An Overview of Information Visualization for Malay Poetry Studies

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ABSTRACT

Information visualization is an application that represents data in a graphical form and meaningful way. In poetry studies, graphics can offer an excellent approach for exploring and presenting features of poetic elements. The significances of representing the poetic features by using graphics in visualization are to provide users with better understanding of poem features and expose the details of texts elements. In recent years, several significant studies have focused on visualization of poem elements. This paper summarizes the visualization of poetry studies and provides analytical views for the potential of information visualization in the Malay poetry study. Various kind of research in this area may assist other researchers to gain insight into the research trends and benefits towards the literary field for exploring text analytics.

Keywords: Information visualization, literary studies, Malay poetry, poem features, text analysis.

I   INTRODUCTION

Visualization can be applied to multidisciplinary domain areas including education, medical, human computer interaction, and engineering. Visualization is a tool that assists observation, facilitates external memorization, stimulates and evaluates hypotheses and disseminates knowledge through effective communication (Chen, Floridi, & Borgo, 2014). The advantage of visualization makes it dominant in various fields including information visualization, scientific visualization, knowledge visualization, visual communication and visual analytics. In information visualization specifically on literary studies, the visualization process uncover the hidden features of poetry that are hard to be illustrated with external memorization including detecting sentiment elements in text data (Kucher, 2018).

Traditional approach is employed to explore the features of the poetry by literary scholar without the power of visualization technology in literary studies. Traditional methods such as oral readings and audio are used to help users to pronounce correct words. These methods indirectly decline the process of poetry learning, as some of the elements in poetry cannot be described verbally. According to Moretti (2005), using visualization in literary studies can help researchers to obtain additional understanding in their related works.

Previous works on Malay studies focused on distant reading which is an abstract view to visualize global features from a single or multiple text (Jänicke, Franzini, Cheema, & Scheuermann, 2015). Little attention has been paid to research on close reading in Malay poetry. Close reading is a process that reads word by word and line by line to explore different features of the texts. Although a few studies exist on close reading in poetry, the studies are mostly focused on English poetry, which is different from Malay poetry.

Thus, this study explores the potential of using information visualization on Malay poetry studies, and some previous works on poetry studies are analyzed. There are several types of Malay poetry such as *pantun, puisi, gurindam* and *sajak*. This research focuses on Malay *pantun* only as a case study to explore their features by using information visualization. These efforts indirectly show the importance of preserving Malay *pantun*.

II   TOWARDS DIGITAL POETRY

Advances in computing have brought a new revolution in many fields including the field of literature. The literary elements are transformed into digital form by using the approaches in information visualization. A piece of data can be represented in an art manner to enhance understanding, and to manipulate a data using graphical form. Based on the research conducted by Levie and Lentz (1982), there are various effects experienced by individuals who study a field of knowledge using pictorial or graphics, which will increase interest and excitement while studying, influencing attitudes, and improving emotional reactions. The effectiveness in presenting spatial information that is difficult to specify in the form of words will be also increased.

Furthermore, in information visualization, the visual channel or visual encoding portrays an important role to convey the information in a meaningful way. The types of visual channel include color, size, spatial position orientation, texture, shape and

direction of motion. Each of these visual channels has certain characteristics and it is used to represent the data according its type. For visualizing poetic variables, visual channels are used to encode the poem features. These channels improve user's view for better understanding. Figure 1 shows the relationship between computer visualization and traditional poetry.
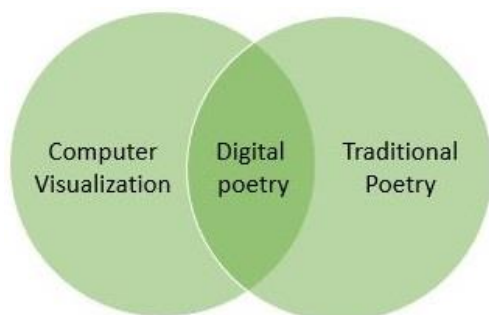

Figure 1. Relationship of Computer Visualization and Traditional Poetry.

In summary, digital poetry provides benefits in conveying underlying meaning in the traditional poetry.

III VISUALIZATION OF POETRY

Research on information visualization that provides an analysis of literary texts has been conducted several years ago. However, before the existence of visualization technology, poetry and visual arts have begun to unite since the 19th century. This can be proved through a visual art of the Man with a Hoe's poetry in 1899 by Jean-François Millet. As the artist reads the poetry, he tandemly transforms the gist of the poetry into an art as illustrated in Figure 2. Meanwhile, in 2017, Wei, Chi, & Lin conducted research on Chinese poetries' artistic conception for digital visualization application. Beneficial through these artworks, the scholar knows the essence of the poems that the poet tries to convey.

