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Abstract. From the traditional perspective, metaphor would be regarded as a literary and ornamental device. Hence, the poets would resort merely to metaphor for the purpose of creativity. Many famous Persian poets such as Attar, Moulana, Sa'adi and Hafiz focused on mystical literature. An important question is that weather the views of these poets regards to using conceptual metaphors differ or not. In this research we response to this question by using statistics and data mining techniques. For this purpose, the poems of Divan of Hafiz and Bustan of Sa'adi, two famous Persian poets, are studied. At first, the conceptual metaphors of these books separately investigate by using data visualization technique. Then, the conceptual metaphors given in these books are compared by applying data visualization technique and chi-square test. The results show that these books are significantly different from each other in view of applied conceptual metaphors.

Keywords: Conceptual Metaphor, Hafiz, Sa'adi, Data Visualization, Statistics, Data Analysis, Text Analysis, Text Mining.

1. Introduction

From the traditional perspective, metaphor would be regarded as a literary and ornamental device. Hence, the poet would resort merely to metaphor for the purpose of creativity. However, as time went by, the attitude toward metaphor was altered and led to utilizing it in colloquial language and considering it as a determining factor in communicating with the world's realities (Gibbs and Steen, 1997). Whereas over the past thousand years philosophers, poets and literary critics have expressed themselves in respect to metaphor, today a considerable number of scholars including linguists have been carrying out investigations in this field. This originates from the fact that metaphor plays a major role in the human contemplation, comprehension, reasoning and, most importantly, creation of social, cultural and psychological realities (Pourebrahim, 2013). Metaphor is a linguistic category which not solely pertains to lexical items; but also encompasses much of human thinking processes (Lakof and Johnson, 1980). When it comes to defining the conceptual metaphor, it has to do with the understanding and analyzing of something by something else (Yu, 1998). Alternatively, a conceptual metaphor comprises two conceptual domains. One of the domains is understood within the framework of the other domain. These two domains have specific names. The domain from which the metaphorical phrases are extracted so as to comprehend the other domain is called source domain, and the conceptual domain which is understood in this manner is called target domain (Pourebrahim, 2013). In other words, the primary objective of a metaphor is to implement the cognitive instrumental form in order to apprehend one concept based upon the apprehension of

the other concept. Thus, not only is metaphor the product of the poet's imagination, but it also reveals his conceptual system (Lakof, 1993). Besides, Kovecses (2002) has mentioned the effect of various cultural, material and intellectual contexts under whose pressure the poet composes poetry and poetic metaphors (Kovecses, 2009).

The major reason why love has been chosen among the other emotional concepts is its significance and prominence in Persian literature. Traditionally, love has been one of the most applicable and the most profound meanings in regard to creating literary masterpieces. Poets have composed numerous great works by utilizing this sense. Love is so broad in meaning that its manifestation varies from one audience to another. Love manifests itself in two ways in Persian poetry, namely human love and mystical love. From the viewpoint of Persian poets, love suggests not merely the affective relationship between two human beings but also a vast category whereby it is likely to understand the philosophy of creation and to account for the mutual relation between the phenomena of the universe. The manifestation of Love differs from one person to another person. Apart from this, love is the best to back us up and to shed light on our path to prosperity (Khorramshahi, 1994). Using a miscellany of common cognitive and literary devices such as metaphors, images, figures of speech and personification, Hafez and Saadi make their best endeavors to conceptualize love. While love tends to be abstract, poetry itself intensifies its abstractness. Kovecses (2002) has classified the common source domains into thirteen categories including *The Human Body, Health and Disease, Animals, Plants, Buildings, Apparatus and Tools, Games and Sports, Commerce, Cooking and Food, Heat and Cold, Lighting and Darkness, Forces, Motion and Orientation*, yet he contends that this classification varies from culture to culture and might be made differently (Pourebrahim, 2013).

This work considers the lines in *Divan of Hafiz* and *Bustan of Sa'adi*. Then the words that have been employed as the alternatives of the word love were categorized in several parts. Then, using data visualization techniques, we explored which words and categories had most uses in these works. Finally, we compared the frequencies of applied alternatives of love in *Divan of Hafiz* and *Bustan of Sa'adi*. To this purpose, the chi-square test is applied.

