progresses lets us benefit from their advantages during the current research processes such as speed and comprehensiveness. In addition, it can depict new horizons for defining the modern needs and or the method of addressing and resolving the problems of the Islamic researches.

On the other hand, this level of knowledge can cause - in the macro-levels – to conscious direction and appropriate strategic planning for the educational and research processes.

From Computer scientist' point of view, familiarity of the developers and academic researchers of this filed, along with various applications in the arena of applying the modern technologies in the researches of Islamic sciences, can attract the attentions to this branch and will cause to identify the needs and the shortcomings more than ever. In addition, this way would create new trends in this arena.

In this study, a systematic review was carried out in hundreds of international scientific articles related to applying AI and modern IT in Islamic Studies. These articles were classified from different dimensions, and the distinctive studies and the active centers and institutions in this filed, also were addressed.

II. ARTICLE CHOOSING PROCEDURE

To identify the target articles the Systematic Review and Inclusion and Exclusion Criteria were applied. In the first phase a list of keywords appropriate to different branches of the Islamic sciences including the Qur'an, exegesis, hadith, Islamic law (fiqh), etc. was made. Based on the made list, many machine searches were carried out in the major indexing databases, in an international scope like SemanticScholar, and then the retrieved articles along with their peripheral information were extracted and recorded.

In this phase 4137 articles were detected. using clustering techniques based on titles and abstracts, the irrelevant articles were detected and excluded in the next phase. What remained after this filtration, was 1511 articles, regarded as relevant articles. In the next phase the unspecialized and low-quality articles were detected and excluded. At the end of this phase 975 articles were finally selected as reviewable

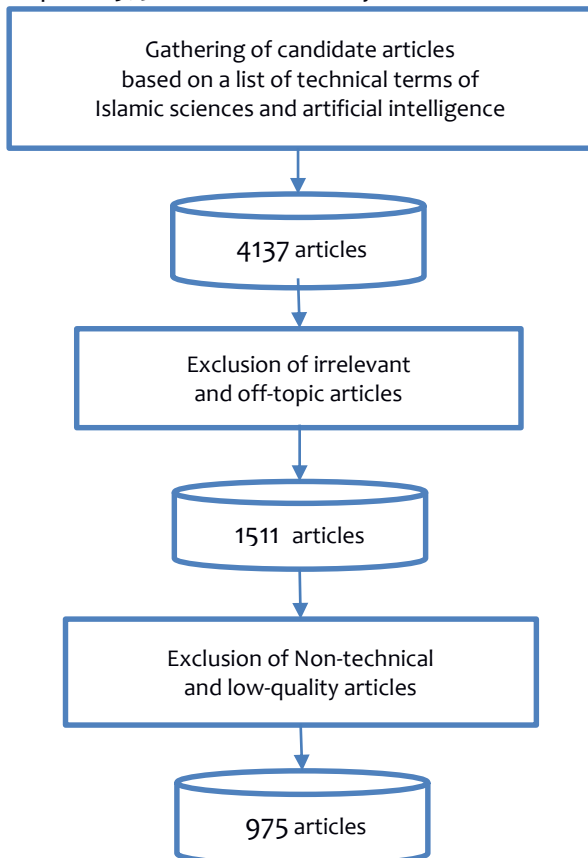


Fig. 1 The flowchart of article selection process

articles. The flowchart of the article selection process is shown in Fig. 1.

III. STATISTICAL ANALYSIS OF THE SELECTED ARTICLES

In this study the selected articles were analyzed from different aspects. From the aspect of the publication date, the required articles have been published within the last two decades. 30 articles were published last two years (i.e. 2022-2023). The chart of distribution of articles by year is displayed in Fig. 2.

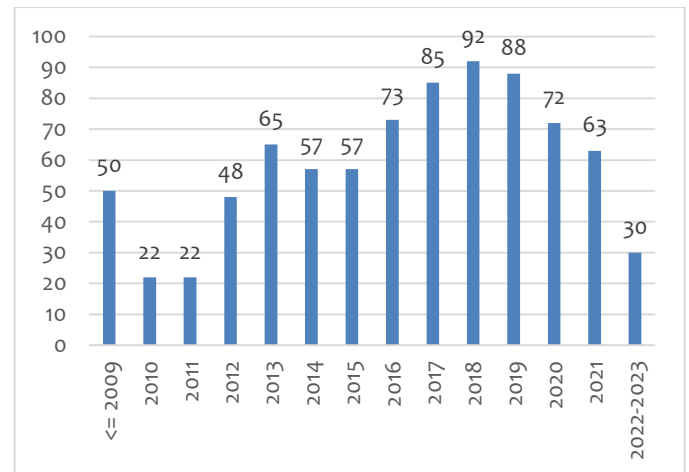


Fig. 2 Chart of distribution of articles by year

The selected articles are of different conditions, from the aspect of the rate of reference by other researchers in the international level. The average reference rate of each article is almost 9 cases, while the maximum reference rate is 140. The chart of distribution of articles based on reference rate is shown in Fig. 3.

