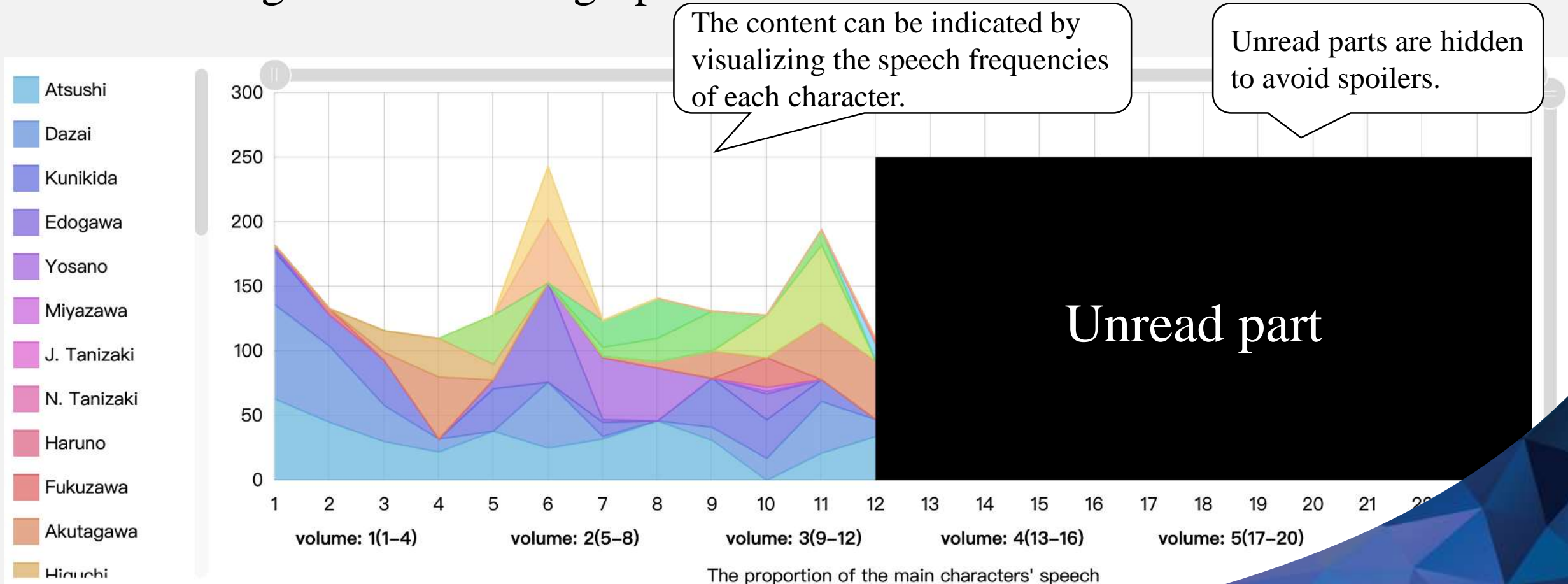


Comic Contents Retrieval Support Interface using Speech Frequencies of Characters

