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(54) Title: COMMUNICATION ENGINEERING, INFORMATION TECHNOLOGY AND ARTIFICIAL INTELLIGENCE IN HADITH TERMINOLOGY SCIENCE

(57) Abstract: The invention relates to using Communication Engineering, Information Technology, and Artificial Intelligence in Hadith Terminology science in order to give people more accurate information about degree of correctness of the Hadith and its feature is; Prophet (SAWS) the signal source (1) that expresses the data of the words to the receiver (4), the transmitter (2) that receives the data contained in the receiver (4) and transfers it to the processor, the transmitter (2) contains a processor containing artificial intelligence algorithms that evaluate the hadith with 'Knowledge of Men' (7), which will receive a stylistic rating indicating the degree of honesty and reliability of the narrators involved and calculate the degree of reliability of the relevant hadith.



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COMMUNICATION ENGINEERING, INFORMATION TECHNOLOGY AND ARTIFICIAL INTELLIGENCE IN HADITH TERMINOLOGY SCIENCE

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Technical Field:

The invention relates to using Communication Engineering, Information Technology, and Artificial Intelligence in Hadith Terminology science in order to give people more accurate information about degree of correctness of the Hadith.

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State of the Art:

The starting from Hadith science was in the first Century After Hijrah (AH), where the companions of prophet Muhammad (SAWS) were collecting his sayings and transferred it to the layer of the followers who didn't meet prophet Muhammad (SAWS) and further to the followers of the followers. At that time, they were not paying huge attention to who is transferring from whom (Al-Sanad) and who is taking responsibility for the registration and saving the sayings 'Al-Hadith'. This stage in Hadith's development history is known as (The Collection and Transferring Stage). In the second century AH, the extension of the Islamic country and the conversions of hundreds of thousands of people into Islam, raise the need of registering the chain of the people who have transferred Al-Hadith. This chain of people is defined in Arabic as Al-Sanad. In this stage, each record of the saying of the prophet Muhammad (SAWS) must have two things in order to be considered as a reliable correct Hadith: The material of the saying itself (called in Arabic: Al-Matn) and the chain of the people who has transferred the material of the saying (Al-Sanad). This conjures the (Recording and Registering Stage). In the third century AH, Al-Hadith science has been developed significantly and split mainly into two main branches. In the first branch, many efforts and scientific contributions were focusing on the collection of the sayings of the prophet Muhammad (SAWS) and registering the corresponding chains of people who have transferred these sayings. This branch is known as the science of Hadith Transfer (in Arabic: Al-Hadith Rewayah). This branch was led by the Collectors

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(in Arabic: Al Huffath). The main contributions in the second branch were focusing on judging, altering and classifying the correct and considerable sayings of prophet Muhammad (SAWS) from the huge, collected sta. This branch is known as the science of Hadith Awareness (in Arabic: Al Hadith Derayah) and it was led by the

5 Correctors/Producers (in Arabic: AlMusa7e7ien/Al-Mukhrrejien). The Hadith Correctors/Producers have the technical task of classifying the huge number of Sayings signed to Prophet Muhammad (SAWS) utilizing the available logical tools. They have initiated the guidelines, rules and fundamentals which must be followed in order to define the grade of the correction of each Hadith. These guidelines, rules and fundamentals

10 conjure what is called the science of Hadith Terminology (in Arabic: Mustalahu-l-Hadieth). In the Eighth and Ninth Centuries AH, the most efforts of the scientists in Hadith have been directed into the classifications of the Hadith based on the topics and writing the books and references to clarify and interpret the Hadith. (In Arabic: Al-Tabwieb Wal-Sherouh). From the Tenth Century AH till now, most of the efforts are in

15 the field of Hadith materials interpretation and classification and some efforts concerning the application of the old Hadith Terminology rules to filter the Hadith staff collected by the collectors. It is clear that the development of the Hadith Terminology and its corresponding rules, terms, and guidelines is almost frozen from the middle of the Seventh Century AH when Ibn Al-Salah introduced his Hadith Terminology Handbook

20 (Muqaddemet Ibn Al-Salah). This patent is introducing much developed system for Hadith Terminology based on the horrible development in Communication Engineering and Information Technology and making use of the Artificial Intelligent revolution. It aims to design new modeling for computing the grade of the Hadith correction based on an accurate analogue system using the actual tools and sciences replacing the other

25 outdated mechanisms which were used for more than eight hundred years.

