Poetry Mix-up: Preserving Culture with Poetic SMS

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Abstract

Younger generation is fast embracing popular culture thus inadvertently endangering the preservation of intangible cultural sources. Creating awareness in intangible cultural resources, such as traditional poetry, by making it an integral part of the consuming popular culture, we can introduce the topic of preservation to the younger generation. By blending media art and poetry, we have developed a poetry mixer called "Poetry Mix-up" to extend SMS (Short message service) to a new level of self expression and public communication. Using only a SMS sent by the user, the system is capable of creating a new poem by using the existing poetry.

1. Introduction

SMS or short message service is a phenomenon that is sweeping the world [1]. The volume of short messages that Hong Kong people sent during the period December 2006 to November 2007 amounted to 3.28 billion, a record high since OFTA (Office of the Telecommunications Authority) started collecting the figures in 2002, translating into an increase of 26% as compared to the same period in 2005 and 2006 [2]. This is a testimony to the immense popularity and the escalation of text messaging. But it is also has to be noted SMS is primarily used for peer-to-peer communication. It is not widely used in promoting public or social communication combining art and culture.

Poetry Mix-up is an extension of the existing text messaging to a new level of self-expression and public communication, combining media art and poetry. Furthermore, it will provide a means of expression in the language that younger generation can understand, and the forms of social communication, which is an essential part of their lives. The application enables a person not only to express herself artistically but also entertain the masses in a form of digital graffiti. It also uses the youth social communication phenomena of "mixing" or "mash-up." Mixing was made popular from hip-hop culture in the 1980's and 90's which has continued to be music and visual DJ (disk jockey)

and VJ (video jockey) culture which young people presently enjoy. Regardless of the context, the essential idea remains the same. A mash-up allows users to combine information of varying granularity from different, possibly disparate sources [3]. "Mashups" are a recent related phenomenon in the Internet. In essence, they are web applications that combine information from different sources to produce derivative works. Mash-ups allow users to combine bits and pieces and personalize their individual experiences, since mash-ups can vary greatly from one user to another. Recently, MSNBC ran a feature on how the internet has given power back to the people to customize their experiences [4]. The explosion of mash-ups has prompted companies to provide even more control to users by increasing the variety of sources users can combine information from. Examples include Yahoo Pipes [5], and Mash-o-matic (Murthy et. al). By using these methods of youth culture, we aim to preserve traditional culture using new media literacy.

There are several modes available in Poetry Mix-up. These modes can be activated based on user requirements as shown in Figure 1. In the basic mode the application will only display SMS on the poetry mixer in an interesting way. The polling mode enables the application to gather data from the public. The most interesting aspect of Poetry Mix-up is its ability to create poetry based on users SMS.
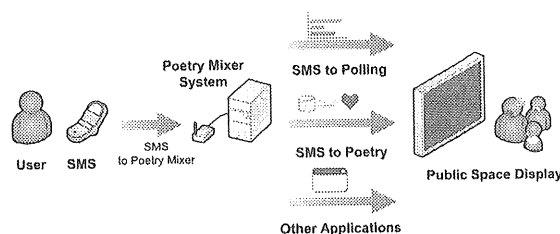

Figure 1: Concept design of Poetry Mix-up

Most of the people are very keen to express themselves in public. Graffiti is a one form of public expression that is very popular in mid 70s. However with the growth of modern technology, people are finding new mediums to express themselves. Blogs enable people to share their ideas with millions of others all over the world. Today Internet websites such as "Youtube" are popular ways people share

their videos and pictures with others. It is important for researchers to create novel ways for people to express themselves.

