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Foreign Manga Reader: Learn Grammar and Pronunciation while Reading Comics

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ABSTRACT

Foreign-language comics are potentially an enjoyable way to learn foreign languages. However, the difficulty of reading authentic material makes them inaccessible to novice learners. We present the Foreign Manga Reader, a system that helps readers comprehend foreign-language written materials and learn multiple aspects of the language. Specifically, it generates a sentence-structure visualization to help learners understand the grammar, pronounces dialogs to improve listening comprehension and pronunciation, and translates dialogs, phrases, and words to teach vocabulary. Learners can use the system to match their experience level, giving novices access to dialog-level translations and pronunciations, and more advanced learners with access to information at the level of phrases and individual words. The annotations are automatically generated, and can be used with arbitrary written materials in several languages. A preliminary study suggests that learners find our system useful for understanding and learning from authentic foreign-language material.

Author Keywords

Foreign Language Learning; Multimedia; Translation

ACM Classification Keywords

H.5.2. Information Interfaces and Presentation: User Interfaces – Graphical User Interfaces

INTRODUCTION

Foreign-language comics, such as Japanese manga, have become popular globally. Due to their conversational language and graphical nature, comics can potentially be an enjoyable way to learn foreign languages. However, due to the difficulty level of reading authentic foreign-language materials, people generally read translations instead, depriving them of this language learning opportunity.

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Figure 1: Screenshot of the Foreign Manga Reader displaying the grammar visualization for a dialog.

Our system aims to help people learn languages in an enjoyable fashion through comics, while maintaining the comprehension and enjoyment benefits of translations, and requiring only the foreign-language source material. Our system is also suitable for learners with all levels of experience, as it exploits the hierarchical structure of language and machine translation to keep the reading experience challenging but not overwhelming.

RELATED WORK

Multimedia is a popular way to learn foreign languages. A handful of Japanese-language instructional materials are written as manga, such as the Mangajin series [5], which provides translations and romanizations for each dialog. Videos are also a popular vocabulary learning resource, which projects such as Smart Subtitles [3] exploit to help learners learn vocabulary while watching videos. Videos, however, are often too fast-paced for learners to spontaneously acquire grammar while watching [4]. Visualizations incorporating grammatical structure have been shown to be more effective than sentence-level machine translations for helping novices comprehend foreign-language sentences [1]. Voice synthesis has also been shown to be beneficial for learning pronunciations [2]. The Foreign Manga Reader system integrates these features



Figure 2: The grammar visualization shows translations for any hovered words or sub-phrases of the dialog.

into the reader's chosen comics to provide an educational experience while reading.

SYSTEM DESCRIPTION

Our system is implemented as a web service based on the NB annotation system [7]. The user begins by uploading the content as a PDF file, and viewing it in their browser. The user can then select a bubble of dialog, and the textual content will be extracted via Optical Character Recognition (OCR). This feature is particularly useful for languages such as Chinese, where it is difficult for learners to input or look up unfamiliar characters. A visualization of the sentence's grammatical structure will then appear above the dialog. Each area of the grammatical structure visualization represents a word or phrase in the sentence. Users can hover over these areas to show a translation, and hear the pronunciation. Translations are also shown for the surrounding phrases to provide users with additional context, as shown in Figure 2. Because clicking on bubbles to navigate through dialogs can become tedious, and the reading order for manga can be unfamiliar, users can navigate to the next or previous dialog using the arrow keys.

We determine the grammatical structure from a parse tree generated by the Berkeley parser [6]. The voice synthesis and machine translation is done using the Google Translate service. Our system currently supports Chinese, Japanese, German, and French, and can be extended to any other language for which an OCR engine, parser, and machine translation system is available.

FINDINGS AND FUTURE WORK

When testing our system with 3 Chinese and 3 Japanese language learners, we observed two common usage patterns for the grammar visualization, depending on experience level. Experienced users tended to start by hovering over an unfamiliar word and go progressively outwards to understand the phrases it is used in. Novice users, in contrast, started with the sentence-level translation to understand the meaning of the dialog, and only afterwards explored the constituent phrases to see how the sentence was constructed. This suggests a learning pattern where, as learners learn more grammar, they rely more on word-level definitions and become less reliant on machine translations.

Failures of the AI portions of the system tended to confuse learners, who were not used to being shown incorrect information. OCR failures, for example, result in the translation becoming incomprehensible because the input text was not correct. This indicates that manual corrections may be helpful when using the system to teach novices.

Feedback on the learning features was positive, with some particularly enthusiastic about being able to learn pronunciations for new Chinese characters via the voice synthesis. Further, the grammar visualization appeared to support comprehension. Learners accurately translated dialogs containing grammar they had not yet learned. Some remarked that enjoyment was diminished due to the slow reading speed relative to a standard translation, suggesting that we should display longer dialogs in English.

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