Searching Algorithm of Authentic Chain of Narrators' in Shahih Bukhari Book

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Searching Algorithm of Authentic Chain of Narrators' in Shahih Bukhari Book

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Abstract - Hadith text consists of two parts which are chain of narrators' and content. The authenticity of Hadith is depending on authentication of the chain of narrators' and its content. Hadith authentication process involves a lot of time because the process is done manually. Manual means hadith researchers need to refer one book to another book. If the numbers of books need to be referred by the hadith researchers could not be determined; and it depends on his or her knowledge. The first step in hadith authentication process is to determine chain of narrators' authentication. Chain of narrators' can be representing in form of network graph. Network graph has element of chain that can help to search chain of narrators' for hadith. This research aims to develop a representation of chain of narrators' in hadith text in form of network graph. This research uses 30 hadith Sahih Bukhari texts. Thereafter, we develop the representation and searching algorithm of authentic chain of narrators' by using Python programming language. The algorithm is a prototype for helping hadith researchers in facilitating them to search for existing authentic chain of narrators' in Sahih Bukhari book. This helps to reduce time in determining the authentic chain of narrators' in hadith authentication process.

Keywords-searching; algorithm; authentic chain of narrators'

I. INTRODUCTION

Hadith comprises of words, acts, consistency and consent from Prophet Muhammad S.A.W. which later becomes principles or law in the religion of Islam. Hadith is one of the sources of principles of law in Islam besides Book of God (Al-Quran), The Agreement of all Muslims(Ijma') and Qiyas. Hadith ranked second after Al-Quran as source of law [14].

Hadith are narrated through the times. Hence, in order to preserve the authenticity of the Hadith, scholars of Hadith reserved lists of narrators of the Hadith from generation to the next one [1]. A research relating to chain of Hadith narrators and texts to distinguish authentic hadith with fabricated hadith is called Research On Hadith Knowledge. This research is focus merely on chain of hadith narrators in hadith texts.

Standard process in doing research on the chain of hadith narrators is done manually [2] and time-consuming [3]. The aforesaid process requires books reference pertaining to details of narrators wherein 10 to hundreds of books needed to refer on one narrator's depending on the narrator's's

reputation/popularity [1]. [4] had identified complexity of authenticity of the narrators is a repetitive/recurring process. The recurring process happens in a text which can be found in more than one collection of hadith (for example, 'M' is a collection of hadith), a text normally has more than one chain of narrators (for example, chain 'N'), one chain consists of a number of narrators (for example, narrators 'P'), and several biography books need to be referred to pertaining to a narrator (for example, 'Q' books).

TABLE I AUTOMATIC VERIFICATION ON NARRATOR'S'S DETAILS

References	Domain Model on Hadith	Analysis Model	Output	Language
[5]	Each narrator	-	Visualize the chain in tree	Arabic
[3]	Each narrator	Refer to books on details of narrator whether authentic or not	Classification of trustworthy and untrustworthy narrator	Arabic
[6]	Each narrator	-	Retrieve narrator name in various type of entity of name	Arabic
[1]	Each narrator	Refer to books of Jami'u Al-Termithi and Silsilat Al-Ahadith Al-Dae'ifah w' Al-Mawdhu'ah	Classification of hadith which is authentic, good, poor or fake	Arabic
[3]	Each narrator	Refer to biography book entitles Al-Kassem Al-Khoei and Al-Waleed Al-Baji	Narrator graph extraction	Arabic
[7]	Each narrator	Refer to books of Ibn Hajar	Ontology-based Isnad Judgment System (IJS)	Arabic

[8]	Each narrator	-	Automatically extracting the sequence of narrators from Hadith and converting these sequences to the graph format	Arabic
[9]	Each narrator	Refer to books of Ibn Hajar entitled Taqrib al-Tahzib	Classification of hadith which is authentic, good, poor or fake	Arabic
[4]	Each narrator	Refer to books of Ibn Hajar	Visualization of narrator chain	Malay

There are some studies which developed the verification process automatically as reflected in Table I. Table I shows [5], [3], [6], [4], [1], [2], [7], [8], [9] extracted each narrator from the chain and evaluate the narrator based on narrator's information book.