Technological development poses a certain danger to us that it will distance us from our cultures. Younger generations interacting with these new technologies are getting absorbed into the popular cultures very fast. Literary arts such as poetry are less interesting to them [6]. Many of them would not go through the literary work such as poetry just for the joy of it [7]. This poses grave threat to some cultures. But it is not an inherent limitation of the technological development that is causing this, but it is how we use this new technology. New technologies have successfully being used to preserve various cultures. But we believe true preservation will not happen in a piece of plastic or silicon. It will truly happen in the hearts and minds of people. Forcing the literary work on younger generation may not be the correct answer. We believe if, the traditional literary work can be wrapped around modern technology, the younger generation will be able to understand and appreciate it while enjoying the works of art like many generations before them.

Poetry is deeply rooted in traditional culture, which we will re-capture in our system. It is also a wonderful way of expressing our inner thoughts. Studies have shown that poetry can be used very effectively to improve mental health [8].

Every one of us has some level of artistic or poetic ability, but it is very hard for most of us to actually create a poem. Especially the younger generation may not have the necessary background or the knowledge to create a poem. Therefore, we need a methodology to bridge this gap. SMS provide ideal basics because the younger generation is very much familiar with the technology. Not only that most young people today do own a mobile phone, so it is readily available.

By recreating an application that captures youth social communication phenomena of "mixing" or "mash-up" using poetry, it would be very appealing to the younger generation. Even though it takes years of practice to be a good DJ, by combining SMS it only takes few seconds for any one to be transformed to a poetry jockey. The interesting fact of "mixing" it allows creation of unique and personal art work using existing work. Similarly a very personal and unique poetry mixer can be created when it uses the users' SMS as the basis for the mixing.

2. Background

Today we build countless applications that provide entertainment to the younger generation but only limited number of them actually combines art and culture to enrich their experience. Following are some of the research work carried out combining art,

social, cultural, and physical interaction. One of the pioneering works in cultural computing was ZENetic computer [9]. It is an interface that evokes self-awakening through important aspects of Zen Buddhist culture. It tries to offer users a chance to engage and understand Buddhist principles of 'recreation' of the self. With stories portrayed in ink, haiku, and kimono, the ZENetic conveys the rich allegorical interactive characteristic of Eastern philosophy.

Researchers around the world have being experimenting with different combinations of art, social communication, and mobile messaging. The mobile phone has already been used as a medium of self expression [11]. Ballagas et al. [12] discuss enabling interactions with large public displays using mobile phone. They have used the embedded camera on mobile phones as an enabling technology. Ballagas et al.'s "Point & Shoot" technique allows users to select objects using visual codes to set up an absolute coordinate system on the display surface instead of tagging individual objects on the screen. Joe Blogg [13] is a public display where users can contribute content by sending messages and images to it using their mobile phones. TexTales [14] is a large-scale photographic installation to which people can send SMS text message captions. It can create technologically supported public discourse spheres in which they can both represent personal views and practice new ways of forming collective opinions. Mobile phone can also act as a controller of a public display, for example in the Blinkenlights [15] project, the upper eight floors of the building were transformed in to a huge display by arranging 144 lamps behind the building's front windows. By using mobile phone users could play a game of "Pong."

Essentially, most poetry generation so far has consisted of randomly choosing words and making the resulting phrases fit in a predefined language grammar. Such attempts at generating language prose have been in a similar vein as PROSE or RACTER [16]; two examples that exist in publication. These are in turn similar to ELIZA [17] and FRED [18], in their approach, which consists creating prose at random but suited to a grammar template. However, natural language generation which aims to mimic communication between man and machine is inadequate when it comes to generating poetry. Poetry possesses characteristics such as rhythm and rhyming schemes. Furthermore, poems generally do not have clear and well defined communication goals. They rely rather on abstract and figurative language, encouraging the reader to form their own conclusions as to the meaning. In view of these differences, a revised poetry generation model is required. Manurung et al. [19] recently proposed the "Stochastic Hillclimbing Model" which attempts to address these difficulties. In our model, we integrate a number of techniques from different disciplines

such as information retrieval and natural language understanding, and augment the system with emotional intelligence to generate a poem which is both meaningful and capable of entertaining the user.