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◆ Research Objective

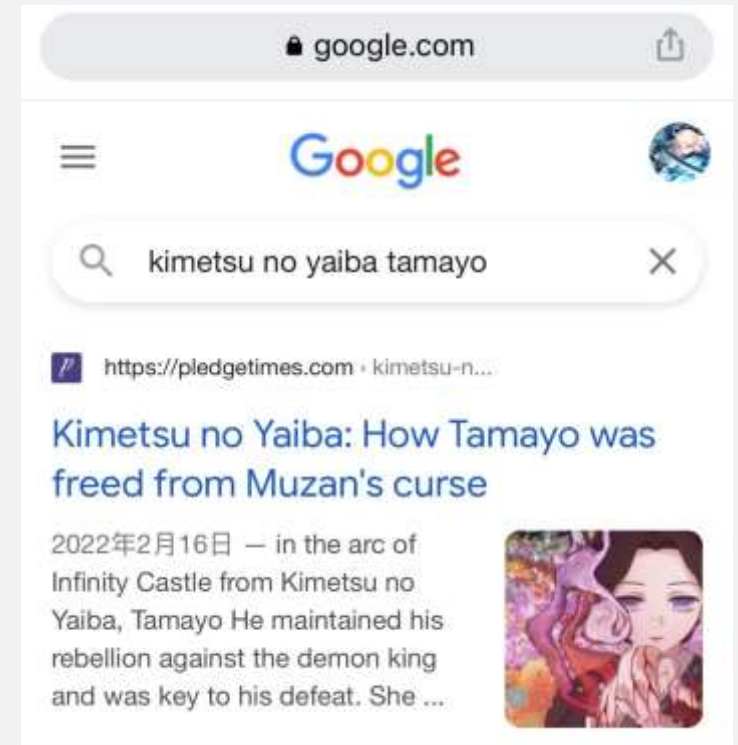
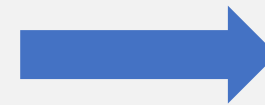
- This paper proposes an interface to support the retrieval of comic content by **visualizing the speech frequencies of characters** in each volume using a stacked area graph.



◆ Introduction

Motivation

- Many comic readers tend to follow several titles in parallel.
- **But it is not easy for the readers to remember how many episodes or volumes they have already read.**
- Some of them will look it up with a search engine, therefore encounter spoilers.
- **Very few systems enable readers to search for certain contents of comics without being exposed to spoilers.**
- We want to make an interface then used to support the **retrieval of comic content.**

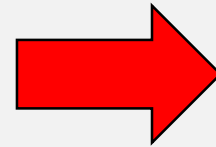
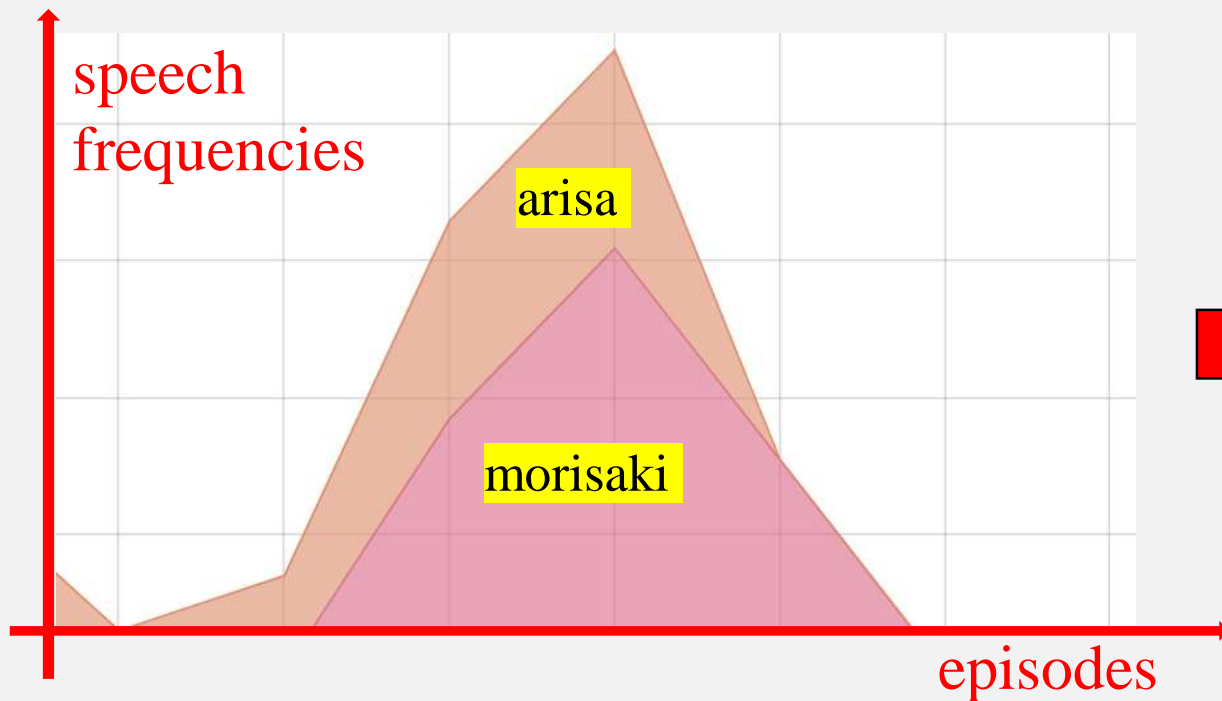