Figure 2. Man with a Hoe.

In 2015, the Pameran Wajah *Pantun* exhibition was held at the Art Gallery of Universiti Malaya to showcase the collections of Malay *pantun* artwork. This effort symbolizes the concept of beautiful and uniqueness of thought in *pantun* to be drawn on canvas as shown in Figure 3. Poetry and visual arts are fields of art perspective that commercializes the poetry in a new form. The illusions of poem are illustrated without emphasizing the features of the poem texts. Another perspective is the poetry and information visualization that produces the digital poetry with in-depth analysis of poem features.

Figure 3. Wajah Pantun.

Madani (2005) creates a poem visualization tool that supports general overview of all poems where the length of poem is represented by lines bar. This tool allows users to read the transcriptions of selected poems and have the ability of the search function. Color of poetry by Robinson (2006) is a Spanish poetry visualization tool. This tool analyses almost all linguistic features of texts such as syllabification, intonation, rhyme, meter and pauses. The tool is also capable to highlight parts of semantic interest within the poems. Hermeneutic structure of poem visualization by Piez (2010) deploys glyphs in the form of rectangular and circular map in poem visualization.

Meneses and Furuta (2015) design poetry visualization tool for critical analysis. The visualization consists of Graphwave, SentimentGraph and SentimentWheel. Milton and Lu (2015) develop text visualization tool to generate text pattern within the poem. The height of the pattern changes depending on the stress of texts and the color changes for different phonemes. SPARSAR system for poetry analysis is produced by Delmonte (2015). This system focuses on the graphical output organized at three macro levels, a Phonetic Relational View (for phonetic and phonological features); a Poetic Relational View (for a poem rhyming and metrical structure); and a Semantic Relational View (for semantic and pragmatic relations in the poem). Besides, colors are used to express attitude in the poem whether its sadness or happiness. Mittmann et al. (2016)

provides four levels display of poem element from phonemes all the way up to whole books. This tool also allows users to search and retrieve poems and verses based on specific criteria.

Information visualization enables visual analysis of sonic features in the poem. McCurdy et al. (2016) created a visualization tool namely Poemage as shown in Figure 4 to visualize interactively the sonic topology of a poem. Poemage extracts a range of more complex sonic patterns and visualizes the interaction of such patterns across the space of the poem. Color is also used to link sets and rhyme types across views. Benner (2014) develop computational techniques for analyzing sound play in a corpus namely *The* Sounds of The Psalter as shown in Figure 5. This method enables scholar to find a sound play in a poetry. Coles and Lein (2013) create a digital poetry visualization tools with sonic patterns and the relationships among poems.
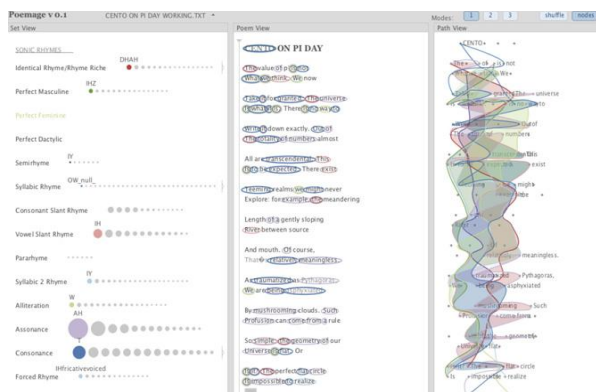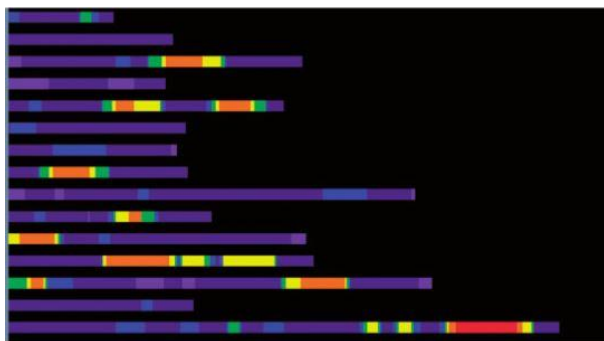

Figure 4. Poemage.

Figure 5. The Sounds of The Psalter.