The development of Hadith Terminology was very slowly grown, till it was concluded in the most critical huge handbook for " Ibn Al-Salah" called "Muqaddimah Ibn Al-Salah" in the middle of the Seventh century AH. It is concluded that the science of (Hadith

30 Terminology) is well-cooked and burnt at that time. From that time, which is about eight hundred years, the development of Hadith Terminology is almost stopped, while the most

scientists contributions are directed into the eld of Hadith clarification, interpretation, and sectorizing of the Hadith into chapters, and books based on topics and subjects.

Description of the Invention:

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The main purpose of the invention is to help the end user secure a more precise information about the garde of correctniss of the Hadith, by turning the digital wording system which is used till now to a percentage analog system which will provide a much more accurate numerical results that helps to show the Hadith readers its grade in terms of Authenticity and Weakness very precisely.

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By using Probability Theory, Signal Processing, Modulation, Communication Systems, Information Technology and Artificial Intelligence our method will be processing the information to create a percentage to show the users the accuracy of the Hadith.

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Using the probability theory; The evaluation of Hadith narrators in terms of justice, preservation, and completeness is following now a digital wording grading system based on twelve quantization levels. This biographical evaluation technique is called in Arabic: Eilm al-rijal; literally meaning 'Knowledge of Men', where each one of the narrators will get a wording grade. In this work, these twelve wording grades will be replaced by numerical grades presenting the Probability of Error PE and the Probability of Correction PC of each of these narrators, where $PC = 1 - PE$. This enables a solid methodology for computing the strength of the communication channel between Prophet Muhammad (SAWS) and the Hadith producer. The transfer function of the communication channel is presented in eq.1 as a multiplication of the Probability of Corrections PC_k for the K series elements in the path starting from Prophet Muhammad (SAWS) ending to the Hadith producer.

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$$H_p = \prod_{k=1}^K PC_{k,p}$$

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Equation 1

Where K is the total number of the elements in this path of communication channel and $PC_{k,p}$ is the transmission factor of the element with index k in the path p . A further innovation is that the Probability of Correction PC_k which is assigned to each element k in the communication channel will be processed and used for generating an enhanced

5 Probability Density Function (PDF) for each person. This PDF will be a function on PC evaluation, the age of the element, the time of his conversion to Islam, his political inclinations, his doctrine, and his specialization. This will provide an effective Probability of Correction EPC to replace the $PC_{k,p}$ in the above equation.

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In the Hadith transfer process, there is a possibility to transfer several copies from the same Hadith within several paths (series of narrators) starting from Prophet Muhammad towards the Hadith producer. In Communication Engineering, we consider such type of channel as a Multipath Channel. The transfer function of the multipath channel is an

15 extension of the path equation presented in eq.2

$$H_{\text{eff}} = \sum_{p=1}^P \prod_{k=1}^K PC_{k,p}$$

Equation 2

20 where P is the total number of parallel paths in the multipath communication channel.

This multipath channel leads the receiver (Hadith Producer) will get several copies from the same Hadith and this can increase the strength of the received signal and enhance the grade of the Hadith. This could be achieved by applying signal processing techniques as

25 illustrated in the following sections.

Each element in the path is receiving the signal and retransmitting it to the following element in the same path with lower quality because of the human factor. This factor is determined from his registered grade in the database of the Knowledge of the Men. This

30 leads to a commutated degradation of the signal through the whole path called in Communication Engineering the Path Loss. Degradation of the signal in the form of

losses, decays, inversions or attenuations is part of the proposed path loss modeling. In addition to that, in the real communication channels, there are additional random signals called Noise added to the received signals in the receivers as shown in eq.3.

5

$$Y(p) = H_p X + N(p) = \prod_{k=1}^K PC_{k,p} X + N(p)$$

Equation 3

where $N(p)$ is the additive noise at each path, and it depends on the number of elements in the path and the surrounding conditions of each element.