Examples of spoilers while searching on Google¹

¹ <https://pledgetimes.com/kimetsu-no-yaiba-how-tamayo-was-freed-from-muzans-curse-earthgamer>

◆ Hypothesis

Readers can recall the content of comics they have read by looking at the characters' speech frequencies.



(“Arisa2” (c) Ken Yagami from Manga109)

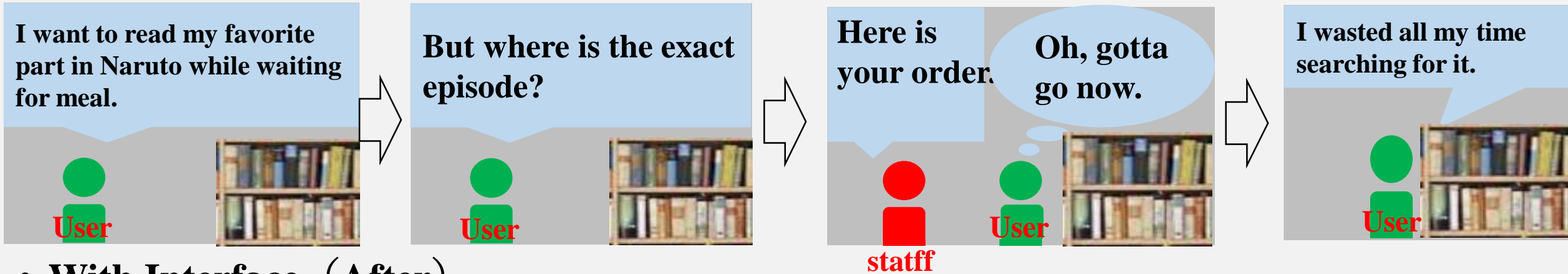


◆ Scenario to use our interface

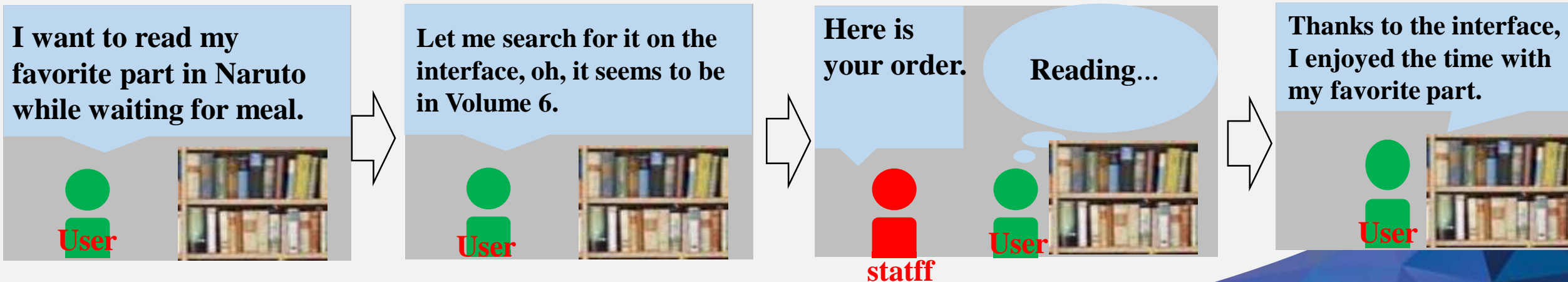
Failing to find a specific scene

e.g. when a person forgets in which episode a character plays an active role and cannot find it quickly.