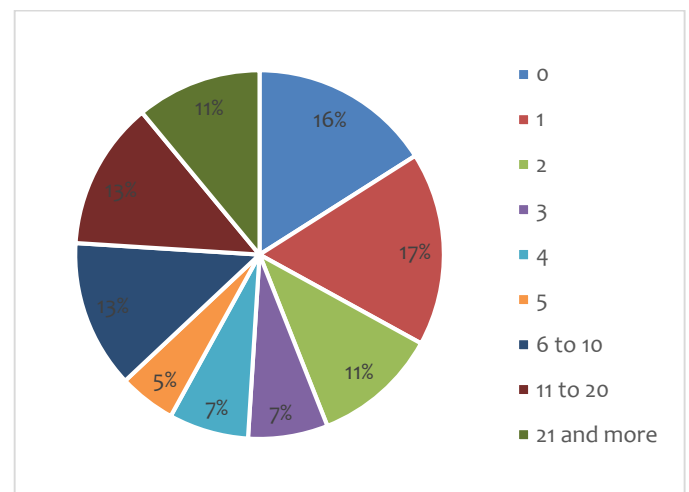


Fig. 3 Chart of distribution of articles based on citation rate.

From the aspect of geographical range, it is notable that according to the review performed, names of many Muslim countries, and even non-Muslim countries, are seen in this field; such countries as Malaysia, Iran, Indonesia, Algeria, Tunisia, Egypt, Pakistan, Palestine, Morocco, Saudi Arabia, Iraq, Jordan, Lebanon, India, Turkey, UK, Germany and Austria.

The great majority of the articles were published in computer journals and conferences, and just a few of them were published in specialized journals of Islamic studies in an international range. However, there exist a few international conferences exclusively deal with the application of IT and its different branches in the Islamic studies. Nearly 0.1 percent of the selected articles have been published in such journals and conferences.

One of these conferences is International Conference on Information and Communication Technology for the Muslim World (ICT4M) that has been held almost biennially, since 2010 by International Islamic University [of] Malaysia (IIUM) in different countries including Malaysia, Indonesia and Morocco. Another specialized space to publish articles is International Journal on Islamic Applications in Computer Science and Technology (IJASAT) which has been registered in Design for Scientific Renaissance (DSR) in Malaysia in 2013.

Similarly, certain peripheral workshops in reliable conferences have dealt particularly with religious and Islamic applications. Among them is 'Language Resources and Evaluation for Religious Texts (Lre-Rel)' that was held in 2012 under the international conference of 'Language Resources and Evaluation Conference (LREC)'. It is notable that recently in the conference of LREC held in 2022 also under 'Open-Source Arabic Corpora and Processing Tools (OSACT)' a certain challenge for development of the Qur'anic Question Answering systems has been defined that has allocated some of the articles of this field to itself.

It is worth mentioning that the University of Taiba in the Holy city of Medina held an international conference in this field in 2013 under the title of 'Taiba University International Conference on Advances in Information Technology for the Holy Qur'an and its Sciences'.

Note that these kinds of special conferences have an important role in spreading and propagating of AI & IT applications in Islamic Studies.

IV. THEMATIC ANALYSIS OF THE SELECTED ARTICLES

After selecting 975 articles about the application of AI and the modern IT in the Islamic researches, the process of thematic classification of the required articles was accomplished through analyzing the title and the abstracts of the selected articles.

At the beginning, all of the main subjects of Islamic sciences were considered as thematic branches. However,

during the review process some new subjects were also defined. At the end of the classification task, taking the number of the articles below each branch into consideration, bigger branches were distinguished, and the related smaller branches were merged with one another.

Finally, six main thematic branches were defined. The main categories and frequency of the article under each of them are shown in Fig. 4.

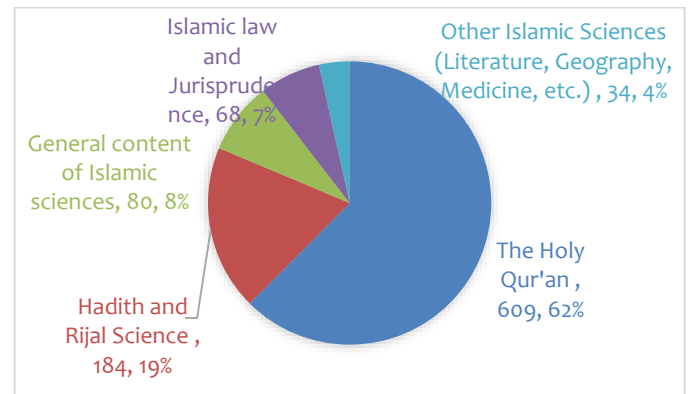


Fig. 4 The chart of thematic distribution of the articles

A. The Holy Qur'an

As it can be viewed in the chart, the most frequented thematic subject is Analysis of the Holy Qur'an'. It encompasses 62 percent of the articles of this field, which amounts to 609 titles. Considering the high quantity of the articles published in the field of the Holy Qur'an, the articles related to this branch have been classified in a minor level and are presented in a comprehensive thematic tree in the Fig. 5.

Explanations about any of the determined subcategories are given below.

Comparison of the Quran content with other texts is one of the subcategories of analyzing the content of the Holy Qur'an that substantiation of the excellence of the content of the Qur'an compared with hadith literatures can be considered among its goals.

According to genuine Islamic tenets, there is no doubt in the point that the words of the Holy Qur'an, as well as their concepts, have been compiled and composed through the divine revelation. In the other hand, the hadith contents have merely divine contents, however, their words have been compiled by the Prophet Mohammad (PBUH). Nevertheless, some others have mentioned for long the doubt that the words of the Qur'an have been arranged and compiled by the Prophet himself. To refute this doubt, taking advantage of the techniques of text processing among which is the 'Authorship Authentication' processes, a meaningful difference between the compilation style off hadiths and that of the Qur'anic verses has been proved.