[5], [6] and [8] did not conduct the process of narrator's verification with information of a narrator. On the other hand, [3], [1], [2], [7], [9] and [4] carried out verification on each narrator by automatically referring to information of a narrator's. The most referred to book pertaining to the said information is a book written by Ibn Hajar. [6] and [8] automatically extracted names of narrator'ss. [1] and [9] had classified the text of Hadith into 3 types namely *sahih* (authentic), *hassan* (good), *daif* (poor) and *maudhu'* (fake). [3] had also categorised narrator into two types which are trustworthy or untrustworthy. [5], [4] and [3] had illustrated chain of narrators into chart and graphic for verification purpose.

Nonetheless, the whole studies specified in Table I automatically indicate that each narrator needs to be verified with books on narrator's information. The said method, repeating the manual process is done. Verification on information of each narrator's with books on narrator's information resulted chain of narrators. Authentic chain of narrators is found in Sahih Bukhari and Muslim. This study proposed verification on chain of narrators with authentic chain of narrators in order to facilitate in time saving for the said study. This study develops authentic chain of narrators' algorithm in the book of Sahih Muslim in aiming for verification of narrators' chain.

II. METHODOLOGY

This section will highlight on development design in searching of algorithm of authentic narrators' chain in the book of Sahih Bukhari. The hadith texts is taken from [10]. The development process can be divided into 3 steps namely pre-processing, network graph development [12] and analysis process as shown in Figure 1.

Pre-processing is implemented as in Figure 2. It is to process hadith text to extract list of narrators in a hadith.

The text of hadith comprises of two parts which are narrators' chain and content [15].
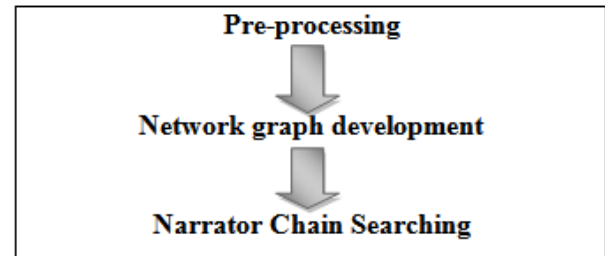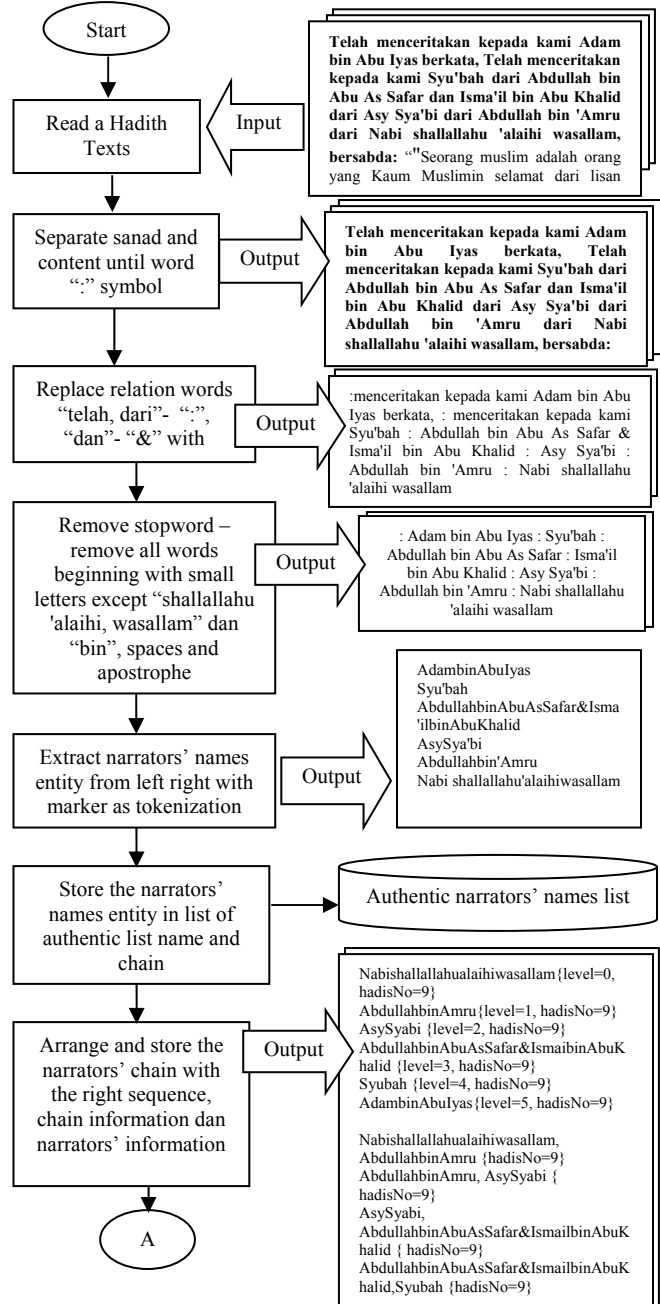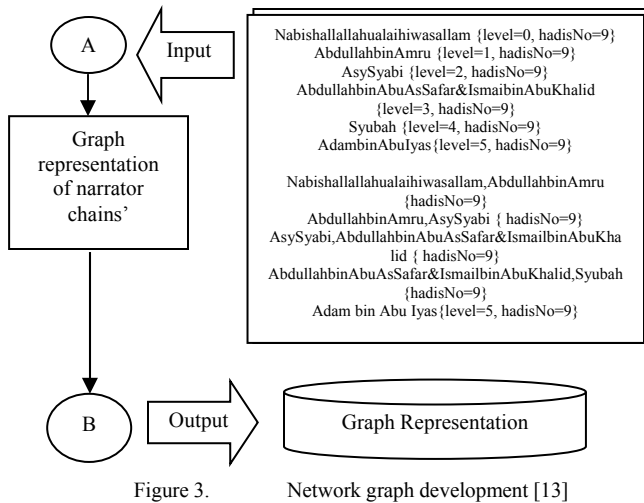