The visualization tool also supports users with digital close reading. In Chaturvedi et al. (2012), myopia visualization tool is developed to analyze how different features of the text in a poem such as sound, syntax and rhythm work together to create meaning. The tool uses line bars to represent the length of syllables as depicted in Figure 6. The similar visualization tool is developed by Abdul-Rahman et al. (2013), namely poem viewer as illustrated in Figure 7. The elements that include in *poem viewer* are consonants, vowels, assonance, alliteration, rhyme, semantic relations and many

more. Although myopia and poem viewer have similar purpose, which is to visualize the individual component of texts, poem viewer offers detailed features of texts analysis.
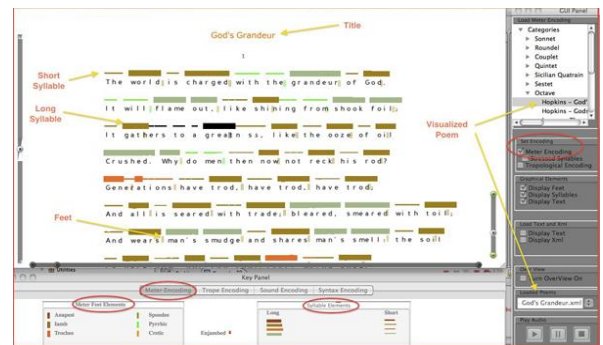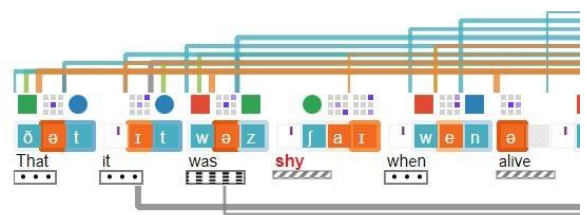

Figure 6. Myopia.

Figure 7. Poem Viewer.

IV VISUAL ANALYSIS OF POETRY VISUALIZATION

From the study in poetry visualization, it can be concluded that researchers have conducted research on poetry visualization focuses on specific purposes such as content, text, pattern, sound and combinations of these. The description of these purposes is described as follows: -

Content: In content, the researcher focuses on the semantic value contained in the poem. The researcher symbolizes the elements in the poem stanza through visual art to illustrate the meaning of the poem. The metaphor becomes the main engine in the poem to be the imaginative material for the artist to envision the poetry related situation. This work requires a high level of artistic skill to translate the meaning of the poetry into a meaningful form of visual art.

Text: Text is a written form of content and it is the main feature in a poem text analysis. It represents the arrangement of phoneme within the poem, and can be represented in the transcription form (phonetic alphabet of IPA). All digital poetry visualization tools use texts as the main element to represent data before transforming texts to graphical elements to create meaningful data.

Pattern: Most of the research that focuses on pattern is a study related to distant reading. It explores the content of poem texts and illustrates the relationships among the texts in the poem. The

patterns that are involved include classifications of poem, word counts, and relationships. Generally, this effort visualizes the pattern of texts to ease exploration and tasks analysis.

Sound: This is an important element when the poetry is studied. The correct pronunciation and melody in the poem reading is a vital form of poem presentation. Rhythm, meter, word sound, melody and stress are the important features in poem. Sound intensely influence the interpretation of the poem. The study of sound can create sound topology and sound play in a poetry.

Combinations: Most researchers use a combination of texts, sound and pattern to produce a comprehensive visualization tool. Texts, sounds and pattern are integrated to develop complete visualization tool for poem analytic. It is easier for scholars to explore all the features available in the poetry.

The research that has the combination of text, sound and pattern can be considered as having a complete poetry visualization features. The benefit of having these features, is that it can provide more support for scholars to read the poem. Table 1 shows the summary of poetry visualization works by several researchers in different perspectives.

V TECHNICAL ANALYSIS FOR MALAY POETRY VISUALIZATION

Based on previous studies on texts analysis in poetry, several features of poem are identified. For example, research on English poem visualization by Abdul-Rahman et al. (2014) has visualized various types of phonetic representation. Meanwhile, McCurdy et al. (2016) focus on analysis of sound in the poem. These studies are known as close reading, whereby the texts are read word by word and line by line to explore different features of the texts. The visualization of texts on close reading assist researchers in text analysis. Some researchers read the texts without understanding important features within the texts. Digital tools analyze the literary texts and they can facilitate scholars to accomplish critical analysis of poetry.