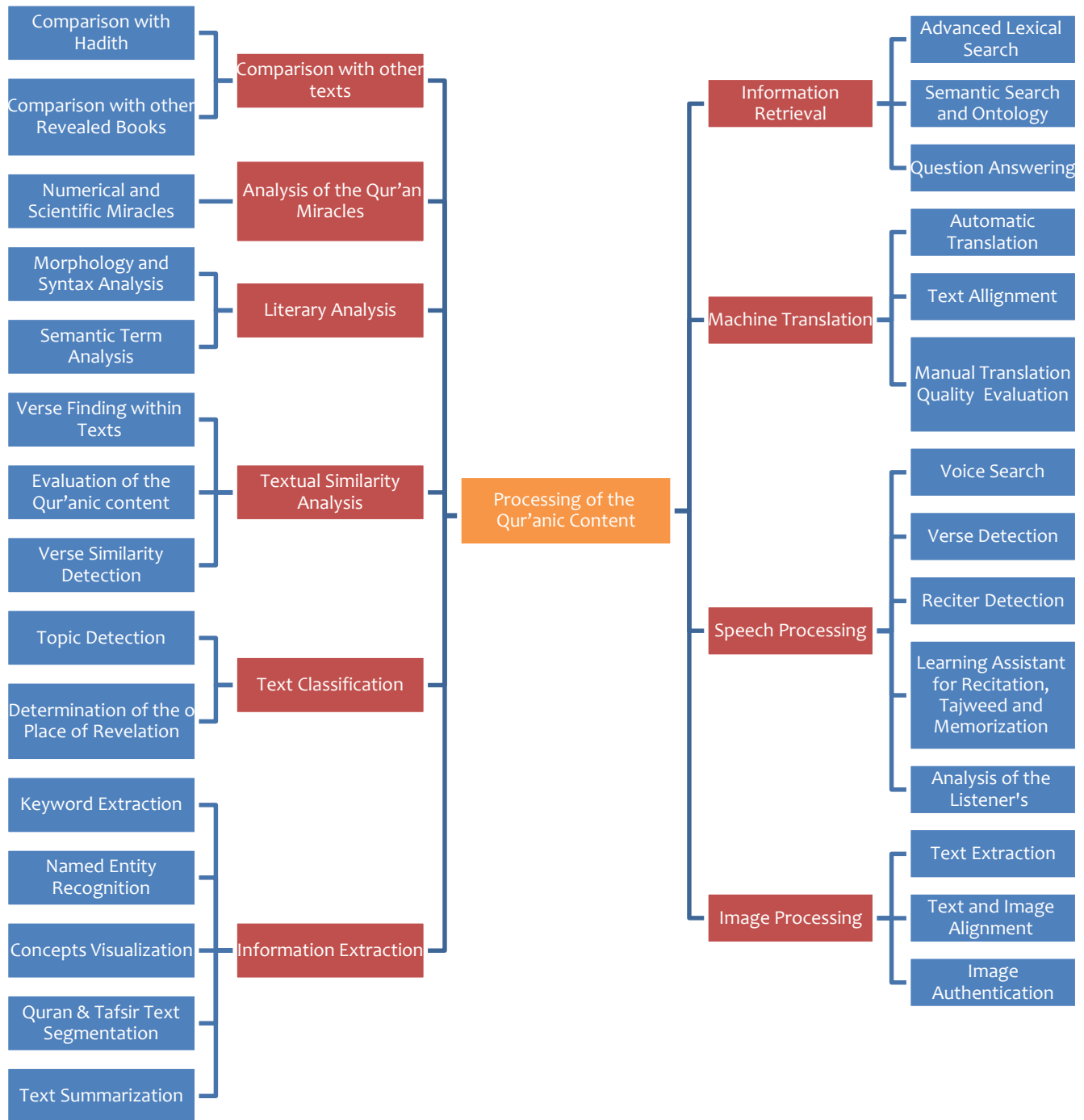


Fig. 5 The Thematic Comprehensive Tree of the Intelligent Processing of the Qur'anic Content

Among other goals is the review and analysis of shared ideas and contents between the Qur'an and other revealed books. Some of the articles have dealt with this field [1]-[6].

Analyzing the miraculous aspects of the Holy Qur'an is another subcategory of the analysis of the Qur'anic content. Establishing the infrastructure for examining the numerical miracles in the content of Qur'an, as well as the building the

related ontology and classification of different cases of scientific miracles of the Holy Qur'an are among the cases dealt with by a group of the articles of this field. [7]-[8]

Literary Analysis is another category in which a group of the articles have dealt with. The main subcategories are as below: Word Morphological Analysis, Selection of the best morphological analysis using Disambiguation techniques,

Syntactic Analysis of the Phrases, Etymology, Stemming and Lemmatization of the Qur'anic Words'.

Some other intelligent analyses made on the Qur'anic words mention can be made of Anaphora Resolution and Analysis of Pronouns' Referent, Detection and Analysis of Qur'anic Multi-Words Expressions, Examining of the Word Collocations, and Automatic Compiling of Qur'anic Glossaries. [9]-[15].

Among other subjects of this field, mention can be made of **Textual Similarity Analysis** in the Qur'anic Content. The Automatic Identification of Qur'anic Text, which can frequently be applied to both specialized and general domains, is another subcategory of this subject.

Detection of the Qur'anic content and labeling it between the texts and determining the address of the verses are among the applications that are used with different goals. The authentication of the validity of the Qur'anic texts can be considered as a strategy for evaluating contents published in different platforms of the social media.