Figure 1.   Algorithm Development Process


Figure 2. Pre-processing [13]

Figure 3.   Network graph development [13]

Initially, the text was read to identify the symbol of ":" in order to distinguish between the narrators' chain and its contents. The symbol of ":" is an indication to remove the content in part of the text. Thereafter, the words 'had/was' and 'from' are used to differentiate between each narrator's names. Those two words are being replaced with the said symbol which is an indication to distinguish narrator's name in the chain of narrators. Meanwhile, the word 'and' indicates two narrators narrating in the same period and is being replaced with the symbol of '&'. Subsequently, the process of removing the stop word is enforced to all words which didn't show the name except the words of 'shallallahu 'alaihi wasallam' and 'bin'. The word 'shallallahu 'alaihi wasallam' is normally used as part of the Prophet's name in order to indicate his nobility. While the word 'bin' is a part of the name which means 'son to'. All the blank spaces and apostrophe were removed from the texts to simplify the process of identifying the narrator's name. The name of the narrator duly extracted will be saved as authentic narrator's names list. The said name is formed as node [2]. The place for the duly extracted narrator's name from the number of hadith and rank of narrators in the chain is obtained and duly kept as levels. Hadith's number and level becomes the attributes for the nodes. The link's location between one narrator to another were extracted from the hadith's number. Hadith's number is the attribute for the edge in the graph.

Next process is the building of chain graph as shown in Figure 3. Information extracted from pre-processing was used to create graph as a representation for hadith text.

Figure 4 is showing the chain of narrator's search. The search that can be done from that particular graph is the chain that exists in the Book of Sahih Bukhari, narrator's teacher, narrator's students and narrator's location in hadith text.

So, there are three main processes that have been done in this study, namely the pre-processing, network graph development and chain of narrators' searching. The algorithm development has been developed base on the design discussed using the Python Programming Language [11][16].

Figure 4.   Narrator chain searching [13]
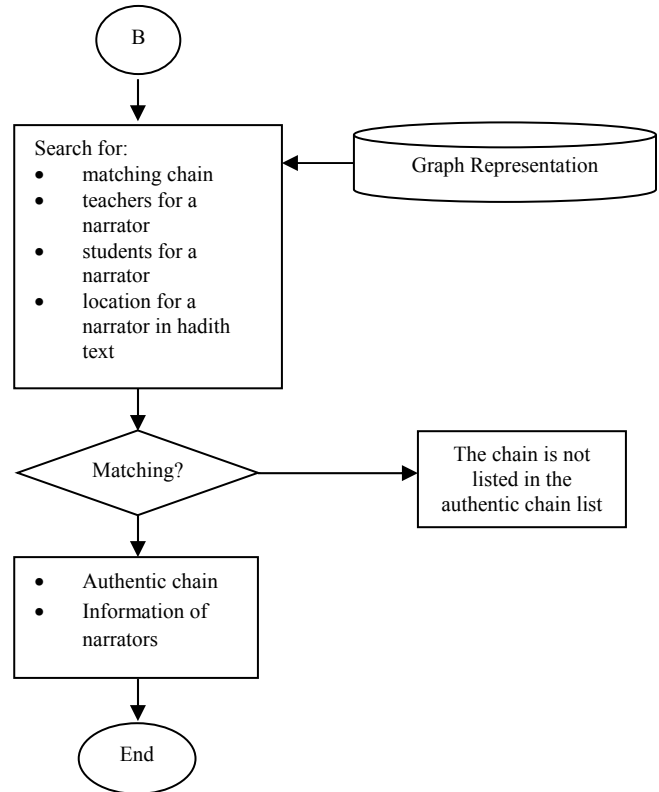
III.   RESULT AND DISCUSSION