2. Hafiz, Sa'adi and Love

Hafiz is one of the best Persian poets. Literary and religion were the major fields of his works. His poetries including objectivity, spirituality and love are liked not only by Persians but by the entire world. The influence of his poetries can be observed in life of Iranians. They use his poems as speeches and proverbs. Many of the poetries of Hafiz explain the life's details and the histories of real events. The number of his poems is not numerous. He wrote poems only when divinely inspired; so on the yearly average of his poetries is approximately ten Ghazals (sonnet). *Divan of Hafiz* is his popular book that contains his famous poetries. The style of much poetry in *Divan of Hafiz* is Ghazal.

Sa'adi, along with Moulana and Hafiz, is one of the three famous in Persian poetry. He had important role on Persian literature and language such that many scientists believe that the modern Persian language is based on the language of Sa'adi. In most schools and universities, his poems are used as the references for Persian language and literature. Two famous books of Sa'adi are the *Gulistan* (*The Rose Garden*) and the *Bustann* (*The Orchard*). Moreover, he also has other books that contain his ghazals and qasidas. In Persian studies, Sa'adi is known as a great Persian humanist poet with great poems of love (Yohannan, 1987).

The poems of Hafiz and Sa’adi are considered to be two of the best samples representing love in Persian literature. These two poets have applied the term 'love' abundantly and miscellaneously throughout their works. To Hafiz and Sa’adi, love paves the way for prosperity and perfection, God has created man to be a lover, angels are distinct from man in that the former fail to understand love, and love is specific to man and has been inherent in him since the commencement of his creation. This last trait is the reason for man's superiority over angels. Although in Persian literature love is divided into two categories, that are human love and divine or mystical love, Hafiz and Saadi have focused upon these two aspects and regard the human love as a prerequisite to divinity or mysticism. These two poets attempt to familiarize man with the romantic way of looking at life.

Mahmoudi and Abbasalizadeh (2018a) considered the love and its alternatives in *Bustan* of Sa’adi. Based on Kovecses (2002), they classified the common source domains into twelve categories including *Human*, *Place*, *Animal*, *Nature*, *Object*, *Plant*, *Ultra*, *Sickness*, *Heat*, *Way*, *Drunkenness*, *Tale*. The results indicated that, the words *Fire* and *Pain*, and the categories *Sickness* and *Human* had significantly more uses. Tuan et al. (2019) considered the love and its alternatives in *Divan* of Hafiz. Based on Kovecses (2002), they classified the common source domains into sixteen categories including *Human*, *Place*, *Nature*, *Object*, *Plant*, *Ultra*, *Sickness*, *Heat*, *Way*, *Drunkenness*, *Tale*, *Voice*, *Point or Circle*, *Art or Work*, *Sedition*, *Load*. The results indicated that, the word *Way*, and the category *Human* had significantly more uses.

In this work, at first, data visualization techniques are employed to visualize which words and categories had most uses in the poems of *Divan of Hafiz* and *Bustan of Sa’adi*. Then, the frequencies of the applied alternatives of love in *Divan of Hafiz* and *Bustan of Sa’adi* are statistically compared.

3. Methodology

In this section, we will explain the details of datasets, the literature review about the applications of text and data mining in real world problems, and the techniques that will be applied in this study. In Subsection 3.1, the details of datasets are given. In Subsection 3.2, we report the literature review about the applications of text and data mining in real world problems. In Subsection 3.3, we summarize different text mining techniques that will be applied to study the collected datasets.

3.1. Datasets

Datasets of this work contain the entire texts in *Bustan* of Sa'adi and *Divan* of Hafiz. At first, we explore the applied alternatives of love in *Bustan* of Sa'adi and *Divan* of Hafiz and then categorize them into sixteen categories including *Human*, *Place*, *Nature*, *Object*, *Plant*, *Ultra*, *Sickness*, *Heat*, *Way*, *Drunkenness*, *Tale*, *Voice*, *Point or Circle*, *Art or Work*, *Sedition*, *Load.* Table 1 shows each category includes which words. Tables 2 and 3 summarize the frequencies of these categories and words in *Bustan* of Sa'adi and *Divan* of Hafiz.

