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A Computational Framework for Syntax-Driven Structured Analysis of Imagery in Tang and Song poems 方称宇 ......................................................... 289
A Computational Framework for Syntax-Driven Structured Analysis of Imageries in Tang and Song Poems

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Abstract

This paper describes some pioneering work between City University of Hong Kong and Yuan Ze University in Taiwan to set up a computational framework for the study of the creative language employed in classical Chinese poetry. In particular, it addresses the issue of syntax-driven structured approach to the analysis of poetic imagery. It will first of all describe an existing ontology of imageries extracted from a collection of poems written during the Tang and the Song dynasties (7th-14th centuries AD). It will then propose the augmentation of such imageries into primary, complex, extended and textual imageries. A rationale of such a structured approach is that while poets may use a common dichotomy of primary imageries, creative language use is to be found in the creation of complex and compound imageries. While this approach will support analysis of inter-poet stylistic similarities and differences, it will also effectively reveal intra-poet stylistic characteristics. This article will then describe a syntactic parser designed to produce parse trees that will eventually enable the automatic identification of possible imageries and their subsequent structural analysis and classification. Finally, a case study will be presented that investigated the syntactic properties found in two lyrics written by two stylistically different lyric writers in the Song Dynasty.

Keywords: imagery, ontology, parsing, lyrics, poetry, Chinese, stylistic analysis, Su Shi, Liu Yong

1. Introduction

The language of poetry is different from that employed in other categories of writing. “Defined from a linguistic perspective, poetry represents a variant form of language, different from speech and common writing, unique in its own way as a linguistic system.” (Yuan 1989: 2). The difference of poetic language from other types of writing typically exists in its intentionally polysemous readings through the creative use of imageries as part of the poet’s artistic conception. Classical Chinese poetry, because of its formal restrictions in terms of syllables, tonal variations and rhyming patterns, commands a language system that appears to be particularly concise, finely rich, highly rhetorical, and thus linguistically complex, requiring a high degree of creativity to write, sophisticated interpretation to read and often a significant level of difficulty to understand.

1 Work described in this article was disseminated at the International Workshop on Adaptation of Language Resources and Technologies to New Domains (17 September 2009, Borovets, Bulgaria). An earlier version of the article included in the proceedings under the title “Adapting NLP and Corpus Analysis Techniques to the Study of Classical Chinese Poetry” (Fang et al. 2009). It has since been revised according to comments and suggestions received from Professor Edwin Thumboo.
This article addresses the issue of machine-aided analysis and understanding of classical Chinese poetry in general and attempts to establish a computational framework (cf. Figure 1) within which both inter- and intra-poet stylistic differences and similarities can be usefully investigated with firm grounding in textual analysis from a linguistic perspective. In particular, we believe that the creative language of poetry can be effectively investigated through its manipulation of imageries and through the range of linguistic devices that help to achieve the poetic articulation of the intended artistic ambience.

![Diagram](image)

Figure 1. A computational framework for the computer-aided analysis and understanding of classical Chinese poems.

The term *imagery* is often used interchangeably with *image* and the term *figurative* is also preferred by many to cover the various functions that images perform (Thumboo, personal communication). To quote The Concise Oxford Dictionary of Literary Terms (Baldick: 2004),

*imagery*, a rather vague critical term covering those uses of language in a literary work that evoke sense-impressions by literal or figurative reference to perceptible or ‘concrete’ objects, scenes, actions, or states, as distinct from the language of abstract argument or exposition. The imagery of a literary work thus comprises the set of *images* that it uses; these need not be mental ‘pictures’, but may appeal to senses other than sight. The term has often been applied particularly to the figurative language used in a work, especially to its metaphors and similes. Images suggesting further meanings and associations in ways that go beyond the fairly simple identifications of metaphor and simile are often called symbols. The critical emphasis on imagery in the mid-20th century, both in New Criticism and in some influential studies of Shakespeare, tended to glorify the supposed concreteness of literary works by ignoring matters of structure, convention, and abstract argument: thus Shakespeare’s plays were read as clusters or patterns of ‘thematic imagery’ according to the predominance of particular kinds of image (of animals, of disease, etc.), without reference to the action or to the dramatic meaning of characters’ speeches.