Similarly, other research applications including detecting lexical similarity between Quranic verses, as well as more complicated analyses such as Semantic Textual Similarity on the level of words and also on the level of the verses of the Holy Qur'an have also been considered in this thematic class. [16]-[20].

One of other main subcategory is **Text Classification**. Different applications in the field of Qur'anic content based on Text Classification have been studied. Qur'anic verses and Tafsir Topic Detection, Identifying the place of revelation of the verses and chapters are among the most major cases of these applications. [21]-[24].

Information Extraction is another major subcategory. The automated Keyword Detection, and Named Entity Recognition such as person names, geographical names, and the names of the tribes, as well as the visualization of the concepts of the Qur'anic verses are among the frequently applied studies of this branch that have been developed concerning the content of the Tafsir in addition to the content of the Qur'an. Other various applications such as segmentation of the Qur'anic verses and Tafsir, as well as summarizing the content of the Tafsir lie in this group. [25]-[29].

Among the articles reviewed, many articles have dealt with the subject of **Information Retrieval** in the Qur'anic content and improvement of the quality of lexical and semantic searches. Some of main applications of this field are as below: Automated query expansion, improvement of ranking the results, building and exploiting knowledge-bases like Wordnet and Qur'anic ontology with general or particular domains such as natural concepts, Qur'anic stories, Development of Question Answering Systems within the

text of the Holy Qur'an and the content of the Tafsir with the capability of searching in the natural language. [30]-[37].

The next subcategory is **Machine Translation**. Presenting a more precise translation based on new machine translation techniques, Comparing the translations of different translators with one another with the purpose of analyzing the quality of human translations and detecting the referenced translations and finally, Automatic Word Alignment between the words of the main verse and the words of the human translations are also of the classified applications in this branch. [38]-[40].

Considering the fact that the audio Qur'anic content is very frequently used, a remarkable amount of the published articles in the field of application of AI and IT in the Islamic content has been classified under the subcategory of **Speech Processing**. The capability of searching in the audio Qur'anic content, detection of the recited verse, and the automated detection of the reciter are among the subcategories of this section. In addition, numerous studies have been conducted in the field of development of the Intelligent Assistant for teaching recitation, Tajweed evaluation and memorization of the Qur'an for ordinary individuals and even the blind people. The most frequent application of the intelligent capabilities in these systems, with the purpose of analyzing and automated Recitation Evaluation of a learner of Qur'an recitation from the aspect of the considerations of reading and the Qur'an memorization, orthoepic points, and the way of pronouncing the letters and even the method of articulating the Maqam melody types. Some other studies that have dealt with the analysis of the parameters of electroencephalogram (EEG) of the individuals while listening to the recitation of the Qur'an, are among other researches classified in this subcategory. [41]-[48]

The last group of the subcategories of Qur'anic Content Intelligent Processing belongs to **Image Processing**. Extracting text from the image of the Qur'anic content out of the printed texts or calligraphic manuscripts, alignment of the text of the Qur'an with the corresponding region of the image at the level of 'word' or 'line', as well as evaluation of the authenticity of the printed image of Qur'an considering the exactness of letters and diacritics are among the topics dealt in the studies within this collection. [49]-[53].

B. Hadith content

After reviewing the applications of AI and modern IT in Qur'anic content, the second main kinds of Islamic contents is Prophetic traditions or Hadith. analyzing the content of the hadiths as well as the Rijal-oriented information which includes 19 percent of the articles.

In Fig. 6, the Thematic Comprehensive Tree of the intelligent processing of the Hadith-oriented content is shown.

The first subjects of the hadith-oriented intelligent processing group is the **Comparison of Hadith Texts with other texts**. Such subjects as Stylometry Analysis and examining the discrimination between the hadith content and Quran or non-hadith content are among other studies addressed in some of the articles. [54]-[56]

Analysis of Hadith Words is another subject of this subcategory. In the articles of this group, in addition to machine parsing, morphological and syntactical analysis of hadiths literatures that is considered as infrastructural task, certain efforts have also been made with the purpose of Word Sense Disambiguation base on the adjacent words analysis after preparation of required dataset. [57]-[61]

the hadith contents published in different platforms like Social Medias. Similarly, other research applications including lexical and semantic similarity detection of the hadith and clustering the hadiths have also been taken into consideration in this group. Applying this kind of Recommender Systems with the purpose of extend the content range can play a remarkable role in expediting and deepening the processes of hadith scholarship of the researchers. [62]-[68]

The next subcategory is **Hadith Classification** that is among the key topics of this field. Classification of texts as one of the main machine learning techniques has various functions in processing the content of hadith. Automated identification of the topic of the hadith is among the most