The research work on close reading for Malay poetry such as *pantun* using visualization approach has not been explored. Historically, *pantun* exists as an oral presentation in Malay folks' daily life for entertainment and as jokes. Collaboration with writers, has transformed the *pantun* into text form. This effort indirectly can save the collections of *pantun* from being forgotten by the new generation. Generally, *pantun* is associated with natural elements such as hills, rivers, animals, vegetation, sky, sun and many more for the delivery of explicit and implied content. Inspired from these elements, *pantun* encountered the new transformation by artist who interpret *pantun* through visual arts. The artists illustrate the *pantun* based on its theme. In computer technology view, this *pantun* can be transformed into scientific analysis through visualization. The visualization approach can visualize *pantun* not only in the texts, but also envisage the texts scientific features.

Like English poems, Malay *pantun* has several features such as lines and stanza, number of syllables, phonetic information, and rhyme. Even though similar in features, but there are huge differences in pronunciation. Furthermore, different languages have different set of rules relating to syntax, grammar, lexis, phonetics and phonology (Mohd Don, 2010). Poem viewer is a research that has complete poetry visualization features. However, little attention has been given to design the consonant phoneme. The consonant design represented the part of articulation was hidden. For readers who are not familiar with the articulation part, it is difficult to them to understand the hidden design.

Previous studies in computer visualization discusses that Malay texts usage as a data, as a mean to validate grammar, speech processing, semantic, tokenizer and others. For example the researches have been done by Mohamed Hanum, Abu Bakar, & Ismail (2013), Seman & Jusoff (2008), Abu Bakar & Abdul Rahman (2003), Ismail, Saad, Omar, & Sembok (2013) and Zulkefli, Abdul Rahman & Puteh (2017). The phonetic parts mainly focus by linguistic department. The combination of computer field and linguistic still has a little attention. Even though the research in pronunciation system existed, it is still different in visualization perspective. The texts are compressed with the sound. Hence, the scholar can perceive the representation of texts including their sound in one media without assistance from any devices.

Thus, the ideas on creating poetry visualization are the great works in information visualization field. A lot of information can be shown, which is beyond the capacity of textual display. The research perspectives on poetry visualization are different depending on the research purposes and the language used. Some researchers provide intuitive user interface for scholars to interact with the visualization tool, resulting to more interactive visualization.

Table 1. A Summary Of Poetry Visualization.

Authors	Poem Language	Description	Purpose
(Madnani, 2005)	English	Supports multiple views of poem, displays the length of poem using line bar and provides transcription.	Text, pattern
(Robinson, 2006)	Spanish	Analysis on almost all linguistic features.	Content, text, pattern
(Piez, 2010)	English	Deploys glyphs in poem visualization.	Text, pattern
(Chaturvedi et al., 2012)	English	Develop myopia to analyze different features of texts in a poem such as sound, syntax and rhythm.	Text, sound
(A. Abdul-Rahman et al., 2013)	English	Poem viewer offers more detail features of texts analysis including consonants, vowels, assonance, alliteration, rhyme, semantic relations and many more.	Text, sound, pattern
(Coles & Lein, 2013)	English	Digital poetry visualization tool with sonic pattern.	Text, sound, pattern
(Benner, 2014)	English	Analyzing sound play in a corpus.	Text, sound, pattern
(Meneses & Furuta, 2015)	English	Use Graphwave, SentimenGraph and SentimentWheel for poetry visualization.	Text, pattern
(Milton & Lu, 2015)	English	Generate poem text pattern where height based on stress and colorful phoneme.	Text
(Delmonte, 2015)	English	Has three macro levels of graphical output: Phonetic Relational View, Poetic Relational View, Semantic Relational View. Uses color to express sadness or happiness.	Text, sound, pattern
(McCurdy et al., 2016)	English	Visualize interactively sonic topology of a poem.	Text, sound, pattern
(Mittmann et al., 2016)	Portuguese	Ability to display poem elements from phonemes to whole book. Allow users to search poems based on specific criteria.	Text, sound, pattern

VI CONCLUSION

In this paper, a visual survey of information visualization in poetry studies is presented. Previous research on literary studies that use visualization approach for presenting poetic features is one of the effort to be conveyed to the literary studies along with the current technology. Many poetic features from single phoneme to sound representation have been visualized by the researchers using different methods, and on-screen reading are deemed the most useful. Currently, research in this area has been limited to English literary. Thus, this research can be extended to other languages in the world that have been rarely performed. The requirement for development of a complete Malay poetry visualization system is needed. It creates opportunities to produce new knowledge in literary study through new media learning. Scholars with little knowledge in the field of Malay poetry, and linguistics can analyze poetic features very well and obtain immense benefit through this information visualization.

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