In this article, we differentiate *imagery* from *image* in the sense that imagery denotes a system of component parts while image tends to be monolithic and indivisible. Imagery in this sense coincides with the structured approach to imagery analysis that we will describe later in this article. The term *imagery* is also used in this article to refer to the component images (imageries), strengthening the notion that imagerial meanings are componential, divisible and therefore computationally trackable according to a structured paradigm. We will first of all describe an ontology of imageries that has been created for the poems written during the Tang and the Song
dynasties, ranging from the seventh century AD to the thirteenth century AD. We will then propose a new, structured approach towards the extraction and classification of imageries, according to which poetic imageries can be categorised into primary, complex, extended and textual sub-types. Since the automatic processing of imageries in this fashion requires syntactic analysis, we shall then move on to the description of a syntactic parser that provides a structured description of the syntactic constituents for classical Chinese poetry. We finally present a preliminary syntactic analysis of two contemporary poets from the Song dynasty in support of a syntax-based approach to the processing and understanding of classical Chinese poetry.

2. An Ontology of Imageries

Lo (2008) describes an ontology of imageries designed for the study of classical Chinese poetry. The complete collection of the poems from the Tang dynasty was processed at the lexical level. The collection comprises 51,170 poems by 2,821 poets totaling 4,767,979 characters. Individual characters were segmented into meaningful word units before such units were indexed according to their semantic class. A synonymous set was created for synonymous word units and each set was described by a keyword. For example, “一年” (one year) is the key word for the following five variant synonymous WUs forming the synonymous set designated by “一年”:

As an example, a search for imageries involving the use of the concept “冬” (winter) in the seasons category would yield 221 records, representing 214 lines from 193 poems by 107 poets. They contain 31 different word units. Table 1 shows a list of such expressions sorted according to frequency in descending order.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Chinese</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>三冬</td>
<td>three winters</td>
</tr>
<tr>
<td>22</td>
<td>冬春</td>
<td>winter spring</td>
</tr>
<tr>
<td>22</td>
<td>嚴冬</td>
<td>harsh winter</td>
</tr>
<tr>
<td>20</td>
<td>窮冬</td>
<td>impoverished winter</td>
</tr>
<tr>
<td>20</td>
<td>經冬</td>
<td>enduring winter</td>
</tr>
<tr>
<td>13</td>
<td>無冬</td>
<td>no winter</td>
</tr>
<tr>
<td>6</td>
<td>冬夏</td>
<td>winter summer</td>
</tr>
<tr>
<td>6</td>
<td>冬雪</td>
<td>winter snow</td>
</tr>
<tr>
<td>6</td>
<td>洁雪</td>
<td>clear winter</td>
</tr>
<tr>
<td>5</td>
<td>冬天</td>
<td>winter day</td>
</tr>
<tr>
<td>5</td>
<td>冬盡</td>
<td>winter end</td>
</tr>
<tr>
<td>5</td>
<td>冬衣</td>
<td>winter clothes</td>
</tr>
<tr>
<td>5</td>
<td>去冬</td>
<td>previous winter</td>
</tr>
<tr>
<td>4</td>
<td>一冬</td>
<td>one winter</td>
</tr>
<tr>
<td>4</td>
<td>冬來</td>
<td>winter arriving</td>
</tr>
<tr>
<td>4</td>
<td>冬寒</td>
<td>winter cold</td>
</tr>
<tr>
<td>4</td>
<td>冬景</td>
<td>winter scene</td>
</tr>
<tr>
<td>4</td>
<td>凍冬</td>
<td>cold winter</td>
</tr>
<tr>
<td>4</td>
<td>過冬</td>
<td>spend winter</td>
</tr>
<tr>
<td>3</td>
<td>冬令</td>
<td>winter season</td>
</tr>
<tr>
<td>3</td>
<td>冬秋</td>
<td>winter autumn</td>
</tr>
<tr>
<td>3</td>
<td>寒冬</td>
<td>cold winter</td>
</tr>
<tr>
<td>2</td>
<td>入冬</td>
<td>entering winter</td>
</tr>
<tr>
<td>2</td>
<td>冬去</td>
<td>winter departing</td>
</tr>
<tr>
<td>2</td>
<td>冬深</td>
<td>winter deep</td>
</tr>
<tr>
<td>2</td>
<td>初冬</td>
<td>early winter</td>
</tr>
<tr>
<td>2</td>
<td>見冬</td>
<td>showing winter</td>
</tr>
<tr>
<td>1</td>
<td>冬初</td>
<td>winter start</td>
</tr>
<tr>
<td>1</td>
<td>早冬</td>
<td>early winter</td>
</tr>
<tr>
<td>1</td>
<td>残冬</td>
<td>remnant winter</td>
</tr>
<tr>
<td>1</td>
<td>逢冬</td>
<td>meeting winter</td>
</tr>
</tbody>
</table>