Table 1: The applied alternatives of love in *Bustan* of Sa'adi and *Divan* of Hafiz [see Mahmoudi and Abbasalizadeh (2018a) and Tuan et al. (2019)]

Category	**Word**

Human	Army, Baby, Bloodthirsty, Butler, Constable, Doctor, Friend, Glassblower, Human, Killed, King, Loved, Lover, Master, Merchant, Messenger, Musician, Mystic, Oppressor, Prisoner, Rector, Robber, Ruler, Saris, Source of emulation, Speaker, Teacher, Thief, Wise
Place	Alley, Bazaar, Caravan, City, Club, Desert, Home, Market, Mastabeh, Neighbourhood, Prison, Sanctum, School, Square, Tent, Threshold, Trap, World
Animal	Bird, Dragon, Hawk, Horse, Lion, Quadruped
Nature	Cloud, Fountain, Garden, Sanctum, Sea, Sky, Sun, Wind
Object	Amulet, Backgammon, Ball, Booklet, Charter, Chess, Flag, Lasso, Livestock, Mirror, Music Instrument, Spear, Stamp, Stone, Sword
Plant	Abir, Garden, Harvest, Sapling, Thorn
Ultra	Angels Rosary, Ascension, Elixir, Idea, Knowledge, Meaning, Paradise, Question, Religion, Secret, Tradition
Sickness	Damage, Melancholy, Pain, Sorrow
Heat	Baked, Fire, Spark, Sun
Way	Way
Drunkenness	Pub, Wine
Tale	Story

Voice	Voice
Point or Circle	Point, Circle
Art or Work	Art ,Work
Sedition	Sedition
Load	Load

Table 2: The frequencies of the categories used as alternatives of love in *Bustan* of Sa'adi and *Divan* of Hafiz [see Mahmoudi and Abbasalizadeh (2018a) and Tuan et al. (2019)]

		Hafiz		Sa'adi	
Category		Count	%	Count	%
	Human	27	19.0	41	17.4
	Place	15	10.6	23	9.8
	Animal	-	-	3	1.3
	Nature	1	0.7	4	1.7
	Object	5	3.5	20	8.5
	Plant	1	0.7	2	0.9
	Ultra	18	12.7	13	5.5
	Sickness	15	10.6	48	20.4
	Heat	4	2.8	38	16.2
	Way	17	12.0	12	5.1
	Drunkenness	11	7.7	11	4.7
	Tale	6	4.2	20	8.5
	Voice	7	4.9	-	-
	Point or Circle	2	1.4	-	-

	Art or Work	10	7.0	-	-
	Sedition	1	0.7	-	-
	Load	2	1.4	-	-
	Total			235	100

Table 3: The frequencies of the words used as alternatives of love in *Bustan* of Sa'adi and *Divan* of Hafiz [see Mahmoudi and Abbasalizadeh (2018a) and Tuan et al. (2019)]

Word	Hafiz		Sa'adi		Word	Hafiz		Sa'adi	
	Count	%	Count	%		Count	%	Count	%
Friend	3	2.1	1	0.4	Secret	10	7.0	7	3.0
Killed	2	1.4	3	1.3	Idea	2	1.4	1	0.4
Caravan	3	2.1	-	-	Pain	3	2.1	31	13.2
King	4	2.8	6	2.6	Sorrow	10	7.0	14	6.0
Musician	2	1.4	1	0.4	Point	1	0.7	-	-
Robber	1	0.7	1	0.4	Fire	2	1.4	35	14.9
Human	2	1.4	-	-	Circle	1	0.7	-	-
Doctor	2	1.4	-	-	Way	17	12.0	12	5.1
Wise	2	1.4	-	-	Wine	8	5.6	11	4.7
Speaker	2	1.4	4	1.7	Story	6	4.2	20	8.5
Teacher	3	2.1	2	0.9	Constable	-	-	1	0.4
Loved	1	0.7	-	-	Baby	-	-	1	0.4
Lover	1	0.7	-	-	Ruler	-	-	9	3.8
Merchant	1	0.7	-	-	Oppressor	-	-	4	1.7
Source of Emulation	1	0.7	-	-	Army	-	-	3	1.4
Mystic	1	0.7	-	-	Prisoner	-	-	5	2.1
Mastabeh	1	0.7	-	-	Bazaar	-	-	1	0.4
Fountain	1	0.7	-	-	Square	-	-	1	0.4
Desert	2	1.4	3	1.3	Trap	-	-	1	0.4