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The total received signal at the Hadith producer (Receiver) could be mathematically presented in eq.4

$$Y_{\text{Total}} = \sum_{p=1}^P Y(p) = \sum_{p=1}^P \prod_{k=1}^K PC_{k,p} X + \sum_{p=1}^P N(p)$$

15

Equation 4

This clearly presents that if the number of elements K per path increased the path loss factor would be dramatically affected and if the number of Paths P is increased, the averaging of the accumulated noise will enhance the Signal to Noise Ratio (SNR). The model of the multipath communication channel H_{eff} considering the additive noise N for the Hadith system effectively enhances the Hadith grading mechanism.

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The Communication System used in a Hadith communication channel is usually registered if it was either a Broadcast or Unicast; Single Input Single Output (SISO) or Multiple Input Multiple Output (MIMO); Simplex, Half-Duplex or Full-Duplex. Unfortunately, even such communication system descriptions have been registered, but it rarely effect the grade evaluation of the Hadith.

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In this work, the communication system can significantly affect the evaluation of Hadith since there is a huge relationship between the topic of Hadith and the corresponding used communication system. It is not acceptable, to announce a very important doctrinal matter using SISO, Unicast communication system. Prophet Muhammad (SAWS) has
5 announced all of the important critical issues in Islam and fundamental roots, using the broadcasting and full-duplex communication systems to guarantee the delivery of his message.

Applying the fundamentals of signal processing by comparing several narrations of the
10 same Hadith fetching the text correlations will enable another measurement dimension of the Hadith. This will help to evaluate the Hadith partially by assigning for each part an analog number presenting the computed correlation value between the different narrations. It will be also a possibility to interpret the reasons for getting these weak parts in our evaluation by illustrating the different narrations of these parts.

15 Information included within Hadith should never cross the boundary conditions settled by Quran and the other confirmed frequent Hadiths. Basic information analysis step should be applied upon Hadith content for assuring that this Hadith is not crossing over that the standards and essentials of Islam. In this patent, this step is included and
20 configures an important input for the well-trained Neural Networking in the Artificial Intelligence system.

In Hadith terminology, the Date of Birth (DoB) and the Date of Death (DoD) of the narrator of the Prophet's hadith are very important, in order to prove the contemporary
25 between two narrators, where one is received Hadith from the other. Unfortunately, not all of the data of the DoB and DoD are available for the whole the narrators. In this work, the Artificial Intelligence (AI) is applied by training Neural Networks (NN) by the huge available data in order to estimate the other missing data. This is successfully performed based on the average age, either the available DoB or DoD and the contemporary narrators
30 who have been proven that they either received or delivered the Hadith from or to the narrator with unknown DoB or DoD. Furthermore, AI is applied to present the Function

of Awareness of the narrator - which is an extension for the coefficients of transmission T_n for each narrator. The function of awareness could be presented in eq.5

$$\phi_n = \varphi (T_n, Y_n, S_n, I_n, P_n)$$

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Equation 5

where T_n is the transmission coefficient of each narrator n , Y_n is the age of the narrator n when he transfers the Hadith, S_n is his specialization and field of knowledge, I_n is his date of conversion into Islam or even starting Hadith transfer, and finally, P_n is a coefficient presenting his polarization, political affiliation, and doctrine of worship or creed. Finally, in order to provide an analog value presenting the Correction Degree of the Hadith, AI is applied to generate the Cost Function (CF) collecting the computed parameters of applying the several previous techniques (Channel Transfer Function (Based on Emerged Probability Theory Concepts, Modulation, Communication Systems, Networking Systems, and Information Boundary Conditions) and finding the best value depending on these computed parameters.

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Description of the Figures:

The invention will be described with reference to the accompanying figures, so that the features of the invention will be more clearly understood and appreciated, but the purpose of this is not to limit the invention to these certain regulations. On the contrary, it is intended to cover all alternatives, changes and equivalences that can be included in the area of the invention defined by the accompanying claims. The details shown should be understood that they are shown only for the purpose of describing the preferred embodiments of the present invention and are presented in order to provide the most convenient and easily understandable description of both the shaping of methods and the rules and conceptual features of the invention. In these drawings.