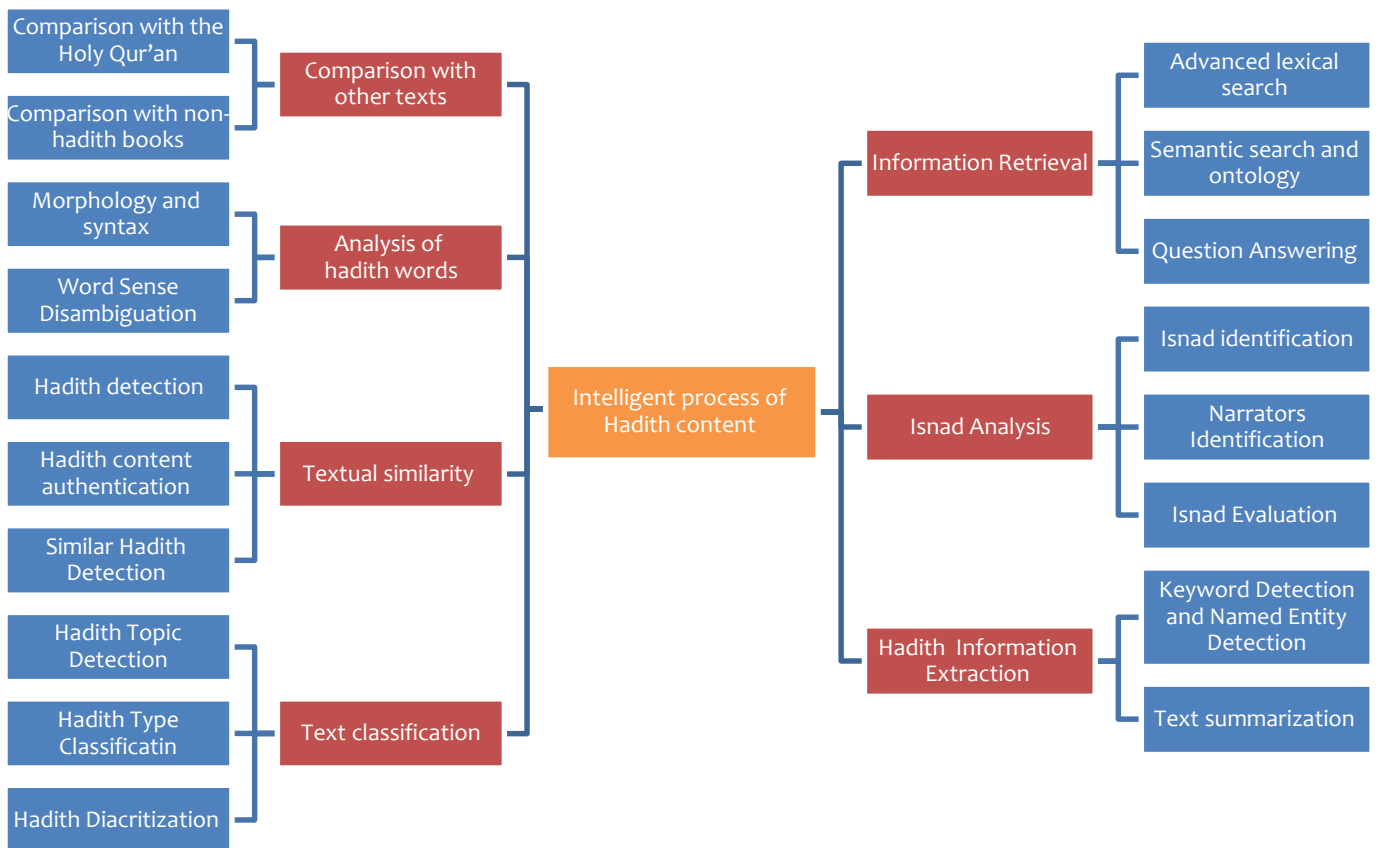


Fig. 6 The Thematic Comprehensive Tree of the Intelligent Processing of the Hadith-oriented Content

Among the frequently applied subjects of this branch, mention can be made of **Hadith Textual Similarity Detection**. Identifying hadith text boundary between the texts with purposes like providing the possibility of reference to the translations, commentaries and other information of the hadith are among the applications. Other subjects such as Hadith Authentication can also frequently be applied in the general platforms. This kind of capabilities, in addition to saving the times for data labeling process, can be considered as an automatic procedure for authenticity assessment of

important functions of this kind, which have been examined based on the collection of different thematic set. Some of other studies have dealt with tagging the hadith kind from other aspects. Distinguishing the hadith denoting the obligation of an act from the hadiths denoting prohibition, as well as the automatic discrimination between the hadiths that give good news and the hadiths that warn based on Sentiment Analysis techniques, are instances of these cases.

Among other subjects attached to this branch, we should mention Automatic Diacritization. It is mostly based upon

the machine learning concerning an appropriate amount of the diacriticized hadiths in a way that the machine will be able to determine the most appropriate kind of diacritics for every letter of the word considering such indications as the collection of the preceding and next letters. [69]-[75]

Among the articles of processing the hadiths content, many articles have dealt with the subject of **Information**

articles, in the next step, making use of some techniques like Sequential Pattern Mining to perform Narrator Name Disambiguation based on the previous and next narrators or transmitters and their temporal analyses. Many articles have concentrated upon the issue of Isnad Authentication and having made use of different techniques such as Expert System, Decision Support System, and Classification or