Table 1. Poetic expressions in the Complete Collection of Tang Poems involving the imagery winter.

3. A Structured Approach to the Analysis of Imageries

In this article, we propose a more structured approach to imageries than what was described in the previous section. While the ontology remains more or less sufficient for descriptions of classical Chinese poems, the imageries themselves need to be reprocessed to reveal their inner structures. For
instance, the imageries involving “冬” (winter) in Table 1 can be analysed into the following according to the role of winter within the phrase structure. Consider Table 2.

<table>
<thead>
<tr>
<th>Function_{winter}</th>
<th>Function_{collocate}</th>
<th>Collocate</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>head</td>
<td>modifier</td>
<td>嚴,窮,凍,去,凌,寒,初,殘,早</td>
<td>64</td>
</tr>
<tr>
<td>head</td>
<td>determiner</td>
<td>三,無,一</td>
<td>42</td>
</tr>
<tr>
<td>complement</td>
<td>verbal</td>
<td>經,過,見,深,去,人,遠</td>
<td>33</td>
</tr>
<tr>
<td>modifier</td>
<td>head</td>
<td>雪,衣,天,景,寒,令,初</td>
<td>28</td>
</tr>
<tr>
<td>head</td>
<td>coordination</td>
<td>春,秋</td>
<td>25</td>
</tr>
<tr>
<td>subject</td>
<td>verbal</td>
<td>盡,來</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 2. A structured analysis of winter imageries.

Table 2 has four columns. Function_{winter} shows the phrase-internal function of winter, the imagery in question. Function_{collocate} indicates the phrase internal function of the collocates co-occurring with winter. Collocate lists the actual collocates and F the number of occurrence of Function_{winter}. The rows are arranged according to F in descending order. As can be seen, of the 216 poetic expressions in the Complete Collection of Tang Poems involving the imagery winter, there are seven types of structural analysis, of which modifier+head_{winter} is the most frequent, occurring 64 times. This structure also has nine different types of instantiations of the modifier as collocates with winter, namely, “嚴” (harsh), “窮” (impoveryished), “清” (clear), “去” (previous), “凌” (cold), “寒” (cold), “初” (early), “殘” (remnant), and “早” (early). It is apparent that modifier+head_{winter} is not only the most significant in frequent terms but also in terms of the variety of its collocates.

It is thus evident that the poetic expressions involving winter could have a more structured and therefore refined representation than what is currently available. We thus propose to distinguish the following types of imageries: primary, complex, extended, and textual:

- **Primary imageries** refer to those head nouns that may have an imagery potential. Winter, for example, is a primary imagery.

- **Complex imageries** refer to primary imageries that have either a premodifier or a determiner. By this definition, “嚴冬” (harsh winter, modifier + head) is a complex imagery and so is “三冬” (three winters; determiner + head).