This section discusses the Python statement and results after the development of searching algorithm of authentic chain of narrators' in Sahih Bukhari. Figure 5 shows the hadith text number 1 in The Book of Sahih Bukhari becomes the input to the algorithm.
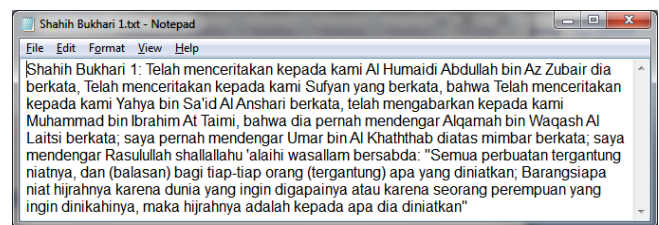

Figure 5. Hadith Text in Shahih Bukahri from Hadith Number 1

Following statements

```
sentenceEnders = re.compile('[:]')
sentenceList = sentenceEnders.split(paragraph)
```

are to separate narrators chain and content. Following statements

```
reps = {'berkata':' @ ', 'berkata,':' @ ',
'berkata;+':' @ ', 'telah': ' @ ', 'dari':' @ ',
'bahwa':' @ ', 'mendengar':' @ ', 'dan':' & ',
'bertanya':' @ ', 'Telah': ' @ ', 'kami':' @ ' }
```

```
hadithText = replace_all(hadithText, reps)
```

are to define words `berkata, berkata, berkata;, telah, dari, bahwa, mendengar, bertanya, Telah` and `kami` as tokenizers for separating each of narrators'. Word `dan` shows two narrators have same level in the chain. The above statements extract the chain of narrator's name and save in as in Figure 6.
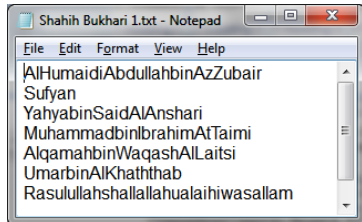

Figure 6. Extracted Chain of Narrator from Hadith Number 1

Then, those names will be re-arranged according to the correct sequences starting from Rasulullah Sallahu Alaihi wa Sallam as shown in Figure 7 by using statement

```
narratorChainList = [narratorChainList[-i] for i
in range(1, len(narratorChainList) + 1)].
```
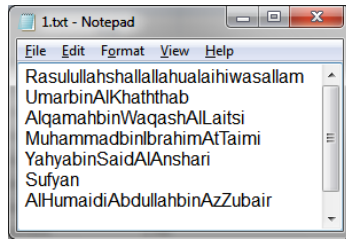

Figure 7. The Correct Chronology of Narrators

And then, the narrator's individual information extracted reveals narrator's name location and their level. Variables `noHadis` in the following statement

```
noHadis = int(re.search(r'\d+',
hadithText).group())
```

is to get hadith number from the text. Variables `level` in the following statements

```
level = 0
for s in sanadEach:
level = level + 1
print>>fileAllNarratorString,''.join(narratorName)
, noHadis, level
```

are to count each of narrators location in the chain. All information of each of narrators name, their level and their hadith number is extracted and save in a file as shown in Figure 8.
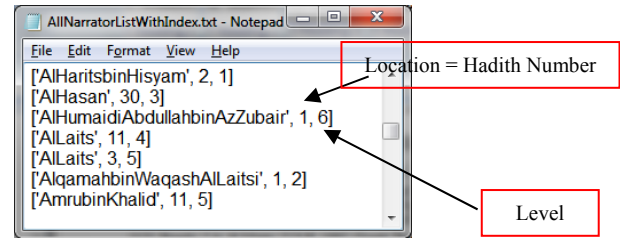