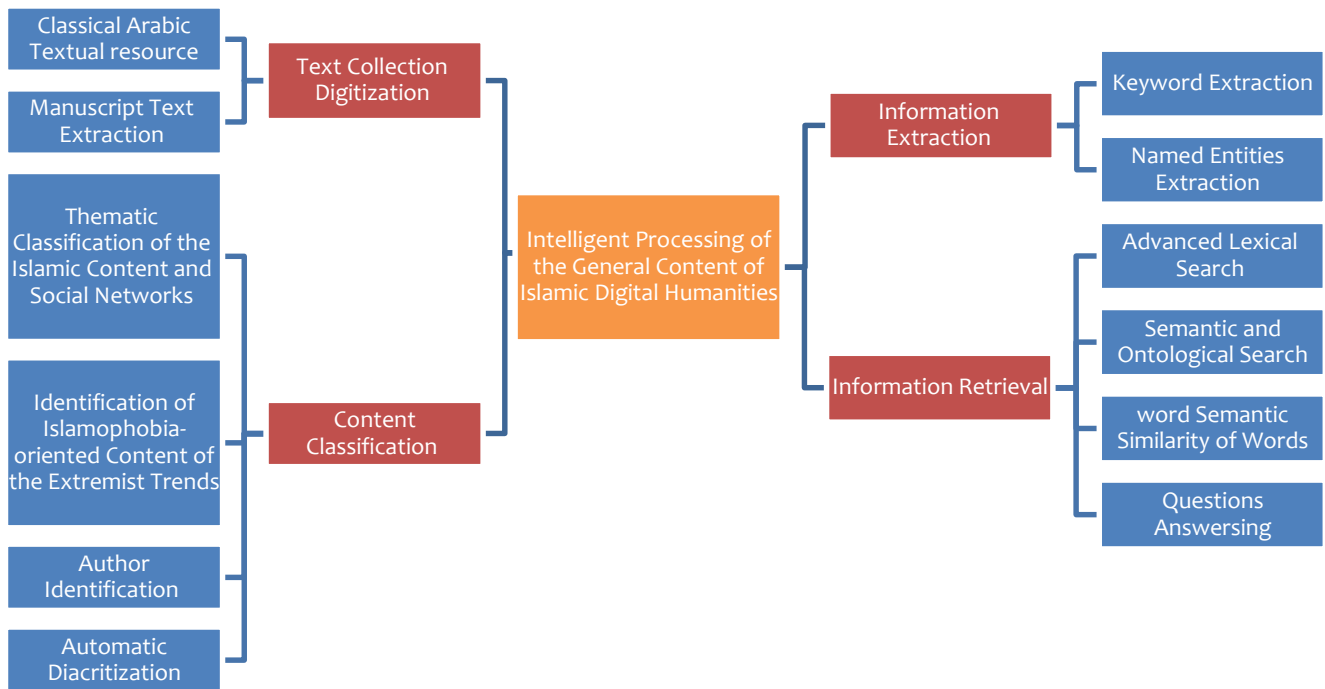


Fig. 7 Thematic Comprehensive Tree of the Intelligent Processing of the General Content of Digital Islamic Sciences

Retrieval and the improvement of the quality of the lexical and semantic hadith search engines and the content of their translations and commentaries. User query Spelling Correction, result ranking improvement, the capability of Cross-lingual search, building and exploiting the general Knowledge-bases like Wordnet and ontology, as well as building of ontology with special purpose such as moral hadiths, du'as and (invocations, development of Question Answering Systems with the capability of searching in natural language are all among the instances of applying the AI and Natural language processing to the hadith content. [76]-[82]

Among the main subjects of processing hadith content, is **Hadith Isnad Analysis**. Many articles have dealt with this issue. The intelligent analysis of the isnads of hadith has different aspects. Some of the articles have dealt with the field of fundamental processes such as Hadith Text Segmentation and determining the text boundary that concerning the isnad, through apparent models and or the advanced techniques of the machine learning. Some other

Opinion Mining algorithms and have achieved acceptable results in this field. [83]-[94]

The last subject among the subcategories of processing the content of hadith is **Information Extraction** from Hadith Literatures. Automatic Keyword Extraction, Named Entity Detection such as person names, geographical names, dates and times and extracting them from the content of hadiths as well as other applications like segmentation the text of long hadiths, summarization of hadiths, translations and commentaries related to them, all belong to this group. [95]-[98]

C. General Content of Islamic Digital Humanities

After the branch of the Qur'an and Hadith, the subject of Processing the **General Content of Islamic Digital Humanities**, is another field encompassing some 8% of the articles. In Fig. 7, the Thematic Comprehensive Tree of the Intelligent Processing of the General Content of Islamic Digital Humanities is shown.

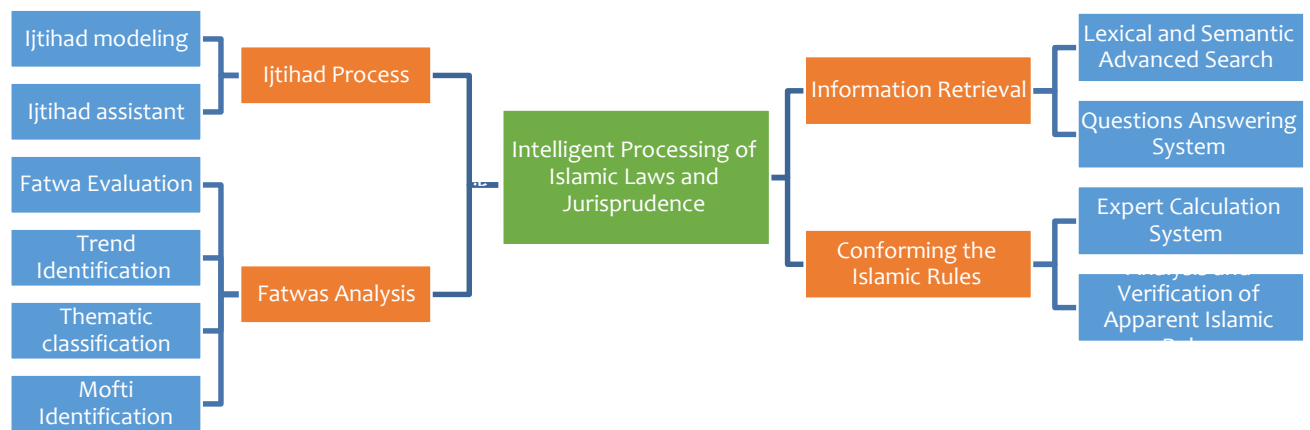


Fig. 8 Comprehensive Thematic Tree of the Intelligent Processing of Islamic Law and Jurisprudence