• Without Interface (Before)



• With Interface (After)



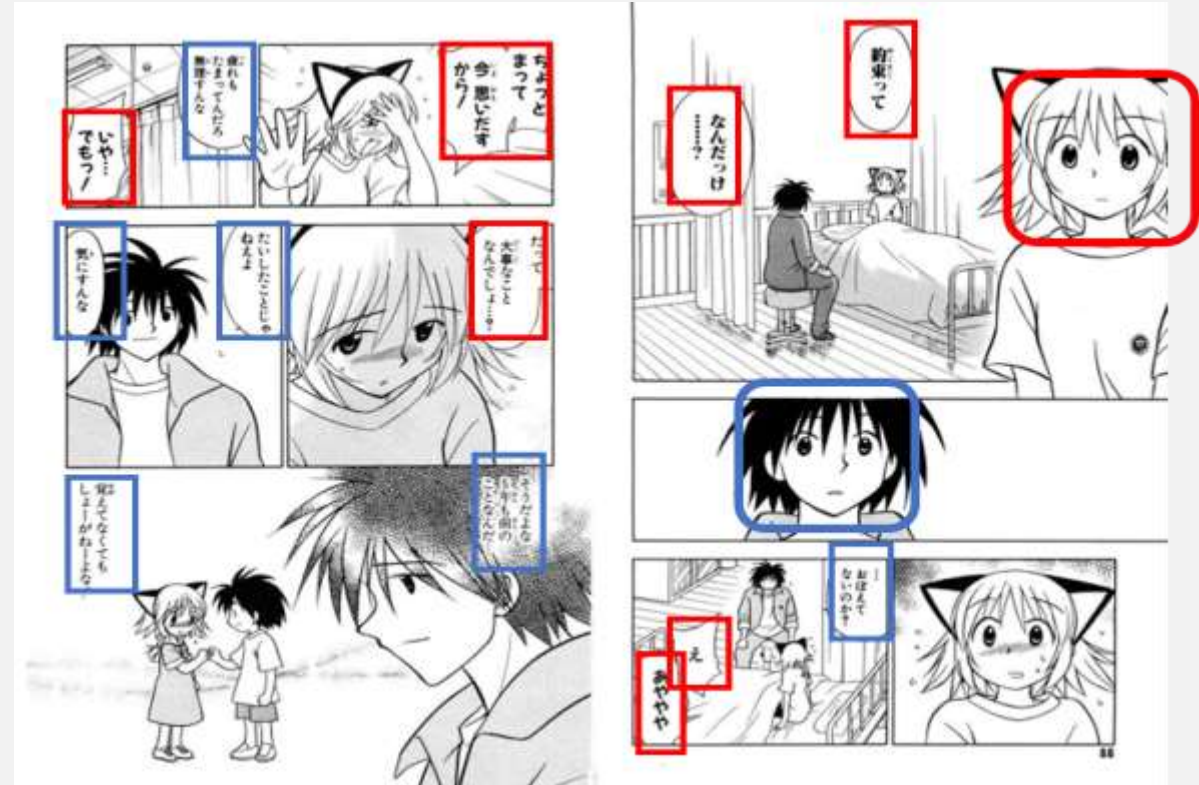
◆ Data preparation of speech frequencies

All the speeches that are judged to have been uttered by the characters are used, even if they are **not included in the speech balloons**.

The total amount will be recorded as the number the speeches in a page.

In the figure, there are six speeches for the male character and seven speeches for the female character.

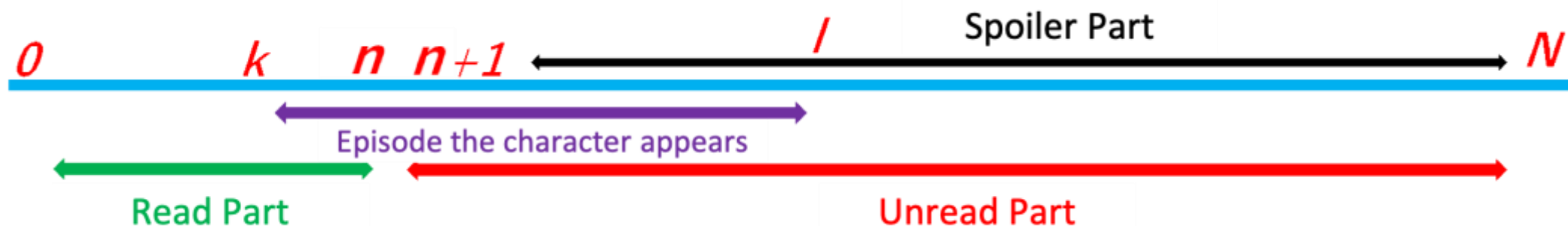
("Arisa2" (c) Ken Yagami from Manga109)