The poetry mixer consists of some of the features found on these previous systems but it concentrates on promoting artistic and social communication for younger generation through poetry. The system is capable of displaying users SMS directly, gather data using polls. The most notable feature of the system is its ability to create poetry. For poetry generation it combines data mining techniques, part of speech tagging, and emotional analysis of the text to come up with a most suitable poetry lines.

3. System overview

Several modes of Poetry Mix-up are available which can activate to the requirements of the user. In the basic mode the application will only display SMS in an attractive way. The polling mode enables the application to gather data from the public. In the poetry mode a poem will be created with the means of the user SMS. The application enables the user to assume the role of a poetry jockey.

3.1 Poetry generation

The poetry generation process in the poetry mixer consists of several stages. The system uses three different criteria to shortlist discrete sets of poem lines. The schematic in Figure 2 illustrate this process. Three separate analyses are performed on each incoming message.
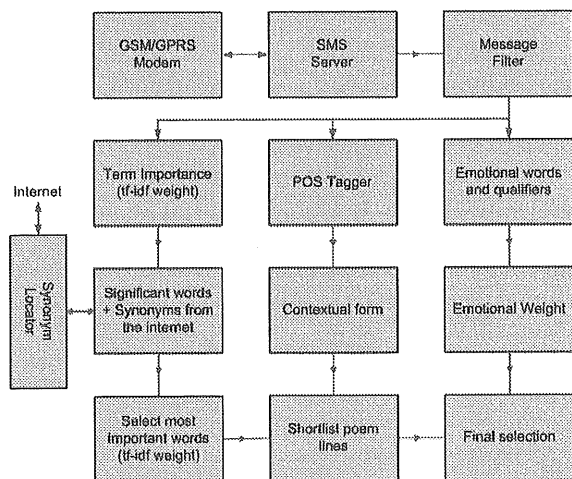

Figure 2: Poetry generation system overview

3.2 Term Importance

Given an input message, the words in the message are arranged according to their importance. For instance, in the sentence "I love thunder and rain," "love," "thunder," and "rain" would be the most important words. Because, very common words such as "I," "and," and "the" would appear in many of the poems, so they are less helpful in identifying a suitable poetry line. The uncommon words such as "thunder" would be more useful in identifying a suitable poetry line. System also grabs synonyms from the Internet [20] to expand the search criteria. This would enable the system to provide an unexpected and surprising result. The importance of a particular word is denoted by a numerical weight. This number, called the tf-idf weight, is the multiplication of two values: the term frequency (tf) and inverse document frequency (idf). The weight is often used in information retrieval and text mining.

The term frequency is a measure of how often a term is found in a collection of documents, in this case poem lines. The inverse document frequency is effectively a measure of how rare a particular term is. It is calculated by total number of poem lines divided by the number of poem lines containing the term. Very common terms ("the," "and," etc.) will have a very low IDF and are therefore often excluded from the shortlisted lines. Then TF divided by the IDF is a statistical weight of how important a particular word in the set of poems.

Given a query of i words, the end result is to calculate this weight (w) for each word in every poem line.

$$w_{i,d} = tf_{i,d} \times \log(n/df_i) \qquad (1)$$

Where; $tf_{i,d}$ is term frequency of the ith word in each poem line in a set of d poem lines. n is the total number of poem lines. df_i is the document frequency of the ith word. For each word i, the system then returns the poem lines such that $\sum w_{i,d}$ is maximized.

3.3 Word sense disambiguation

One key success factor of the system is the ability to make meaningful connections between user input and the poem lines in the database, resulting in an original and meaningful poem. For this purpose, word sense disambiguation is necessary and this is the second part of the analysis. The system uses a part of speech (POS) tagger for basic disambiguation. The tagger used in Poetry Mix-up is the English POStagger [21], primarily for the tagging speed and ease of integration.

The input message and each poem line in the database are tagged using a POS tagger. In order to avoid poems that do not make sense, these tags are used to pick only those poem lines which use a

particular keyword or its synonym in the same sense as in the input message.