- **Extended imageries** are defined to include those complex imageries that either serve clausal functions with an overt subject-verb-object structure or with other syntactic constructs that function as predicates.3

- **Textual imageries** are represented in the poem as a system of extended imageries, carefully intended and designed by the poet as part of the artistic conception and articulation.

The four types of imageries thus correspond to four levels of linguistic analysis: word-class, phrasal, clausal and textual as schematised in Figure 3.

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3 In contemporary as well as classical Chinese, grammatical categories can be used interchangeably. The syntactic function of a predicate, for instance, can be performed variously by a verb phrase, an adjective phrase, or often a prepositional phrase. See Section 5 for additional information.
Figure 3. A schematised correspondence between structured imagery analysis and different levels of linguistic analysis.

The neat correspondence between structured imagery analysis and different levels of linguistic analysis shows that linguistic analysis can be deployed as a stepping stone between poems as raw texts and an ontology of structured imageries derived from the nominal groups (noun phrases). Computation can be performed on the expressions of imageries according to the clausal structure to derive extended imageries. If necessary, techniques for textual analysis can be applied to extended imageries to represent the raw text as a system of interrelated extended imageries.

The structured approach towards the analysis of imageries described in this section will have two immediate applications. The first has to do with the automatic extraction, analysis and classification of imageries, which practically means that ontology generation can be fully automated. The second application lies in the actual analysis of classical Chinese poems. The idea that there is an intrinsic structure within imageries makes it possible to stratify and hence better analyse imageries from lexical, grammatical, syntactic and textual perspectives (cf Figure 3). In the analysis of two poets for inter-poet stylistic differences and similarities, it might be possible that the two poets both make use of a similar set of primary imageries measured in terms of lexical use and semantic grouping. Their creative use of language, which marks them as two different poets or even two distinctive stylistic schools, comes from the creative manipulation of such primary imageries by way of complex imageries, extended imageries and textual imageries.

4. A Syntactic Parser for Classical Chinese Poems

The transfer of nominals to a structured representation of imageries thus requires a syntactic parser of classical Chinese poems. This section describes a parser that represents perhaps the very first effort to analyse poetic lines in a syntactic way.

The current version of the parser is driven by a phrase structure grammar (PSG) for the generation of syntactic trees. Written in Java, it takes two input files, one as a collection of PSG rules and the other containing a poetic line where each component character is tagged with a part-of-speech symbol. It produces all of the possible syntactic analyses for the poetic line permissible by the grammar. Consider the following line from a song lyric (詩, Ci) written by Liu Yong (柳永) in the Song Dynasty.

殘日下, 漁人鳴榔歸去。
(Under the setting sun, fisher men bang the rod and leave for home.)

Each character in the above text is POS tagged to yield the following input text where a POS tag is assigned and associated with the character by an underscore:

残_adj 日_n下_marker, _punc漁_n人_n鳴_v榔_n歸去_v + _punc

\[\text{3 The parser is adapted from an earlier version written by Mr Norman Goalby as part of his MSc thesis (Goalby 2004) supervised by the first author of this article at the Computer Science Department, University College London.}\]
A PSG grammar is written in the following manner:

\[
S \to \text{PP} \text{ NP} \text{ VP} \\
\text{AJP} \to \text{adj} \\
\text{NP} \to \text{NP} \text{ n} \\
\text{NP} \to \text{AJP} \text{ n} \\
\text{NP} \to \text{n} \\
\text{PP} \to \text{NP} \text{ marker punc} \\
\text{VP} \to \text{VP} \text{ VP} \\
\text{VP} \to \text{v} \text{ NP} \\
\text{VP} \to \text{v} \text{ punc}
\]

The parser then produces a syntactic tree shown in Figure 4.

![Syntactic Tree](image)

Figure 4: The syntactic tree automatically produced by the parser for the poetic line “殘日下，漁人”，

Such a tree structure would allow the identification of a set of useful units summarised in Table 3.