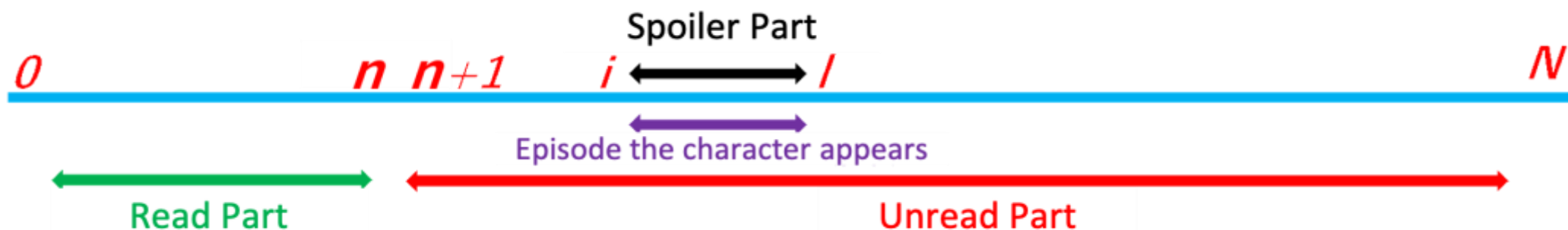
Speeches in red boxes are uttered by the female character, speeches in blue boxes are uttered by the male character.*

◆ Detection of spoilers related to the appearances and disappearances of characters.

1. A new character appears in story in the unread part



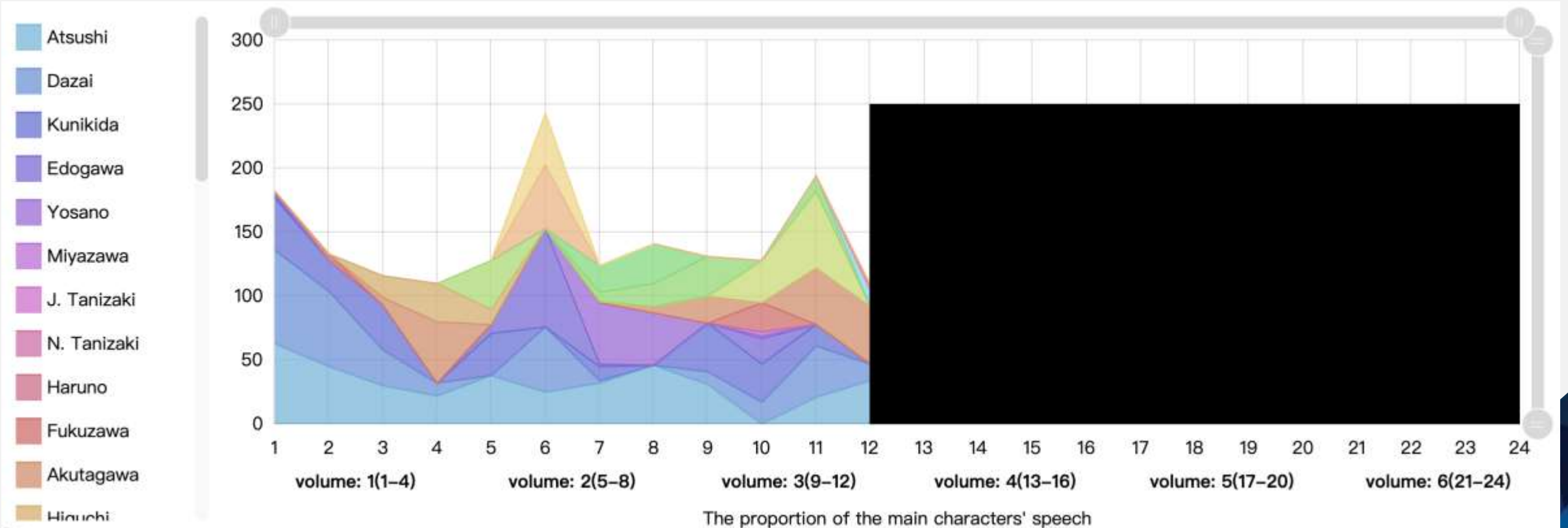
2. An old character disappears in story in the unread part



