ReciPic: A Tool for Generating Infographic from Recipe Procedure Text

Advanced Sciences　Computer Science　2040664
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1 Introduction

In recent years, more and more people have chosen to use recipe websites to look for recipes, cooking advice, or share their cooking ideas. The most popular recipe website in Japan is Cookpad [1], which has over 50 million monthly users in Japan, and an additional 42 million monthly users across 74 countries, with 3 million recipes. To support such a large user community and improve user satisfaction, it is necessary to analyze the recipes in recipe websites.

A recipe in recipe websites contains the recipe name, food image, knack&points, ingredients, and cooking procedure. Among these components, the cooking procedure is the crucial part that users will follow. However, they are often displayed by pure text. It is difficult for users to grasp valuable information and have a big picture of the food materials, cooking tools, and cooking methods at a glance. Even though some recipes contain food images, those images usually show only the finished dishes to attract users rather than indicate the cooking process.

This thesis proposes ReciPic, an interactive visualization tool to make the cooking procedure text more understandable. Our tool allows users to enter recipe procedure text and transform it into the corresponding infographic. With the help of infographics, users can understand the procedure text information effectively.

2 Proposed Tool

2.1 Text Analysis

To understand the meaning of the input, ReciPic will perform text analysis on it. Text analysis will first segment the input into appropriate units and extract the valuable parts, then classify different parts into three categories (namely food materials, cooking tools, and cooking actions), and finally analyze the dependency relation between the segmented parts. In addition, ReciPic will also complement the omitted cooking tools before generating the infographic.

2.1.1 Word Segmentation

Word segmentation is the process of splitting text into meaningful units. ReciPic implements this function with a tool called mecab [2].

A word segmentation result is shown below:
[**Input**]: 鍋に水、本だし、料理酒、みりん、濃口醤油、上白糖を入れて、手羽元を入れて強火にかける. (Put water, hondashi, cooking sake, sweet sake, dark soy sauce, caster sugar and the chicken wings in the pot, and set the strong fire.)
[**Output**]: 鍋 (pot) 水 (water) 本だし (hondashi) 料理酒 (cooking sake) みりん (sweet sake) 濃口醤油 (dark soy sauce) 上白糖 (caster sugar) 入れ (put) 手羽元 (chicken wings) 入れ (put) 強火 (strong fire) かける (set)

2.1.2 Word Classification

Word classification is the process of classifying the segmented units into appropriate categories and labeling them with corresponding tags. Three categories will be used in generating infographics, namely food materials (Tag: F), cooking tools (Tag: T), and cooking actions (Tag: Ac). ReciPic implements this function with a tool called PWNER [3]. A classification dictionary has been prepared to supplement words that cannot be recognized by this tool.

A word classification result is shown below:
[**Output**]: 鍋 (pot)/T 水 (water)/F 本だし (hondashi)/F 料理酒 (cooking sake)/F みりん (sweet sake)/F 濃口醤油 (dark soy sauce)/F 上白糖 (caster sugar)/F 入れ (put)/Ac 手羽元 (chicken wings)/F 入れ (put)/Ac 強火 (strong fire)/T かける (set)/Ac

2.1.3 Dependency Parsing

Dependency parsing is analyzing the grammatical structure in a sentence and finding the relationship between semantic units. ReciPic implements this function with a tool called cabocha [4].

A dependency parsing result is shown below:
[**Output**]: 鍋 (pot)/1-8 水 (water)/2-3 本だし (hondashi)/3-4 料理酒 (cooking sake)/4-5 みりん (sweet sake)/5-6 濃口醤油 (dark soy sauce)/6-7 上白糖 (caster sugar)/7-8 入れ (put)/8-12 手羽元 (chicken wings)/9-10 入れ (put)/10-12 強火 (strong fire)/11-12 かける (set)/12-0

Each semantic unit is marked with two numbers connected with a hyphen. The number before the hyphen indicates the order of this unit, and the number after the hyphen indicates its grammatically related unit. Take "鍋 (pot)/1-8" as an example, "1" shows "鍋 (pot)" is the first semantic unit, and "8" shows "入れ (put)" is its grammatically related unit. It is worth mentioning that the "0" in "かける (set)/12-0" means "かける (set)" is the last semantic unit.

Finally, ReciPic will combine the word classification result with the dependency parsing result, check if there is any omitted part in the input, complement it with a prepared dictionary, then generate the text analysis result.

