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Research Article

A Framework for *Haiku* Generation from a Narrative

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ABSTRACT

The primary goal of the authors' research related to the generation of narratives and *haikus* is to complete a mutual transformation mechanism between a narrative and a *haiku*. In this work, the authors propose a framework for transforming a narrative into *haiku*. The paper shows a basic method of generating *haiku* from a fragmented narrative by selecting, arranging, and modifying the elements in the narrative. The authors have been developing an Integrated Narrative Generation System (INGS) that automatically generates narratives. The authors aim to introduce the developed *haiku*-relating mechanism into the INGS in the future.

1. INTRODUCTION

A *haiku* is the shortest form of poetry in the world and expresses a scene or feeling using only seventeen morae. The seventeen morae are composed of three parts with five morae, seven morae, and five morae.

The primary goal of this study, which is related to the generation of narratives and *haikus*, is to create a mutual transformation mechanism between a narrative and a *haiku* [1]. Previously, the authors had developed an Integrated Narrative Generation System (INGS) [2], and the concept of mutual transformation is based on this background. INGS automatically generates narratives. This system produces a cyclical generation of stories or expressions. The authors have previously presented a method for generating a narrative from a *haiku* [3]. By analyzing the relationships between a *haiku* and the interpreted sentences of a *haiku*, these relationships can be used to obtain new interpreted sentences. We approach *haiku* generation from two aspects. One is a quantitative method, and the other is a method that uses the structure of a narrative.

In previous studies, the authors have presented the following quantitative methods for *haiku* generation: a method using the transition patterns of word categories (part of speech) in *haikus* [4], a method based on the appearance frequency and co-occurrence of concepts and words in *haikus* [5], and a method using deep learning for the transition patterns of words and characters in *haikus* [6]. Yoneda et al. [7] proposed a method using deep learning.

On the other hand, we not only try to generate *haiku* with a large amount of data, but also try to generate *haiku* by manipulating the structure of a narrative. Nitta [8] proposed a method for generating *haiku* from the structure of a narrative. This method establishes a meta-sentence and core sentences about the narrative.

This study aims not to express the structure of a narrative with only one *haiku*, but to express the entire story with multiple *haiku* (such as a *haiku* collection). To this end, this paper proposes a method to generate one *haiku* from the elements of a narrative.

2. A *HAIKU* GENERATION FRAMEWORK FROM A NARRATIVE

In this paper, a sentence composed of three phrases (five morae, seven morae, five morae) is defined as a *haiku*. Since this definition is a minimum condition, the generated sentence can be expressed as *haiku*-like sentence. For example, it is possible to generate sentences that are more suitable for *haiku* by adding *kigos* (words describing seasons). However, some *haikus* do not have *kigos*. Therefore, we define *haiku* as the number of mora and a *haiku*-like sentence as a *haiku*.

Haiku generation using a story generates *haiku* from the events contained in a story, with the user specifying an arbitrary element. We assume that selecting an element corresponds to selecting a feature of the story. When generating multiple *haikus* from a story, the way of expressing the story changes depending on the type of elements to be selected and the order of selection (this treats *haiku* generation as a kind of narrative discourse [9]).

The method proposed here selects four types of elements from the story, including the selected elements, by selecting the type of central element. Then, under certain constraints, the selected elements are rearranged forming a *haiku*.

To generate a *haiku* from a narrative, the authors focus on the factors of "selection," "arrangement," and "modification" of the

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elements of a narrative. The proposed system consists of three modules (the system was developed by "Common Lisp") as follows:

- "Arrangement" module: Constraint-based determination of word arrangement structure.
- "Selection" module: Selection of the word to arrange.
- "Modification" module: Adjustment of mora number by *kireji* (*kireji* likes punctuation words.).

3. GENERATION PROCESSES OF A *HAIKU* FROM A NARRATIVE

In the following algorithm, step (i) corresponds to the "arrangement" of narrative information. Steps (ii) and (iii) correspond to the "selection." Step (iv) corresponds to "modification."

(i) Selecting a format for a *haiku*. For generating a *haiku* according to various methods, the system preliminarily prepares several formats and selects one of the formats that suits the purpose.

(ii) Extracting one or more sentences in a narrative, which is the input information in this system, according to the condition of the selected method. These conditions are shown in the examples in the next section.

(iii) Extracting one or more elements from the sentences extracted in (ii) and substituting the extracted elements in the sentence format selected in (i).

(iv) Adjusting the above information according to the standard *haiku* form of three parts of five, seven, and five morae. If necessary, the system adds one or more *kirejis* to the selected elements in the *haiku* to be generated. (*Kireji* is a category of words used to regulate the sounds of a *haiku* and especially indicates emotional emphasis in the psychological aspect of linguistic rhetoric.)

4. GENERATED EXAMPLES

4.1. Example of an Input

The authors present the following three types of methods of *haiku* generation from a narrative using the above general framework. The story shown in Figure 1 was used as the input narrative for all the methods. The sentence shown in Figure 1 uses natural language, but in reality, it takes a conceptual structure as the input. For example, the first event in Figure 1 has a case structure similar to that in Figure 2. The system determines the target element according to the case structure.

Next, we show an example of generation with action as selection element.