◆ Visualization of characters' frequencies

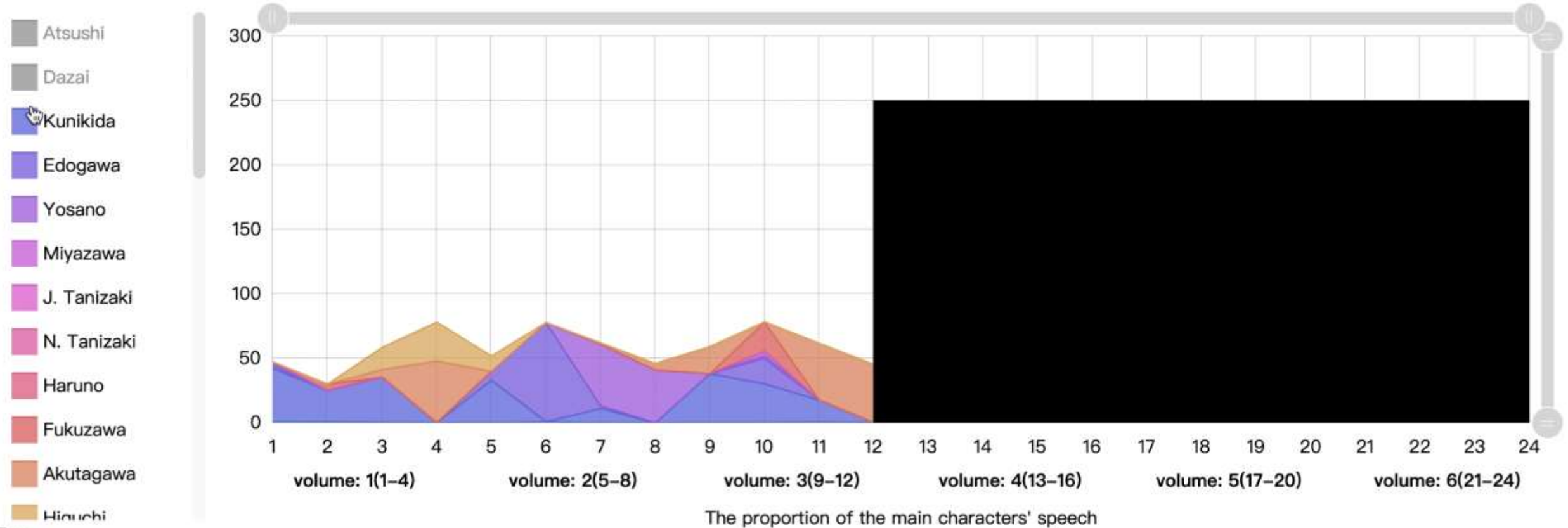
The figure shows an example of the interface.

In this case, the user **has read from episode 1 to 13** and **has not read episode 14** and more yet.



◆ Usage example of the proposed interface

Suppose the reader wants to read a specific episode of “Bungo Stray Dogs” again in which “Edogawa Rampo” is active.



The proportion of the main characters' speech

◆ Evaluation experiments

The goal was to evaluate whether the proposed interface could help users to find the desired content. The authors conducted experiments.

The authors conducted the experiments on the assistance of the retrieval of comic contents and evaluated the results corresponding to scenario.

We used 3 types of comics.

Used Comic :

5 volumes were selected from each comic

Title	Author
Fly Me to the Moon Vol.1 - 5	Kenjiro Hata
In/spectre Vol.1 - 5	Kyo Shirodaira
Bungo Stray Dogs Vol.1 - 5	Kafka Asagiri

Procedures

1. The participants were asked to read a comic designated by the experimenter from volume 1 to 5 within 2 hours.
2. Then they answered quizzes about a specific scene of the comic. They answered the episode number of the comic. The time for response to all questions was 15 minutes.

