

# Computable Difference Matrix for Synonyms in the Holy Quran

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**Abstract**—In the field of Quran Studies known as GHAREEB AL QURAN (The study of the meanings of strange words and structures in Holy Quran), it is difficult to distinguish some pragmatic meanings from conceptual meanings. One who wants to study this subject may need to look for a common usage between any two words or more; to understand general meaning, and sometimes may need to look for common differences between them, even if there are synonyms (word sisters).

Some of the distinguished scholars of Arabic linguistics believe that there are no synonym words, they believe in varieties of meaning and multi-context usage. Based on this viewpoint, our method was designed to look for synonyms of a word, then the differences that distinguish the word and their synonyms.

There are many available books that use such a method e.g. synonyms books, dictionaries, glossaries, and some books on the interpretations of strange vocabulary of the Holy Quran, but it is difficult to look up words in these written works.

For that reason, we proposed a logical entity, which we called Differences Matrix (DM).

DM groups the synonyms words to extract the relations between them and to know the general meaning, which defines the skeleton of all word synonyms; this meaning is expressed by a word of its sisters.

In Differences Matrix, we used the sisters (words) as titles for rows and columns, and in the obtained cells we tried to define the row title (word) by using column title (her sister), so the relations between sisters appear, the expected result is well defined groups of sisters for each word. We represented the obtained results formally, and used the defined groups as a base for building the ontology of the Holy Quran synonyms.

**Keywords**—Quran, synonyms, Differences Matrix, ontology.

## I. INTRODUCTION

THE study of the vocabulary of Holy Quran is a great science; ancient Arabic scholars studied it deeply, they had had known that the Holy Quran is miraculous due to the meanings in its vocabularies, the most important vocabularies called Ghareeb Al Quran (The study of the meanings of strange words and structures in Holy Quran). A better way to know a meaning of a vocabulary and its context is to deeply study what words guessed as synonyms, and the search for what can collect between the synonyms, or can differ between them. Some scholars [1] like ElAskri [2] wrote a book called The Differences, he gainsays (disprove) the synonyms in Arabic language; especially in the Holy Quran, and believes in varieties of meanings and multi-context usage.

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The research problem in differences between synonyms in the Holy Quran lay in choosing accurately the meanings of what supposed to be synonyms; moreover, how to extract the required meaning.

The rarity of references and scholars' disagreement about vocabulary's synonyms in this field are problems the researcher in this field may face.

## II. THE IDEA

The idea was based on grouping of the synonyms words or what supposed to be synonyms in Differences Matrix (DM); to extract the relations between them, we used synonyms (sisters) as titles for rows and columns, in each obtained cell; we tried to define the column title by using the row title; the definitions were summarized in single words called servant words so the relations between sisters appear, the cell considered empty if it had the same title for row and column, or the cell contained general definition for titles. By DM, we can know the general word (based word or mother of sisters), which involves overall meaning that defines all word synonyms; it lies in the most filled row.

Example: In Table I there are five sisters and eleven relations between sisters (servants); Word4 is the mother of the five sisters, because it has relation with most of the sisters.

TABLE I  
WORDS SISTER

	Word1	Word2	Word3	Word4	Word5
Word1	-	Servant1		Servant2	
Word2	Servant3	-			Servant4
Word3			-	Servant5	
Word4	Servant6	Servant7	Servant8	-	Servant9
Word5		Servant10		Servant11	-

## III. THE METHOD

1. Firstly, we chose the sisters' words
2. In DM, we put sisters as rows and columns titles
3. We used respectable dictionaries to fill DM cells
4. We specified the most filled row cells, and regard its title as the mother of sisters
5. From the filled cells we determined the relations between rows and columns titles, then summarized each relation in one word (servant)
6. Following the previous steps the mother of sisters and servants were determined. For ontology emergence, we formally represented that using set theory, predicate logic and formal concept analysis [5]

#### IV. THE IMPLEMENTATION

To Clarify the idea, we collected words that look like synonyms from the Holy Quran [3], i.e.-(الخوف-الحذر-الخشيبة-الخوف) :  
الفرع-الشفقة-الرهبية-الجزع-الوجل-الهلع-الافتاء), each of these words reflected the meaning of fear (الخوف), they look like synonyms, but there are differences in meaning between them. The meanings of the chosen words in Arabic are as follows [4]:

- الخوف: هو توقع مكره عن اشارة مظنونة أو معلومة
- الحذر: هو خوف مع احتراز
- الخشيبة: خوف يشوبه تعظيم
- الفرع: خوف مفاجئ
- الشفقة: عناية مختلطة بخوف
- الرهبية: خوف مستمر
- الجزع: هو حزن يمنع الإنسان ويصرفه عما هو بصدده ويقطعه عنه
- الوجل: استشعار الخوف
- الهلع: هو الفرع مع اضطراب شديد
- الافتاء: جعل النفس في وقاية مما يخاف

Apparently these words have the same meaning and have semantic relations between them. It was noted that the word (الخوف), AIKhawf) was repeated in most definitions of other sister words, therefore we could infer the relations between the sisters by using DM, see Table II

TABLE II A  
DM OF (AL KHAWF) SISTERS

6	5	4	3	2	1	
الرهبية	الشفقة	الفرع	الخشيبة	الحذر	الخوف	الخوف
استمرار	عناية	مفاجأة	تعظيم	احتراز	الخوف	الحذر
						الخشيبة
						الفرع
						الشفقة
						الرهبية
						الجزع
						الوجل
						الهلع
						الافتاء

TABLE II B  
DM OF (AL KHAWF) SISTERS

11	10	9	8	7	
الروع	الافتاء	الهلع	الوجل	الجزع	الخوف
	وقاية		استشعار		الحذر
					الخشيبة
		اضطراب			الفرع
					الشفقة
					الرهبية
				حزن يصرف الإنسان عما هو بصدده	الجزع
					الوجل
					الافتاء

Looking at the DM matrix and analyzing its components we inferred the following:

1. The AIKhawf word is the mother of sisters, because it is the title of the most filled row, the other titles in DM are the sisters; they are the components of the AIKhawf set (W), i.e.:

$$W = \{W_1, W_2, \dots, W_{11}\}$$

2. Let A be a set of servants; these words help in distinguishing the relations between the mother and their sisters, i.e.:

$$A = \{ \text{الخوف, احتراز, تعظيم, مفاجأة, عناية, استمرار, استشعار} \}$$

$$\{ \text{وقاية, اضطراب} \}$$

$$A = \{A_1, A_2, \dots, A_9\}$$

3. To generalize we can define classes for mother words; one for each; and every word in a class represents sisters e.g.:

$$\text{Classes} = [\text{الخوف, الحزن, المحي, ...}]$$

From Table II the word (الجزع) is not in AIKhawf class, and may be added to other class called (الحزن).

Now, every sister in AIKhawf set could be represented by the following relation:

$$W_i = W_1 + A_i$$

For example:

$$W_2 = W_1 + A_2, (\text{الحذر} = \text{الخوف} + \text{الاحتراز}),$$

$$W_4 = W_1 + A_4, (\text{والفرع} = \text{الخوف} + \text{المفاجأة}),$$

$$W_8 = W_4 + A_9$$

$$\therefore W_8 = W_1 + A_4 + A_9$$

Some sisters may be related to mother via two servants

4. Sisters in AIKhawf could be members in other classes, therefore we can use Formal Concept Analysis to deduce concept hierarchy or its ontology from group of objects and their properties, and suppose that the objects are sister words, and the properties or attributes are the servant words, e.g. AIKhetraz (الاحتراز) represents the difference between the mother (main word) AIKhawf and one sister word AIHather (الحذر):  $W_2 = W_1 + A_2$ , ( $\text{الحذر} = \text{الخوف} +$ ) (الاحتراز)

We can represent the context of AIKawf sisters in Table III.

TABLE III  
 RELATIONS BETWEEN SISTERS AND SERVANTS WORDS

وقاية	اضطراب	استشعار	استمرار	عناية	مفاجأة	تعظيم	احتراز	الخوف
								✓
							✓	✓
						✓		✓
					✓			✓
				✓				✓
		✓						✓
	✓							✓
			✓					✓
								✓
✓								✓
	✓							✓
								✓
								✓

In Table III the sisters title the rows and the servants title the columns, Boolean value; e.g. tick (✓); in cell (x,y) when word (sister) x has Attribute y. the context compromise from group of words X and group of attributes A, and pointer link each word by proper attribute/s, formally, this table can be considered as binary graph  $I \subseteq W \times A$ , and every concept is an ordered pair (Wi, Ai) as following:

1.  $S \subseteq W$
2.  $P \subseteq A$
3.  $\forall s, s \rightarrow p$
4.  $\forall w, (w \in W) \wedge (w \notin S) \rightarrow \exists a, a \notin P$
5.  $\forall a, (a \in A) \wedge (a \notin P) \rightarrow \exists w, w \notin S$
6.  $\forall w, (w \in W) \rightarrow w = S \cap \cup \neg P$

EXAMPLE:

1.  $S = \{w_2, w_3\}$
2.  $P = \{a_1, a_2, a_3\}$
3.  $w_2 \rightarrow a_1, a_2, w_3 \rightarrow a_1, a_3$
4.  $w_4 \rightarrow a_1, a_4$
5.  $w_2 \rightarrow \neg a_4$

We can represent Dm graphically by bigraph (Figs.1,2)

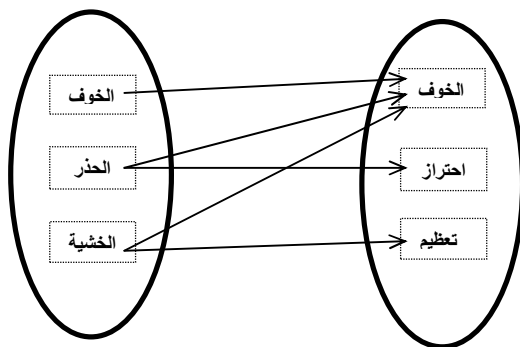


Fig. 1 Bigraph for part of DM

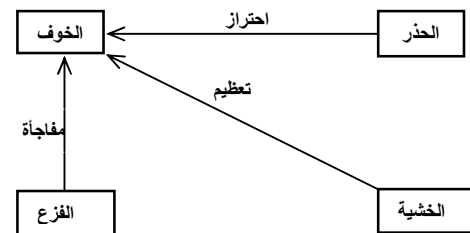


Fig. 2 Graph for part of DM

## V. RESULTS

DM can be represented by using predicate logic, which is computable logic e.g.

- احتراز (الحذر، الخوف)
- تعظيم (الخشية، الخوف)
- مفاجأة (الفرع، الخوف)
- ...

Each one of the sisters (word or concept) becomes main set or main ontology. It is considered as another sister but in another semantic domain, which is in set of servants (attributes). These concepts can be represented by lexical map or concept map or bigraph (Figs. 1,2).

## VI. CONCLUSION

This paper presented Differences Matrix; it was an idea of moral built on some language concepts; the DM could be collected from what were scattered in language dictionaries and glossaries. The holy Quran interpreters who are concerned and focused on language appreciate a matrix that can be used to collect the words supposed to be synonyms, and can easily exclude those that are not.

In addition, the idea for abstraction used to reach a logical formula nearing to represent language, and trying to attain understanding may be employed to lay down the foundations for formal logic that can better deal with language problems i.e. machine translation than other usual Logics, because the language is the source of logic, and the logic is an inactive language, therefore it is better to deduce logical formulas from the source; language; instead of using ready templates. Any logic may be hard to adapt to representing language, and due to that proper methods for ideas used to simplify the computability, Formal concept

theory were used, and in the future some ontology language may be capable of representing it.

This paper deals only with real meanings; the metaphorical meaning needs more extensive research to find out if DM could properly represent it.

#### APPENDIX

TABLE IV

TRANSLATION LIST OF ARABIC WORDS (SYNONYMS) THAT WERE USED

Arabic word	English translation
الخوف	The expectation of hating
الخشَر	Fear with precaution
الخشَبة	Fear tainted by maximizing
الفرع	Sudden fear
الشَّفقة	Care mixed with fear
الرَّهبة	Constant fear
الجَزَع	Sadness preventing man from doing something
الوجل	Fear sensing
الهلع	Sudden fear with disorder
الانقضاء	Prevention of fear

TABLE V

TRANSLATION LIST OF ARABIC WORDS (SERVANTS OR ATTRIBUTES) THAT WERE USED:

Arabic word	English translation
الخوف	Fear
احتراز	Precaution
تعظيم	Maximizing
مُفاجأة	Surprise
عناية	Care
استمرار	Continuation
استشعار	Sensing
وقاية	Protection
اضطراب	Disorder

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