A text analysis result is shown below：

[**Output**]: 鍋 (pot)/T/1-8 水 (water)/F/2-3 本だし (hondashi)/F/3-4 料理酒 (cooking sake)/F/4-5 みりん (sweet sake)/F/5-6 濃口醤油 (dark soy sauce)/F/6-7 上白糖 (caster sugar)/F/7-8 入れ (put)/Ac/8-12 手羽元 (chicken wings)/F/9-10 入れ (put)/Ac/10-12 強火 (strong fire)/T/11-12 かける (set)/Ac/12-0

2.2 Infographic Generating

After getting the text analysis result, ReciPic will look for the illustrations of all the food and tools in a prepared database and combine them according to the infographic-generating rules shown in Figure 1.

Which rule to pick is determined by the cooking action relevant to the food and tool. For example, cooking action 入れ (put) means putting the food into the tool, so rule (d) will be picked. Action 切る (cut) means cutting the food on the chopping board, so rule (b) will be selected. Action 洗う (wash) means washing the food under the water tap, so rule (e) will be picked.

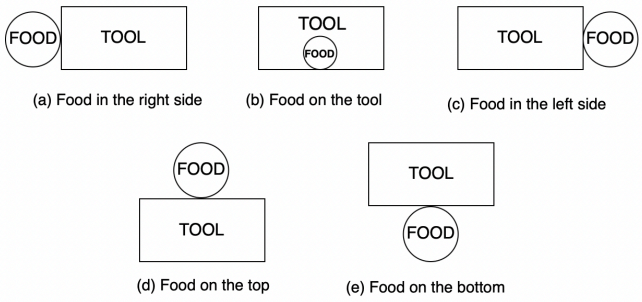

Figure 1: Rules for generating infographics

3 Experimental Result

An experiment result of ReciPic is shown below:

[**Input**]: 鍋に水、本だし、料理酒、みりん、濃口醤油、上白糖を入れて、手羽元を入れて強火にかける. (Put water, hondashi, cooking sake, sweet sake, dark soy sauce, caster sugar and the chicken wings in the pot, and set the strong fire.)

[**Output**]: 鍋 (pot)/T/1-8 水 (water)/F/2-3 本だし (hondashi)/F/3-4 料理酒 (cooking sake)/F/4-5 みりん (sweet sake)/F/5-6 濃口醤油 (dark soy sauce)/F/6-7 上白糖 (caster sugar)/F/7-8 入れ (put)/Ac/8-12 手羽元 (chicken wings)/F/9-10 入れ (put)/Ac/10-12 強火 (strong fire)/T/11-12 かける (set)/Ac/12-0

[**Infographic**]: The result is shown in Figure 2.

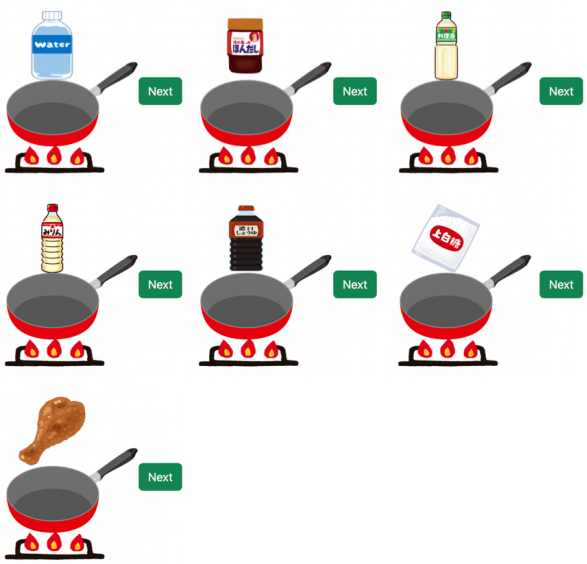

Figure 2: Generated infographic

4 Conclusion

This thesis introduced ReciPic, an interactive tool that accepts a recipe procedure text as input, transforms it into an infographic, and then represents it to users. We explained the key components of ReciPic in detail and experimented with an input example.

In the future, we plan to test ReciPic with a broader input range and complement the text analysis dictionaries and the illustration database to make it applicable to more recipe texts. In addition, we will extract other words, such as adjectives and the quantity of ingredients, and discuss how to present them in the infographic.

References

[1] Cookpad company, https://cookpad.com/.

[2] Mecab, Part-of-Speech and Morphological Analyzer, https://taku910.github.io/mecab/.

[3] PWNER, PointWise-based Named Entity Recognizer, www.lsta.media.kyoto-u.ac.jp/resource/tool/PWNER/home.html/.

[4] Cabocha, Japanese Dependency Structure Analyzer, http://taku910.github.io/cabocha/.