Threshold	3	2.1	2	0.9	Tent	-	-	1	0.4
Voice	7	4.9	-	-	World	-	-	1	0.4
Neighbourhood	4	2.8	5	2.1	Prison	-	-	6	2.6
Work	6	4.2	-	-	Hawk	-	-	2	0.9
Knowledge	5	3.5	-	-	Horse	-	-	1	0.4
Sea	-	-	3	1.3	Amulet	-	-	1	0.4
Garden	-	-	1	0.4	Stone	-	-	3	1.3
Art	4	2.8	-	-	Spear	-	-	4	1.7
Pub	3	2.1	-	-	Chess	-	-	1	0.4
Sanctum	2	1.4	-	-	Sun	-	-	3	1.3
Melancholy	2	1.4	-	-	Thorn	-	-	2	0.9
Load	2	1.4	-	-	Music Instrument	-	-	3	1.3
Ball	1	0.7	-	-	Angels Rosary	-	-	1	0.4
Sword	-	-	4	1.7	Backgammon	-	-	1	0.4
Lasso	1	0.7	3	1.3	Religion	-	-	1	0.4
Charter	1	0.7	-	-	Meaning	-	-	1	0.4
Flag	1	0.7	-	-	Tradition	-	-	1	0.4
Pearl	1	0.7	-	-	Elixir	-	-	1	0.4
Sapling	1	0.7	-	-	Damage	-	-	3	1.3
Question	1	0.7	-	-	Sedition	1	0.7	-	-
Spark	1	0.7	-	-					

3.2. Literature Review about the Applications of Text and Data Mining

Data mining and analysis are popular techniques to study datasets and extract knowledge from them. Mahmoudi et al. (2018a) applied clustering analysis and chi-square test to study “Love” and its alternatives in Divan of Moulana. Mahmoudi and Abbasalizadeh (2018a) applied

clustering analysis and chi-square test to study “Love” and its alternatives in poems of Saadi. Mahmoudi and Abbasalizadeh (2018b) applied statistical techniques to study the Divan of Khaghani. Mahmoudi and Abbasalizadeh (2018c) considered the similarities between different orders about the revelation of Quran, based on the hierarchical clustering method and the regression analysis. Yin et al. (2019) used text mining techniques to investigate the Divan of Khaghani. Liu et al. (2019) applied statistical techniques to study the different traits of God in the Meccan and Medinan suras of Quran. Many other scientists applied data mining and analysis in different fields [see for example, Haghbin et al. (2011); Mahmoudi and Mahmoudi [(2014a), (2014b)], Mahmoudi et al. (2016), Mahmoudi et al. [(2017a), (2017b)], Jalali et al. (2017), Maleki and Mahmoudi (2017), Maleki et al. (2017), Bahrami et al. (2017), Mahmoudi (2018), Jalali et al. (2018), Mahmoudi et al. [(2018b), (2018c), (2018d), (2018e)], Heydari et al. (2018), Abbasi et al. (2018), Liu et al. (2019), Yin et al. (2019), Maleki et al. (2019), Ji-jun et al. (2019), Mahmoudi et al. (2019)].

3.3. Text Mining and Statistical Techniques

To analyze the datasets, the statistical software *R version 3.6.1* and *SPSS version 25* are used. At first, for *Divan* of Hafiz and *Bustan* of Sa'adi, the frequencies of love and its alternatives are separately compared by using data visualization. Then, the frequencies of love and its alternatives in these works are compared by applying chi-square test.

4. Results

In this section, the results of applied data mining techniques are reported. Subsection 1 reports the data visualization about the love and its alternatives in *Divan* of Hafiz. The results of reports the data visualization about the love and its alternatives in *Bustan* of Sa'adi are

summarized in Subsection 2. The comparison of the love and its applications in *Divan* of Hafiz and *Bustan* of Sa'adi are also given in Subsection 3.

4.1. Data Visualization about the Love and its Alternatives in *Divan* of Hafiz

Figures 1-2 report the data visualization plot about the love and its alternatives in *Divan* of Hafiz. The results indicated that Hafiz usually used the word *Way* and the category *Human* as alternatives of love.