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- Figure 1 Hadith Communication System Model
- 30 Figure 2 Hadith Communication System and Possibility Model
- Figure 3 Hadith Communication System and Possibility Model

The figures to help understand the present invention are numbered as indicated in the attached image and are given below along with their names.

Description of References:

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1. Signal Source
2. Transmitters
3. Communication Channel
4. Receivers

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5. Signal Sink
6. Age
7. Knowledge of Men
8. AI system
9. Comparison

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10. P factor
11. Date of Conversion to Islam
12. Date of Death

Detailed Description of The Invention:

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The method subjected in the invention include; signal source, (1) transmitters (2), communication channel (3), receivers (4) and signal sink (5).

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As our invention used the telecommunication engineering systems to help explain more about the method; the signal source (1) represent Prophet Muhammad (SAWS) talks and speeches to people in general and in private. The Signal source (1) is how the signal (Prophet Muhammad (SAWS) words) are transmitted to other people in many cases.

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Transmitter (2), which represent the people who received the signal from the signal source (1) Prophet Muhammad (SAWS) and start to transmit it to other people. The transmitters (2) are people who lived in Prophet Muhammad (SAWS) and transmitted it to different people. The transmitters (2) is evaluated by 'Knowledge of Men' (7), where each one of

the transmitters (2) will get a wording grade that shows how much the transmitter (2) is honest and trusted which will help to figure how much the hadith is strong and true. Also using the AI we will be approximately in known at what age (6) did the transmitter (2) narrowed the hadith. In general, to be a 100 % mature you need to be in the age (6) around 5 40 years old so, using the AI it will help us state how old was the transmitter even if we only know his date of birth or date of death, because as we enter most of the data to the AI system it will help us complete the missing data approximately.

The Communication Channel (3) in our invention is described as the people how received 10 the information from the transmitters (2) after the death of Prophet Muhammad (SAWS) and kept it on going through years by passing and collecting it. Our method will also use 'Knowledge of Men (7)' and AI to help making sure about the hadith trustiness.

The Receivers (4) in our invention are the people how received the information from the 15 communication channels (3) and spread it widely in different places. The Receivers (4) also will be evaluated according to 'Knowledge of Men ' (7) and AI.

The Signal Sink (5) is the people who collected the hadith from the Receivers (4) and 20 arranged them in books which we still use, also within collecting they also described more about the situation that the hadith was said in.

Using several dictionaries and sources our invention the words and phrases used inside the hadith will be evaluated by the AI system to help show if such phrases were used in 25 prophet Mohammed (SAWS) period or not. Which will help shows the truthiness of the hadith more accurately.

Collecting all the data and analysis from the above stated parts of the invention, a percentage will be produces using the P factor (Probability factor) to show how much the 30 hadith is true. Using Knowledge of men (7), AI system, comparison of the same hadith from several sources and also analyzing the words if it was used in that ages or not.

CLAIMS

- 1- The invention is related to a system that includes communication engineering, information technology and artificial intelligence in hadith terminology science, and its
5 feature is;
- Prophet (SAWS), that expresses the data of the words which is the signal source (1) to the receiver (4),
 - the transmitter (2) that deliver the data contained in the receiver (4) and transfers it to the processor,
 - 10 - the processor contains artificial intelligence algorithms that evaluate the hadith with 'Knowledge of Men' (7), which will receive a stylistic rating indicating the degree of honesty and reliability of the narrators involved and calculate the degree of reliability of the relevant hadith.
- 2- As mentioned in Claim 1, hadith is a system that includes communication engineering,
15 information technology and artificial intelligence in the science of hadith terminology, its feature is; it is characterized by the fact that it contains artificial intelligence algorithms that calculate the information about the age (6) at which the hadith was transmitted approximately by pulling the date of birth or date of death of the narrower from the database.
- 20 3- As mentioned in Claim 1, hadith is a system that includes communication engineering, information technology and artificial intelligence in the science of hadith terminology, its feature is; using natural language modulation algorithms to use various dictionaries and phrases in the hadiths transmitted by the narrators, it is characterized by the fact that it contains artificial intelligence algorithms that determine whether it was used in the period
25 of the Prophet Muhammad (SAWS) and calculate the accuracy of the hadith.
- 4- As mentioned in Claim 1, hadith is a system that includes communication engineering, information technology and artificial intelligence in the science of hadith terminology, its feature is; characterized by includes a processor that calculates a percentage using the P
30 factor (Probability factor) (10), which shows how accurate the hadith is by collecting all the data and analyzes in the hadiths transmitted by the narrators.