3.4 Emotional Weight

Analogous to the tf-idf weight described earlier, which ranks words in the input message according to importance, the third analysis is the calculation of an emotional weight. This attaches a numerical value to the mood or emotional content of the message.

The system maintains a database of words that can influence the emotional state of the sentence, along with the corresponding weight of the word along two axes: degree of arousal and degree of pleasantness. The weights are modeled after the Russell Dimension for emotions [22]. In addition, a database of qualifiers and their corresponding multipliers are also maintained. For instance, the phrase "not happy" will result in the weights of the word "happy" being multiplied by negative one which will yield in a result closer to the emotional weight of "sad."

The system thus analyses the input message for such emotional words and qualifiers. Ultimately, the message will be attached a numerical value denoting the emotional weight. In a similar manner, all the poem lines in the database will also be assigned a numerical emotional weight. The system will then shortlist lines with weights that are closest to the weight of the input message.
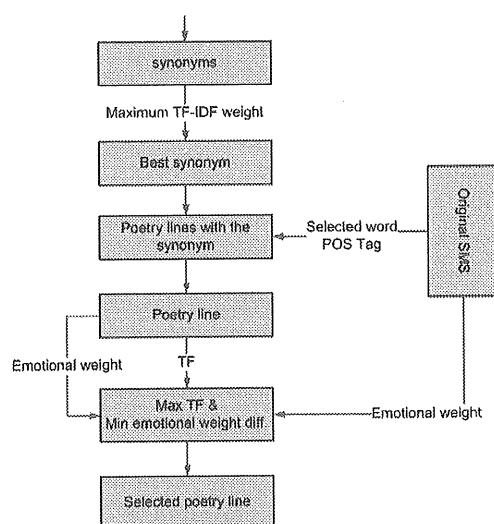
3.5 Final Selection

Figure 3: Poetry selection

These three processes are important to the final output. In the first case, the significant words whose tf-idf weights are highest will be augmented by fetching synonyms from the internet. A second round of calculation of tf-idf weights results in the most important words from this combined set. These words, together with the contextual tag from the POStagger and the term frequency of the lines are used to shortlist poem lines. Only the poem lines which contain these words used in the same context (noun, verb, etc.) as well as term frequency is highest are shortlisted. The final output to the user will be the lines that maximize the term frequency and minimize emotional weight difference (closest in emotional weight to the input message) of the poetry.

4. Results

Suppose the user sends the SMS "On this day, I speak only of the glorious consequence."

Output from the POS Tagger;

On/IN this/DT day/NN I/PRP speak/VBP only/RB of/IN the/DT glorious/JJ consequence/NN

For this example, the words are identified as follows;

Table 1: POS Tagger Tags

On	IN	Preposition or subordinating conjunction
this	DT	Determiner
day	NN	Noun, singular or mass
I	PRP	Personal Pronoun
speak	VBP	Verb, non-3rd person singular present
only	RB	Adverb
of	IN	Preposition or subordinating conjunction
the	DT	Determiner
glorious	JJ	Adjective
consequence	NN	Noun, singular or mass

Based on the Russell Dimensions, the line is assigned numerical values based on the emotional weight along two axes. The poetry mixer maintains a list of words and qualifiers that influence the emotional state of the line or message. The system searches for the occurrence of these words in the message. In this example, the result is as follows. The word "glorious" produces a positive value (+1) on the degree of pleasantness axis.

Table 2: Emotional Weight of Message

x-value (Degree of pleasantness)	+1
y-value (Degree of agitation/arousal)	0
On this day, I speak only of the glorious consequence	(1,0)

Important words selected are "glorious", "only", and "consequence" based on term importance. The number of words selected corresponds to the number of poetry lines generated by the system. The application selects three words in the default setting. The tf-idf weights of all the words in the SMS are shown in Table 3.