<table>
<thead>
<tr>
<th>Imagery Units</th>
<th>Lexical Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPs</td>
<td>殘日 (remnant sun), 漁人 (fisher men), 橋 (rod)</td>
</tr>
<tr>
<td>Primary imageries</td>
<td>日 (sun), 漁 (fisher), 人 (men), 橋 (boat)</td>
</tr>
<tr>
<td>Complex imageries</td>
<td>殘日 (setting sun), 漁人 (fisher men)</td>
</tr>
<tr>
<td>Extended imageries</td>
<td>漁人鳴橋 (fisher men bang the rod)</td>
</tr>
</tbody>
</table>

Table 3. Useful imagery units extracted from the parse tree in Figure 4.

Of course, as is also evident from the sample parse tree, syntactic functions are inferred implicitly. The pre-VP NP is interpreted as the subject of the sentence and the post-VP NP as the direct object. The pre-head NP “漁” (fisher) is interpreted as an NP that functions as a premodifier of the head “人” (men) because of its position within the NP proper. If two nouns are juxtaposed or coordinated within the same NP with or without an overt coordinator, the first conjoin will not be promoted to a NP in its own right. It is thus possible to distinguish between NP as a premodifier and a noun as part of a coordinated construction.
While syntactic relations can be implicitly inferred without much problem for this particular example, we envisage the further development of the current parser into one that not only produces a tree structure labelled by phrasal categories such as NP and VP but will also explicitly indicate the syntactic functions of such phrasal categories such as subject and direct object. A good example can be found in the Survey Parser, which was used to complete the one-million-word International Corpus of English (Fang 1996 and 2000; Greenbaum 1996) with a grammar of fine granularity (Fang 2005).

5. A Syntactic Study of Two Lyrics Written in the Song Dynasty

As was mentioned at the end of Section 4, the creative use of language by two poets, which marks them as two different poets or even as belonging to two distinctive stylistic schools, comes from the creative manipulation of primary imageries by way of complex imageries, extended imageries and textual imageries. Naturally, a range of linguistic devices, within the paradigm of syntax, will have to be exploited in order to achieve the intended poetic articulation. For this matter, it is also of great benefit to perform syntactic analysis for extractions of the syntactic relations preferred or typically used by individual poets. This section describes a case study.

Two lyrics (詞, Ci) were selected. They are Yong Yu Yue (永遇樂, See Appendix A for original text in Chinese) and Ye Ban Yue (夜半樂, See Appendix B for original text in Chinese). The two lyrics were written in the Song Dynasty respectively by Su Shi (蘇軾) and Liu Yong (柳永) as representatives of the two stylistically distinctive schools, namely, the Hao-fang School (豪放派) and the Wan-yue School (婉約派). 4 Su Shi was selected also for a second reason: he also wrote substantially in the wan-yue style. It is thus possible to formulate a comparative framework whereby Shu Shi and Liu Young can be compared in the first instance for their differences and similarities in the manipulation of imageries as representatives of two contrastive stylistic schools. The same procedure can be applied to Shu Shi as a single poet for differences and similarities in his use of imageries across the two stylistically different groups of poems.

Table 4 summarises the two lyrics in terms of tokens, types, and type-token ratios (TTR).

<table>
<thead>
<tr>
<th>Poet</th>
<th>Title</th>
<th>Character Token</th>
<th>Character Type</th>
<th>Type-Token Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Su Shi</td>
<td>Yong Yu Le</td>
<td>127</td>
<td>87</td>
<td>68.5%</td>
</tr>
<tr>
<td>Liu Yong</td>
<td>Ye Ban Le</td>
<td>167</td>
<td>130</td>
<td>77.8%</td>
</tr>
</tbody>
</table>

Table 4. Basic statistics about the two lyrics.

The TTR for Su Shi is 68.5% while the TTR for Liu Yong is 77.8%, a difference of nearly 10%. The difference seems to indicate different degrees of lexical density but since the two poems have a different number of characters, interpretations here remain inconclusive. Our focus of study will be described in Sections 5.1 and 5.2.