Figure 8. Narrator's Individual Information

Next, file in Figure 7 also be as input file to the following statements and store in `sublist` variable. `narrateTo` variable is to store upper level relationship between two narrators in the chain and `narrateFrom` variable is to store lower level relationship between two narrators in the chain.

```
connection = []
for i in range(0,len(sublist)):
    narrateTo = sublist[i]
    connection.append(narrateTo)
    if i < len(sublist) - 1:
        narrateFrom = sublist[i+1]
        print>>fileout,narrateTo,narrateFrom,noHadi
s]
        connection.append(narrateFrom)
        connection.append(NoHadis)
print>>fileout,connection
```

These relationship as shown in Figure 9. Figure 9 shows narrator's connection's location between one narrator to another. This connection reveals the link of the teacher to his student and the student of his student.
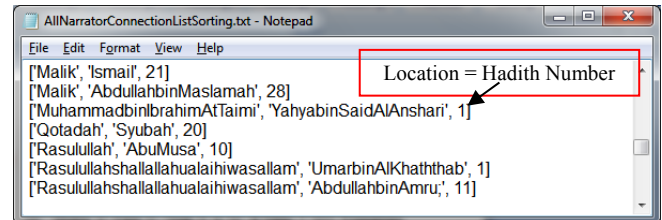

Figure 9. Information on connections between narrators

All those information collected is store in the graph. Node information is created by using file in Figure 8 as input file in the following statements

```
for item in individualNarratorAll:
    x = ast.literal_eval(item)
    DG.add_node(x[0],noHadis = x[1], level = x[2])
```

Narrator name as node, hadith number and level are attributes for the node. Relationship is created by using file in Figure 9 as input file in the following statements

```
for item in narratorConnectionAll:
    x = ast.literal_eval(item)
    DG.add_edge(x[0],x[1], noHadis = x[2])
```

and hadith number is attribute for the relationship.

After all the information has been saved in network graph, the chain search process can be done as in Figure 10.

```
• print ''
• print "Sanad bermula Rasulullah s.a.w hingga kepada perawi Malik"
• print find_all_paths(DG, "Rasulullahshallallahualaihiwasallam", "Malik")
```

Figure 10. Narrator's's Chain Search

The search was done to find the chain of narrators from Rasulullah Sallahu Alaihi wa Sallam up to "Malik". The result shows there are four chains existed in Sahih Bukhari for that particular search as shown in Figure 11.

Figure 11. The chain of narrators from Rasulullah Sallahu Alaihi wa Sallam up to "Malik".

Additionally, search in regards to the link between the teachers was done using the predecessors function in graph as shown in Figure 12. The result shows that narrator "Malik" have four teachers named *Abdurrahman bin Abdullah bin Abdurrahman bin Abu Shashaah*, *Hisyam bin Urwah*, *Zaid bin Aslam* and *Amru bin Yahya AlMazani*.

```
>>> DG.predecessors('Malik')
['AbdurrahmanbinAbdullahbinAbdurrahmanbinAbuShaShaah',
 'HisyambinUrwah',
 'ZaidbinAslam',
 'AmrubinYahyaAlMazani']
```

Figure 12. Teachers up to narrator "Malik"

Meanwhile, the link between students to the narrator was done using the successors function in graph as shown in Figure 13. The result shows that narrator's "Malik" have three students named *Abdullah bin Maslamah*, *Ismail* and *Abdullah bin Yusuf*. Revision on the link between teachers and students, to the narrator, was done to differentiate narrators with same name but different persons.

```
>>> DG.successors('Malik')
['AbdullahbinMaslamah', 'Ismail', 'AbdullahbinYusuf']
```

Figure 13. Students up to narrator "Malik"

Overall, we use 30 hadith texts from Sahih Bukhari to test the algorithm. 18 hadith texts are accurate in the pre-processing process and network graph development. 12 hadith texts have an error in the pre-processing process and resulted error in the network graph development.

IV. CONCLUSION

In conclusion, this study developed authentic narrator chain algorithm using the Python Programming Language. The research was intended to facilitate hadith's researchers in revising the process of narrators' in hadith's chain. In future, this study will keep the search of authentic narrator chain algorithm complete and up to date. Finally, it will also subsequently develop classification on Sahih Bukahri's narrators' chains with other narrators' chains in other Book of Hadiths.

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