Table 3: The tf-idf weights of the words

Word	tf-idf weight
glorious	*1.73*
only	*1.65*
consequence	*1.49*
speak	1.30
day	1.19
on	0.78
this	0.71
i	0.66
the	0.55
of	0.45

Table 4: Fetching synonyms

Word	Synonyms
glorious	magnificent, splendid, brilliant, resplendent, splendiferous, glorious
only	lonesome, sole, lone, solitary, alone, but, just, merely, simply, exclusively, solely, entirely, only if, only when, only
consequence	effect, result, upshot, outcome, event, issue, aftermath, moment, import, consequence

The system then searches synonyms for each of these selected words. For example, synonyms found for word "only" would include "simply," "merely," and "solely." Similar sets of synonyms are found for "glorious" and "consequence." In this case, the following words were chosen from the set augmented with synonyms: "glorious", "only", and "consequence". The complete sets are shown in Table 4.

The system calculates the tf-idf weights of all the words in these augmented sets once again. The final lists of tf-idf weights, sorted in descending order, are shown in tables 5, 6 and 7. Note that the words that are not in the system are not shown in the tables.

Table 5: The tf-idf weights of synonyms for "glorious"

Word	tf-idf weight
glorious	**1.73**
magnificent	1.62
brilliant	1.51
splendid	1.26

Table 6: The tf-idf weights of synonyms for "only"

Word	tf-idf weight
simply	**4.32**
only	1.65
Solitary	1.63
alone	1.51
Lonesome	1.39
merely	1.30
solely	1.13

Entirely	1.08
lone	1.06
sole	0.95
just	0.84
but	0.62

Table 7: The tf-idf weights of synonyms for "consequence"

Word	tf-idf weight
event	**1.51**
consequence	1.49
import	1.44
result	1.39
effect	1.17
moment	0.95

In each set, the word with the highest weight is selected ("glorious", "simply," and "event"). Subsequently in the first step, for each selected word the system shortlists poetry lines where the term frequency of the word is highest, the selected word is used in the same context as in the original SMS, emotional weight of the poetry lines is closest to the emotional weight of the SMS are shown in table 8, 9 and 10.

Table 8: Poetry lines for "glorious" (selected for "glorious")

Line	tf	Emotional weight
The glorious Sun uprist:	0.20	(1,0)
My bosom underwent a glorious glow	0.17	(1,0)
A heterogeneous mass of glorious blame	0.17	(1,0)
Were something very glorious to behold	0.17	(2,0)
Their Gallic names upon a glorious day	0.14	(1,0)

Table 9: Poetry lines for "simply" (selected for "only")

Line	tf	Emotional weight
Very simply	0.50	(0,0)
And say simply	0.33	(0,0)

Table 10: Poetry lines for "event" (selected for "consequence")

Line	tf	Emotional weight
Tonight then is a rare event,	0.17	(0,0)
Must the event decide between the two?	0.14	(0,0)

In the final phase, poetry line that maximizes the term frequency and minimizes the emotional weight difference (closest in emotional weight to the input

message (which as mentioned above is (1, 0))) is selected. Following is the final output of the system;

The glorious Sun uprist:
Very simply
Tonight then is a rare event,

4.1 User Experience

Previous versions of BlogWall have been shown in several exhibitions. When users discover what the system can offer in poetry mode they start exploring their own poetic nature and try to create a beautiful poem. One of the rewarding findings of the system is that most users like to take photographs with the message they have send, using the very mobile phone they used to send it.

5. Conclusion

Poetry Mix-up is a novel mobile artistic media application which promotes self-expression and public communication, combining media art and poetry. Most notable feature of the application is its ability to create poetry using users SMS. The application combines data mining, part of speech tagging and emotional analysis to generate poetry. The system recreates youth social communication phenomena of "mixing" or "mash-up" using poetry. The novel interface to poetry as well as wide usage of SMS among younger generation would make this application very appealing to younger generation. With this effort we hope to create new form of SMS art as well as attractant younger generation to literary works such as poetry.

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