5.1 A grammatical analysis of the two lyrics

Both lyrics were segmented and duly analysed by hand at grammatical, phrasal and clausal levels according to a fine-grained formal grammar noting both category types and syntactic functions. Table 5 is a summary of the two lyrics in terms of the four open classes, namely, adjectives, adverbs, nouns and verbs. Column F lists the raw frequency of occurrence for the classes and Column % the proportion of the four classes in all the word tokens.

4 To quote Owen (1996: 582), "[t]he 'masculine' style was called hao-fang, loosely translated as 'bold and extravagant'; the 'feminine' style was called wan-yue, something like 'having a delicate sensibility'." The two terms are also translated as the heroic style and the devious-evocative in Yeh (1998).
<table>
<thead>
<tr>
<th>POS</th>
<th>Su Shi Frequency</th>
<th>Percent</th>
<th>Liu Yong Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjectives</td>
<td>21</td>
<td>16.5</td>
<td>20</td>
<td>11.9</td>
</tr>
<tr>
<td>Adverbs</td>
<td>9</td>
<td>7.1</td>
<td>17</td>
<td>6.6</td>
</tr>
<tr>
<td>Noun</td>
<td>41</td>
<td>32.3</td>
<td>55</td>
<td>32.9</td>
</tr>
<tr>
<td>Verbs</td>
<td>13</td>
<td>10.2</td>
<td>21</td>
<td>16.2</td>
</tr>
</tbody>
</table>

Table 5. Summary statistics about the two lyrics’ use of adjectives, adverbs, nouns and verbs.

Grammatically speaking, according to Table 5, the two lyric writers seem to be similar in their use of nouns, which account for 32.3% and 32.9% respectively for the two. Adverbs also seem to show a good degree of similarity between the two poets.

Significant differences between the two writers arise from their use of verbs and adjectives. Liu Yong employs a much higher proportion of verbs, which accounts for 16.2% of his total use of the word tokens. Su Shi, in contrast, has a much smaller proportion of verbs of only 10.2%, 6% lower than the other writer. Regarding adjectives, Su Shi has a more frequent use of adjectives (16.5%) than Liu Yong, whose adjective use has a lower proportion of 11.9%. That Liu Yong has a relatively higher use of verbs but lower use of adjectives seems to suggest that this poet is perhaps stylistically more colloquial and more intended for freer vocal rendition by those who liked him. The relatively lower verb proportion and higher adjective use by Su Shi, on the other hand, seems to relate his writing style to one that is more intended for the reading eye and thus more formal, densely expressed and hence scholarly.\(^5\)

5.2 A syntactic analysis of the two lyrics

Syntactic properties for the two poets are summarised in Table 6, which lists six syntactic functions: subject, predicate, object, premodifier, adverbial and complement. Each property is described by its raw frequency and its associated proportion % for the two poets.

<table>
<thead>
<tr>
<th>Function</th>
<th>Su Shi Frequency</th>
<th>Percent</th>
<th>Liu Yong Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>15</td>
<td>11.8</td>
<td>15</td>
<td>8.90</td>
</tr>
<tr>
<td>Predicate</td>
<td>19</td>
<td>14.9</td>
<td>31</td>
<td>18.6</td>
</tr>
<tr>
<td>Object</td>
<td>4</td>
<td>3.1</td>
<td>1</td>
<td>0.59</td>
</tr>
<tr>
<td>Premodifier</td>
<td>18</td>
<td>14.2</td>
<td>30</td>
<td>17.9</td>
</tr>
<tr>
<td>Adverbial</td>
<td>16</td>
<td>12.6</td>
<td>17</td>
<td>10.2</td>
</tr>
<tr>
<td>Complement</td>
<td>1</td>
<td>0.79</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 6. Summary statistics about the two lyrics’ use of syntactic constructions.