The first group of the articles of this thematic branch, has dealt with **Text Collection Digitalization** based on the successful model of 'Digital Humanities'. Standardization of the storage structure of textual and visual contents of Islamic sciences and producing appropriate corpora for launching the processes of machine processing are among the subjects of this branch. In addition, the researches related to the applicable issues such as extraction of text from images of Islamic resources and also manuscripts have been collected in this branch. [99]-[104]

The next group consists of articles dealing with the subject of **Content Classification**. The automatic classification of the content of Islamic sciences, classification of the questions in Islamic Question Answering System, and even the analysis of the content of social media, and identification of contents with Islamophobic purport or belonging to extremist currents are among the issues dealt with in this branch. Identification of the author for ancient texts or even the newly published contents in the Social Medias or Question Answering Systems are also among other applications based on the auto-classification techniques. In addition to the abovementioned instances, a number of the researches dealt with the issue of text diacritization, that were also attached to this branch. [105]-[112]

Another group of the articles have dealt with **Information Extraction** from the general Islamic content and the Classical Arabic texts. Such subjects as Keyword Extraction, and 'Named Entities Extraction' such as names of the individuals have been among most distinctive subjects of the researches in this field. [113]-[117]

Information Retrieval from the general Islamic content is another subject that has attracted the attention of some of the researchers. Improvement of the quality of lexical and semantic search engines for the general content of Islamic

sciences are among the major subjects in this field. The query expansion based on Soundex Arabic Word Similarity, results ranking enhancement, development of semantic search based on the similar words, building and exploiting word knowledgebase like Wordnet and ontologies, development of the Question Answering Systems, are among the instances of applying the AI and the Data Science in this filed. [118]-[122]

D. Islamic Law and Jurisprudence

The Other main subject of **Islamic Law and Jurisprudence** is another field encompassing 6% of the reviewed articles. In Fig. 8 the comprehensive thematic tree of intelligent processing in this field is shown.

The articles of the intelligent processing in Islamic Law and Jurisprudence have been divided in the four main branches. Explanations about each case are given as below.

The first group consists of those articles that have dealt with the subject of **the ijthad process**. Some of these articles have attempted to make a model of the ijthad process in the form of algorithm, and 'Formal Logic' so that they would prepare the preliminaries of the machine analyses within the jurisprudential sources, while some other articles of this group have had efforts by making use of such techniques as 'Case-based Reasoning' and certain types of 'Reinforcement Learning', in line with assimilating the ijthad process by means of the machine and getting access to the 'Islamic Jurisprudence Expert System' or the 'Intelligent Jurisprudent Assistant'. [123]-[127].

The next group includes articles that deal with **analyzing the Fatwas** from different dimensions. By popularization of Islamic Social Medias and QA platforms, the evaluation and ascertaining the authenticity of the issued fatwas has gained more importance. Therefore, some of the articles of this field have dealt with the evaluation and authentication of

the fatwas, while some others have examined the jurisprudential questions and inquiries in the course of time and based on the techniques of the 'Trend Analysis' they have provided a platform to detect new jurisprudential needs of the Muslim communities. Another group of the articles classifies the fatwas thematically. And the last group of these articles has had attempts in order to identify the issuer of the fatwa on the basis of analyzing its writing style using stylometry methods. [128]-[132]

The **Information Retrieval** from among the contents of jurisprudential sources is another main subject. Enhancement of lexical search engines through customizing the search results ranking, providing the possibility of 'Semantic Search' in the jurisprudential content, Keyword Extraction have been of the main subjects of these articles.

Similarly, the building and exploitation of jurisprudential wordnet and ontologies, generally or exclusive for a particular thematic range, development of the Question Answering Systems with the possibility of searching in natural language and creating Chatbots are all of the instances of application of the AI and the data science in the jurisprudential contents. [133]-[137]

Another group of the researches have dealt with the phase of **Conforming the Islamic Rules**. They have attempted, by taking advantage of AI and modern technologies to analyze the implementation of jurisprudential fatwas and application of Sharia in Muslims actions. On these lines, some of the articles have dealt with establishing an expert system to assist the Muslim obligees in particular issues which are based on calculation or some clear rules, and develops a machine assistant in such issues as Inheritance Calculation System, and the Zakat Calculation System. In addition, some of the articles have gone beyond the simple expert systems, and have benefited from more advanced algorithms of machine learning, so that they presented an intelligent assistant in more particular issues. For instance, they have suggested intelligently the amount of the earnest money in the 'Earnest Sale' (bay`al-`arabūn) after having the different indications of the issue taken into consideration.

Furthermore, based on modern concepts of IT and E-Commerce such as 'Smart Contract' and 'Blockchain', some other articles of this group have suggested a secure and transparent infrastructure for the turnover of the religious funds and Sharia finances (i.e. the khums), that can also be followed by gaining more confidence of the obligees.