5- As mentioned in Claim 1, It is a system that includes communication engineering, information technology and artificial intelligence in hadith terminology; it is characterized by the system using probability theory, signal processing, modulation, networking, communication systems, information technology and artificial intelligence.

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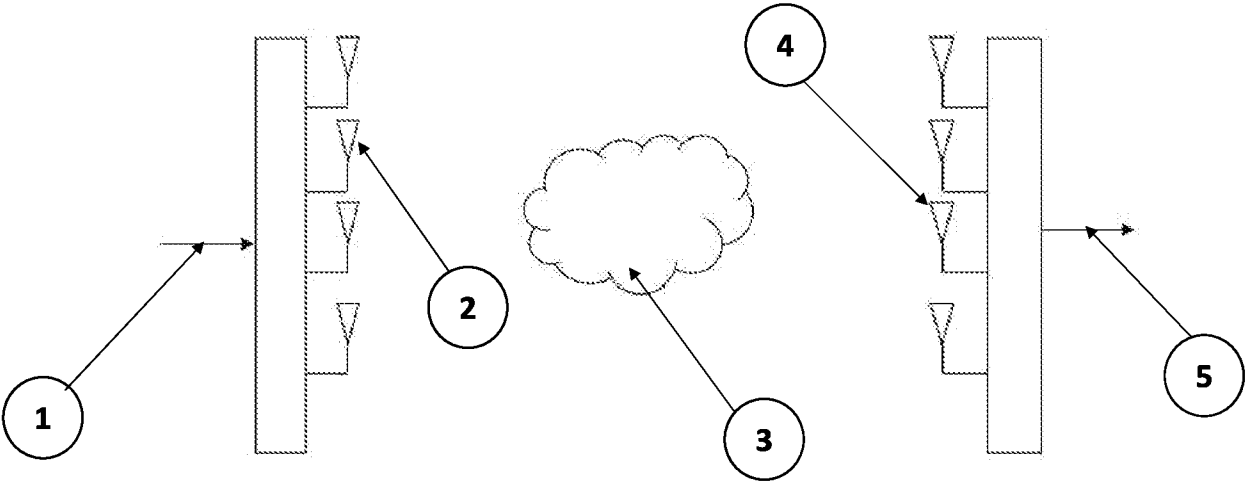