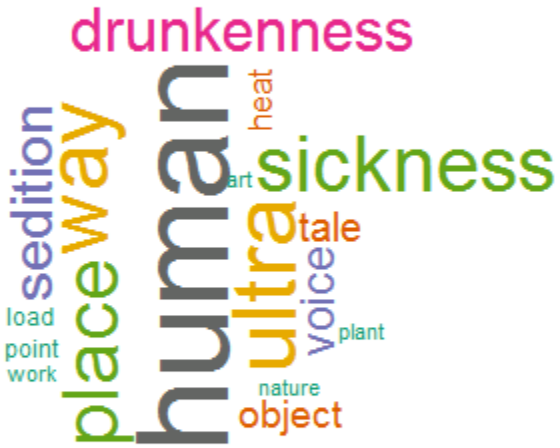

Figure 1: Data visualization about the categories used as alternatives of love in *Divan* of Hafiz

Figure 2: Data visualization about the words used as alternatives of love in *Divan* of Hafiz

4.2. Data Visualization about the Love and its Alternatives in *Bustan* of Sa'adi

Figure 3-4 reports the data visualization plot about the love and its alternatives in *Bustan* of Sa'adi. The results indicated that Sa'adi usually used the words *Fire* and *Pain* and the categories *Sickness* and *Human* as the alternatives of love.

Figure 3: Data visualization about the categories used as alternatives of love in *Bustan* of Sa'adi

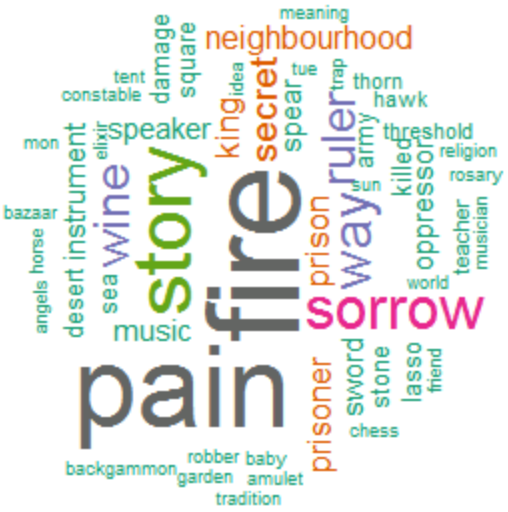

Figure 4: Data visualization about the words used as alternatives of love in *Bustan* of Sa'adi

4.3. Chi-Square Test

In this part, the frequencies of the applied alternatives of love in *Divan* of Hafiz and *Bustan* of Sa'adi are statistically compared by using chi-square test. It can be observed from Table 4 that the frequencies of the applied alternatives of love in *Divan* of Hafiz and *Bustan* of Sa'adi are statistically different, both in words and categories ($p < 0.001$).

Table 4: The comparison of the love and its applications in *Divan* of Hafiz and *Bustan* of Sa'adi

	Test Statistic (χ^2)	P-Value (p, in abbreviation)
Word	268.8	<0.001
Category	128.5	<0.001

5. Discussion

The poems of Hafiz and Sa’adi are considered to be two of the best samples representing love in Persian literature. These two poets have applied the term 'love' abundantly and miscellaneously throughout their works. To Hafiz and Sa’adi, love paves the way for prosperity and perfection, God has created man to be a lover, angels are distinct from man in that the former fail to understand love, and love is specific to man and has been inherent in him since the commencement of his creation. This last trait is the reason for man's superiority over angels. Although in Persian literature love is divided into two categories, that are human love and divine or mystical love, Hafiz and Saadi have focused upon these two aspects and regard the human love as a prerequisite to divinity or mysticism. These two poets attempt to familiarize man with the romantic way of looking at life. As a main concept, love is discussed in many different ways in Hafiz's poems. Sa'adi, along with Moulana and Hafiz is one of the three famous in Persian poetry. He had important role on Persian literature and language such that many scientists believe that the modern Persian language is based on the language of Sa'adi. In most schools and universities, his poems are used as the references for Persian language and literature.

This research studied the different words that Hafiz and Sa'adi employed as the alternatives of love. All the lines in *Bustan* of Sa'adi and *Divan* of Hafiz considered. The alternative of love were explored and categorized in sixteen parts. Then the counts of each word and category were computed and visualized. The results indicated that Hafiz and Sa'adi usually

used the word *Way* (Hafiz), the words *Fire* and *Pain* (Sa'adi), the category *Human* (Hafiz) and the categories *Sickness* and *Human* as the alternatives of love. Finally, we compared the applied alternatives of love in poems of these poets. To this purpose, the chi-square test was applied. The results showed that the applied alternatives of love in poems of these poets were significantly different ($p < 0.001$).

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