Some other articles of this group deal with evaluation and authentication of the Sharia in action. 'Assistant Prayer Teaching' on the basis of motion sensors and the 'Internet of Things (IOT)', analyzing the dress code and hijab condition by taking advantage of the techniques of image

processing, analyzing the condition & safety of religious ceremonies, as well as the management of population intensity during congregational rituals such as Haj or pilgrimage to Mecca are among the instances of these studies. [138]-[143]

E. Other Contents of Islamic Sciences

Finally, other articles that could not be classified in the previous main categories, lay under a category named '**Intelligent Processing of other Contents of Islamic Sciences**'. This branch encompassed 4% of the reviewed articles. In Fig. 9, the Thematic Tree of Intelligent Processing in the Content of other Islamic Sciences is shown.

The articles of Intelligent Processing in the Content of other Islamic Sciences have been divided in the three main subcategories that are explained below:

A group of articles have dealt with discussions related to '**Literature**', '**Linguistics**' and '**Poetry**' between the Islamic contents. The analysis of changing the meaning of words over the time, producing glossaries based on identifying different meanings and senses of a word, and developing morphological analyzer of the classical Arabic are among the subjects relevant to literature and linguistics. Poem similarity detection, extraction of the poetic content between the texts, classification of the poems based on temporal course, as well as the detection of the poets, are among the subjects dealt with in this category. [144]-[149]

Some other articles have dealt with '**Historical**' and '**Geographical**' issues. The scholars of this field have gained remarkable achievements by taking advantage of the techniques related to 'Spatial-temporal Data Analysis'. 'Automatic Event Extraction', between the texts and analyzing them in different temporal periods, extracting and analyzing the biographies, analyzing the frequency of the names of palaces and geographical positions and the relation of the individuals with the places within the historical texts with the purpose of detecting the effective places in the course of different historical limits, as well as the development of the historical QA system and teaching historical facts, are among the most important considerable subjects in the field of history and geography.

It is worth mentioning that in addition to history scholarship, certain of the studies have made use of the progresses of IT in this field for the current requirements of the Muslims in general. Analysis of the geographical locations of the mosques, producing 'Geographical Information Systems' corresponding them for different applications, as well as the analysis of dispersion of Muslims internet usage in different regions, are among these cases. [150]-[153]

As the last subject, some of the articles have dealt with issues of **Islamic Medicine**. Development of an Expert System to offer the recommendations of the Islamic

Medicine to the patients, building ontology network out of medical and medicinal concepts in the Holy Qur'an and the Islamic content, as well as establishing information retrieval systems and the advanced search for this kind of content are among subjects dealt with [154]-[156].

V. CONCLUSION

The analysis of the trend of the growth of research and the rate of producing articles in the field of applying the AI and modern IT in the content of Islamic sciences during the past decade shows, more than ever, the attention of the researchers to this field.

The examined articles can be analysed both qualitatively and quantitatively. From the aspect of quality, it can be said that in cases the researchers of AI due to their personal information or close relation with Islamic centers have enjoyed an appropriate level of knowledge concerning the content of Islamic sciences, they could attain effective achievements in this field. This matter suggests the necessity of enhancement of the familiarity level of the experts of the field of AI with the content of the Islamic sciences, as well as the existing challenges and requirements with the purpose of improving the qualitative level of this kind of researches.

In a quantitative point of view, as indicated in Figure 4 (Thematic Distribution of the Articles) many activities have been done in the field of the analysis of the content of the Qur'an and hadiths. However, in other branches of Islamic sciences including exegesis of the Qur'an, Islamic law (fiqh) and legal theory (uṣūl al-fiqh), and the historical texts, it seems necessary to detect the requirements and redefine the existing problems in the prevailing forms of AI. On the other hand, according to the investigations, it becomes clear that one of the effective factors in increasing the rate of producing knowledge (in this field) is holding international specialized conferences in this field.

From the aspect of geographical distribution of the published articles, it can be said that the Muslim countries in east Asia such as Malaysia, Indonesia, as well as the western institutes and universities with their orientalist-oriented point of view and that of Islamic scholarship, have allocated a high percentage of the international articles to themselves.

Therefore, considering the necessity of introducing the achievements in an international level, as well as trend making and synergy between us and other researchers and scholars of the Great Muslim Community, it seems that the real status of the Islamic Republic of Iran in this field, that is the highest rank in an international level shortly accessible through strategic target determination by seminary institutions, universities and the active centers in this field. At the end of this article, it is notable that one of the

fundamentals and requirements of most of the processes of machine learning and AI is the existence of a standard data corpus that has been labeled by man in the required issue. For this reason, a purposeful investment in the field of producing and publishing the standard data corpus in different Islamic issues can play the role of a propellant, and have a remarkable part in development and blossoming the scientific and operational atmosphere of digital Islamic sciences and the exploitation of the artificial intelligence and the modern information technologies in the content of Islamic sciences.

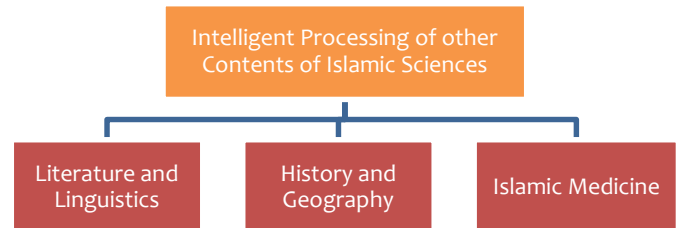


Fig. 9 The Thematic Comprehensive Tree of Intelligent Processing in the Content of other Islamic Sciences

VI. ACKNOWLEDGEMENT

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VII. CONFLICT OF INTEREST

The authors declare that there is no conflict of Interest

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