According to Table 6, Su Shi outperforms Liu Yong in his use of subjects, objects, adverbials and complement. Conversely, Liu Yong outperforms Su Shi in his use of predicates and premodifiers. The pattern of differences here as evidenced by Table 6 seems to suggest that Su Shi deploys a wider range of syntactic devices than Liu Yong, which is also supported by our observations based on grammatical properties summarised in Table 5. Again, a higher proportion of predicates in Liu Yong’s writing seems to suggest a more casual, colloquial style while the lower proportion of predicates by Su Shi is accompanied by a relatively higher proportion of objects, thus indicating a preference for SVO constructions, a feature typically found in formal prose. Su Shi’s more frequent

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\(^5\) This is partially evidenced by a recent study reported in Cao and Fang (2009), which reveals that adjectives tend to occur more frequently in formal academic writing than in informal casual speech though the primary data for the analysis comes from contemporary English.
use of adverbials also seems to confirm this as adverbials have been found to correlate with degrees of formality albeit reported for contemporary British writing. See Fang (2006) for a detailed report of the empirical study.

That Liu Yong’s works tend to be more casual and colloquial is also pointed out by literary critics. As Yeh (2000:1–12) points out, Liu Yong was a popular song writer at the time and ‘every common person by the community water well could sing his songs’. Liu Yong as a lyric writer is innovative in that he abandoned the poetic convention and adopted a more life-like tone and voice in the description and presentation of women in a more realistic style (ibid).

Although only a case study based on very limited evidence, the analysis results presented in this section already speak strongly and favourably for contrastive stylistic analysis of different poets within a framework where linguistic properties at grammatical and syntactic levels can be usefully retrieved and computed. The authors believe that such a computational framework represents a powerful instrument in the automatic analysis of literary texts in general and classical Chinese poems in particular.

6. Conclusion

This paper described a computational framework for the analysis of classical Chinese poems. In particular, it presented an ontology of imageries that has been empirically generated from the complete collection of poems written in the Tang Dynasty. The ontology is now accessible on the Internet and has been a major instrument for the analysis of imageries.

The article then argued for a structured analysis of imageries and proposed a system of imageries subcategorised as primary, complex, extended and textual. Such a system usefully links linguistic analysis at lexical, grammatical, syntactic and textual levels to the analysis and evaluation of imageries.

We then described an automatic parser of classical Chinese poems and demonstrated that linguistic analysis could be effectively automated to enable the automatic generation of structured imageries for poetic studies.

Finally, a case study was described that investigated the grammatical and syntactic properties in two lyric poems written by two different poets in the Song Dynasty. The study demonstrated that the two poets as seen in the two lyrics made use of different linguistic devices and that a frequent account of such devices seemed to support literary as well as linguistic interpretations of the two distinctive composing styles.

We conclude by reiterating that such a computational framework represents a useful and insightful instrument in the automatic analysis of literary texts in general and classical Chinese poems in particular.

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References


Appendix A. Yong Yu Yue by Su Shi

蘇軾《永遇樂》
徐州夜夢覺，北登燕子樓作。

明月如霜，
好風如水，
清景無限。
曲港跳魚，
圓荷蓧藕，
寂寞無人見。
紛如三鼓，
閟於深院，
階陽夢雲斷。
夜茫茫，
重尋無處，
覺來小窗行遍。

Appendix B. Ye Ban Yue by Liu Yong

柳永《夜半樂》

淒雲黯淡天氣，
扁舟一葉，
乘興離江渚。　
浪裏驚千巖，
越溪深處，
怒濤激凜，
潮風乍起，
更聞商旅相呼。　
片帆高掛，
泛畫鹢，
翩翻過南浦。　
望中酒席閃閃，
一簇煙村，
數行霜樹。
殘月下，
漁人曉鏡歸去。　

敗荷零落，
衰楊掩映，
岸邊兩兩三三，
浣沙遊女，
避行客，
含羞笑相語。

到此因念，
緒閣輕拋，
浪莽難駐。　
歎後約丁寧竟何據。　
慟離懷，
空根䆓晚歸期阻。　
凝淚眼，
杏杏神京路。　
斷鴻聲遠長天暮。