Figure – 1

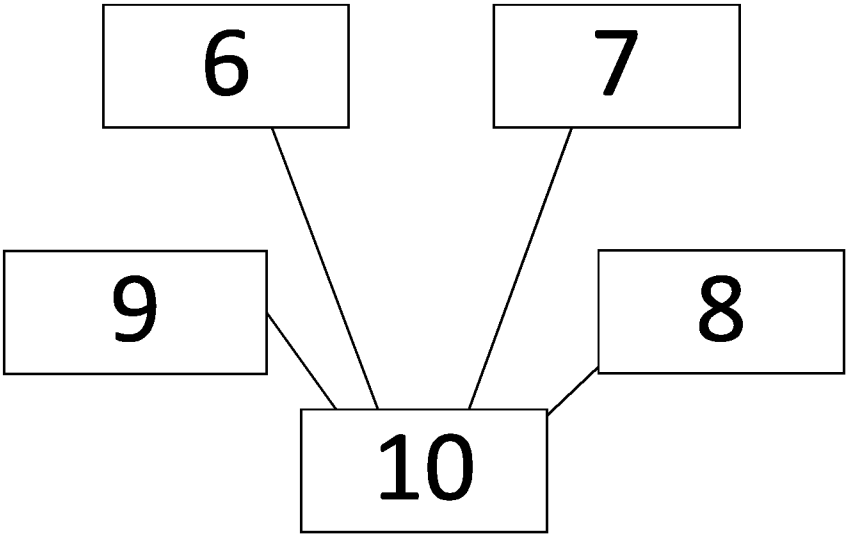


Figure – 2

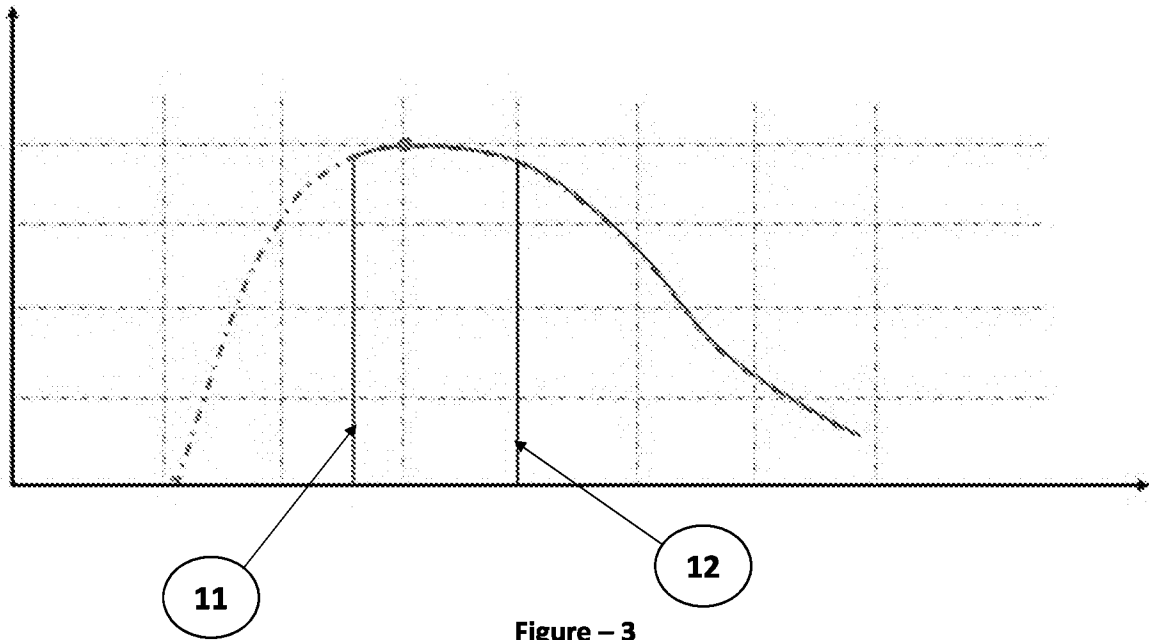


Figure – 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/TR2022/051254

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06Q10/00

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SYED IRFAN ET AL: "Towards a Database Oriented Hadith Research Using Relational, Algorithmic and Data-Warehousing Techniques Application Strategies of Design Patterns in Software Architecture and Frameworks View project", , 31 January 2008 (2008-01-31), XP093060919, Retrieved from the Internet: URL:https://www.researchgate.net/profile/Syed-Hyder-5/publication/281558734_Towards_a_Database_Oriented_Hadith_Research_Using_Relational_Algorithmic_and_Data-Warehousing_Techniques/links/55ede19408aedecb68fc5ed7/Towards-a-Database-Oriented-Hadith-Research-Using-Relational-Algorithmic-and-Data-Warehousing> section 5, 6 ----- -/--	1-5



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

5 July 2023

Date of mailing of the international search report

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Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

PCT/TR2022/051254

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BINBESHR FARID FARID@HU EDU YEFARID BINBESHR@GMAIL COM ET AL: "A Systematic Review on Hadith Authentication and Classification Methods", ACM TRANSACTIONS ON ASIAN AND LOW-RESOURCE LANGUAGE INFORMATION PROCESSING, ACM, 2 PENN PLAZA, SUITE 701 NEW YORK NY 10121-0701 USA, vol. 20, no. 2, 23 April 2021 (2021-04-23) , pages 1-17, XP058491430, ISSN: 2375-4699, DOI: 10.1145/3434236 section 4.1.1 -----	1-5