Participants

18 university students were divided into two groups with 9 students.

Group A used the proposed interface to answer the questions, while Group B did not use anything and answered the questions by relying on their memories.

Quizzes

A total of 24 questions, 8 for each comic, were designed.

Questions Examples

Manga and Questions

"Fly Me to the Moon"

In which episode did Nasa and Tsukasa bought rings together?

In which episode did Chitose went to the hot spring for the first time?

"In/spectre"

Which episode was Police Terada's first appearance?

In which episode did Kotoko and Saki meet each other for the first time?

"Bungo Stray Dogs"

In which episode was Dazai kidnapped by the mafia?

In which episode did Higuchi and Black Lizard rescued Akutagawa?

◆ Results of Experiment

The average correct rate for **Group A** was **76%**.

The average correct rate for **Group B** was **30%**.

This result showed that the visualization of the time series of speech frequencies could **support the retrieval of comic contents more**.

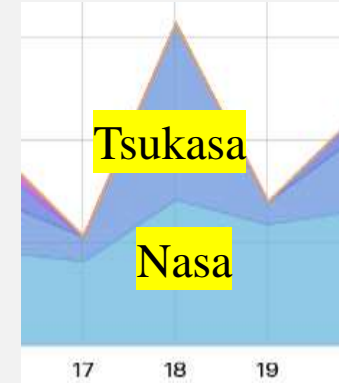
Correct answer rate of quizzes in evaluation experiment

Comic	Group A	Group B
Fly Me to the Moon	83%	21%
In/spectre	75%	16%
Bungo Stray Dogs	71%	29%
<i>Average</i>	<i>76%</i>	<i>30%</i>

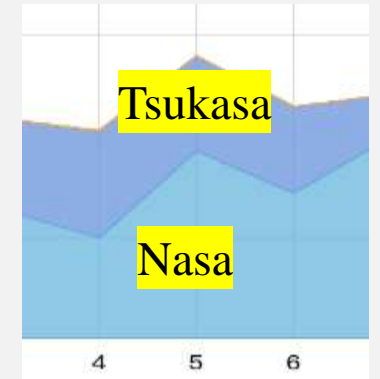
◆ Analysis

- The accuracies of two questions were relatively lower by group A.
- The questions were:
 1. “In which episode did **Nasa** and **Tsukasa** bought rings together?”
 2. “In which episode did **Aya** and **Chitose** meet each other for the first time?”
- The reason was there were other scenes have simliar frequencies to the question.
- **If multiple characters appear and the frequency of the scene is similar, users will fail to find the specific scene.**
- We will improve the interface by adding a new function to show a comic frame corresponding to the frequencies.

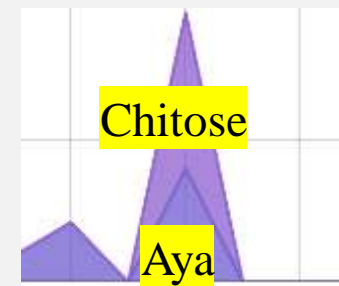
Visualization of “ Fly Me to the Moon ”



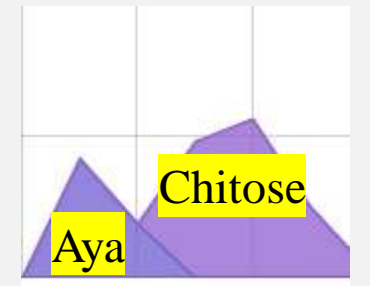
Ep 18, The correct answer



Ep 5, Similar situation



Ep 49, The correct answer



Ep 12, Similar situation

◆ Conclusion

- In this paper, the authors proposed an interface to support the retrieval of comic contents using time-series visualization of characters' speech frequencies.
- The authors conducted experiments to verify the efficiency.
- According to the results, the proposed interface could **supported the retrieval of comic contents.**

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Thank for listening