4.2. A *Haiku* that Summarizes a Character's Action

This method is expected to generate a *haiku* that expresses an overview or summary of a character's action in the narrative. The system

父が家屋で狼に困る．[A father is distressed by a wolf in his house.]
息子のアランが家屋で父を励ます．
[His son, Alain encourages his father in his house.]
父が「アランが外出する」ことを禁止する．
[The father forbids Alain from going out.]
アランが家屋で泥を洗う．[Alain washes off mud in his house.]
アランが牧場で衣服を乾かす．[Alain dries clothes in a stock farm.]
狼が牧場で羊を襲う．[The wolf attacks sheep in a stock farm.]
アランが狼を待ち構える．[Alain waits for the wolf.]
アランが狼を襲う．[Alain attacks the wolf.]
アランが狼を殴る．[Alain hits the wolf.]
狼が逃げる．[The wolf escapes.]
アランが狼を逃がす．[Alain misses the wolf.]
父がアランを称える．[The father praises Alain.]

Figure 1 | An input narrative.

(event 困る1[distress] (ID 1) (type action)
(agent age%父#1[father])
(counter-agent age%狼#1[wolf])
(location loc%家屋#1[house]))

Figure 2 | The case structure in Figure 1.

selects two sentences in the narrative that includes a character as a designated agent to generate a *haiku* using the elements in the selected sentences.

(i) Selecting a format of *haiku*: In this example, the system selects a format, "S V1 + O1 V2." In this format, S means a designated character (or agent) in the narrative. V1 corresponds to a verb in the selected first sentence and O1 is the object of V1. V2 corresponds to a verb in the second sentence that was selected.

(ii) Extracting some sentences: For example, according to a character, "wolf," "The wolf attacks sheep in a stock farm." and "The wolf escapes." are extracted.

(iii) Extracting some elements: A character or agent "the wolf," which is included in the sentences selected in (ii), is substituted with S in the format selected in (i). Then, a verb, "attacks," which was extracted from the first sentence selected in (ii), is substituted with V1. Furthermore, "sheep" is substituted with O1 and "escapes" is substituted with V2. At last, "狼 (the wolf), 襲う (attacks), 羊を (sheep), 逃げる (escapes)" are acquired.

(iv) Adjusting morae number: For "狼 (Ōkami)" that has four morae, a mora *kireji*, "や (ya)," is added. Similarly, "襲う羊 (Osou hitsuji)" that has six morae is extended with a mora *kireji*, "や (ya)." Further, as "逃げる (Nigeru)" has three morae, two morae *kireji*, "かな (kana)," is added. Finally, the following *haiku* is created.

Ōkami ya/Osou Hitsuji ya/Nigeru kana
狼や 襲う羊や 逃げるかな
[The Wolf/Attacks Sheep/(Who) Escapes.]

4.3. Other Patterns of Selecting Element

In the next method, the authors expect to generate a *haiku* that describes an event in a narrative. This method extracts a sentence that has the character in agent case. Further, it selects the sentence before or after and generates a *haiku* using the elements of the selected sentences. For example, system generates the following *haiku.*

Ōkami ya/Alain Naguru ya/Nigeru kana
狼や アラン殴るや 逃げるかな
[The Wolf/(Who is) Hit by Alain/Escapes.]

In the above example, the system selects a format, "S1 S2 + V1 V2." S1 is a designated character (or agent) in the narrative. S2 is a character who appears in a sentence before or after the sentence containing S1, and V1 is a verb showing the action of S2. V2 is a verb that shows S1's action.

More, other pattern enables to generate a *haiku* that focuses on a location in a narrative.

Chichi Komaru/Alain Arau ya/Kaoku kana
父困る アラン洗うや 家屋かな
[A Father is Embarrassed/Alain Washes/at His House.]

The system selects a format, "S1 + V1 S2 + V2 L." S1 corresponds to a character (or agent) in the first sentence selected and V1 is a verb that shows S1's action. S2 is a character in the second sentence and V2 is a verb that shows the action by S2. L is a word representing a location or place.

5. FUTURE WORKS

Our short-term plan is to evaluate the generated *haiku* or the processes according to specific goals. These goals are related to "what in a narrative must be represented through a *haiku*?" Through the above-mentioned concepts, the generated *haiku* expresses the features of the narrative.

As described in Section 1, one of the macro goals is to design and implement a mutual transformation mechanism between the narrative and *haiku*. Figure 3 shows an overview of this process.

Moreover, assuming that a *haiku* can function as a kind of catch phrase to express the essence and theme of the story, it can be thought of as a kind of discourse technique in narrative generation.

Furthermore, with regard to the advertising generation systems that the authors have been developing [10], such a circulative mechanism could contribute to the implementation of a new advertising method in which both long narrative explanations and short *haiku*-like representations can be mutually generated for a brand.

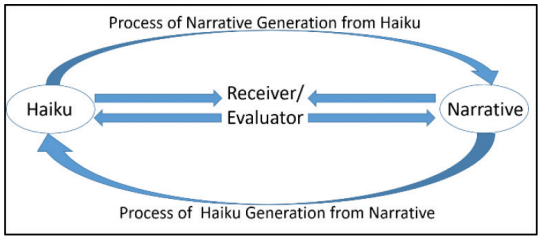

Figure 3 | Overall process of mutual transformation between narrative and *haiku*.

6. CONCLUSION

The authors presented a framework to generate a *haiku* in which one or more designated elements are extracted from a narrative used as the input and these elements are arranged and modified according to the *haiku* form. Three types of methods were shown according to the framework in this paper. Future work will include various topics, including evaluating the generated *haiku*, completing the development of a mutual transformation mechanism between narrative and *haiku*, and applying the results to various applications such as advertising narrative generation.

CONFLICTS OF INTEREST

There is no conflicts of interest.

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Authors Introduction

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