A Helpful Reviews Composition Assistance System for Online Shopping Users

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Background
More helpful reviews make online shopping better

- **Abundant Reviews**
  Every day, lots of people share their shopping experiences by writing reviews.

- **Popular Reference**
  Many people rely on these reviews when deciding what to buy. They need the real experience from the real buyers.
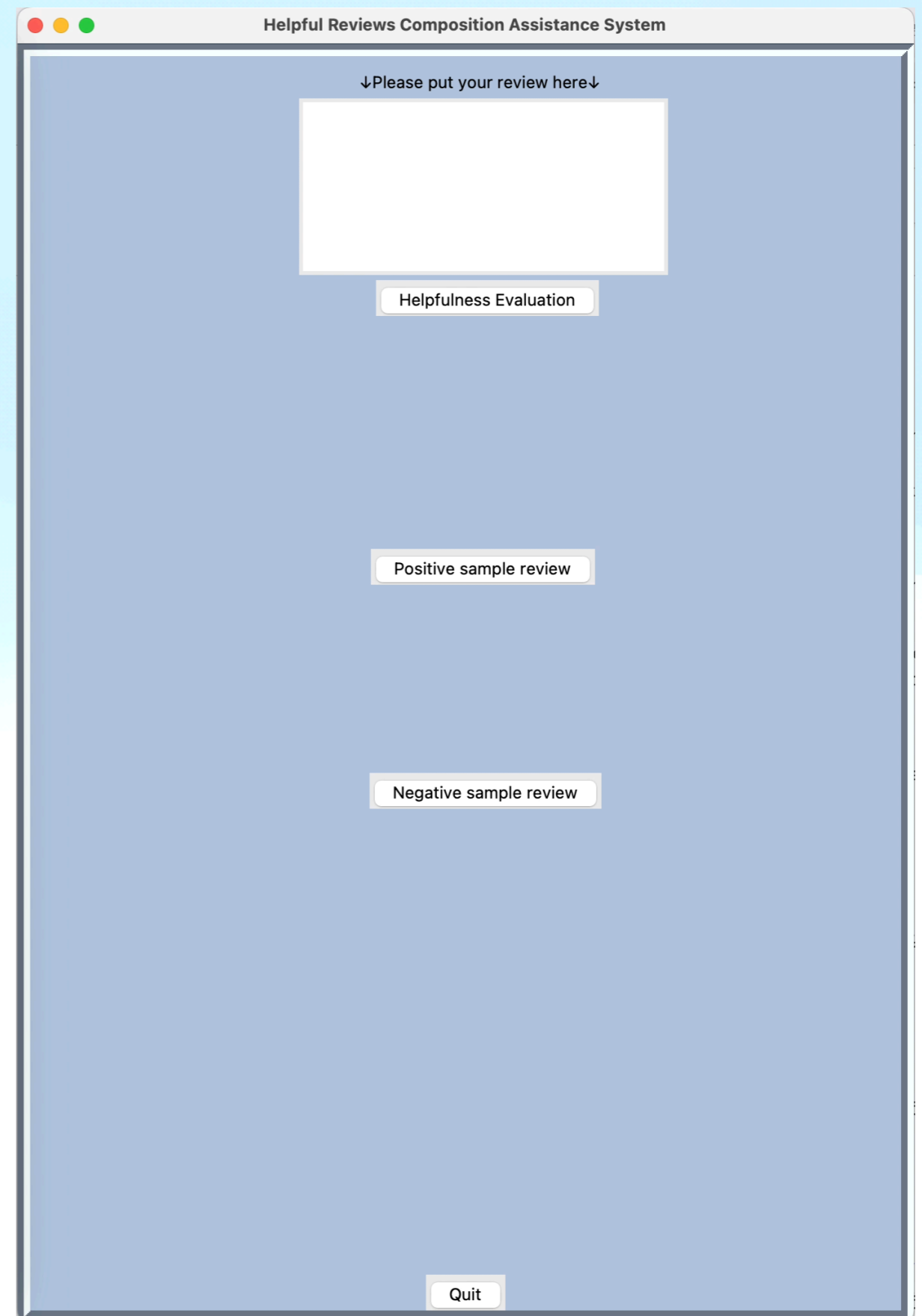
- **Challenges with Unhelpful Reviews**
  Unfortunately, some reviews don't provide useful information. This can be frustrating for people trying to make a decision.

- **Necessity for Supporting**
  We believe it's crucial to support users write more helpful reviews. This support can improve the overall quality of reviews, making the decision-making process easier for everyone involved in online shopping.
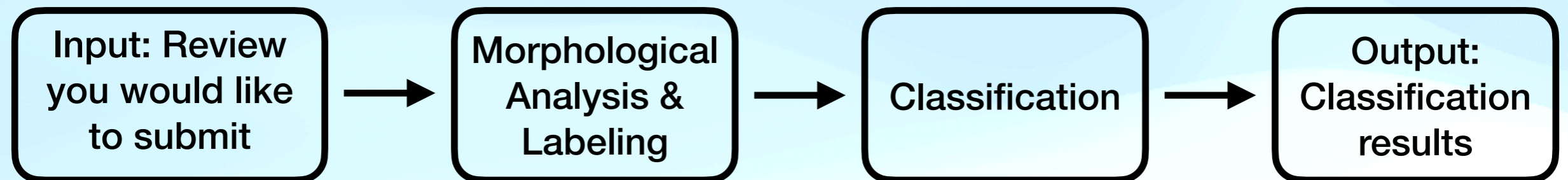
Main achievements

- We constructed a system that evaluates whether user-generated shop reviews are useful to others.

  - A useful review receives higher evaluations from other customers and resulting in increased visibility among more people.

  - It becomes possible to better disseminate what we recommend and what we feel should be avoided.

Helpful Reviews Composition Assistance System

↓Please put your review here↓

Helpfulness Evaluation

Positive sample review

Negative sample review

Quit

Approaches for Problem Solving

Two issues, two modules

1. Users do not know the criteria for what kind of reviews are useful. → **Helpfulness Evaluation Module**

Input: Review you would like to submit	→	Morphological Analysis & Labeling	→	Classification	→	Output: Classification results

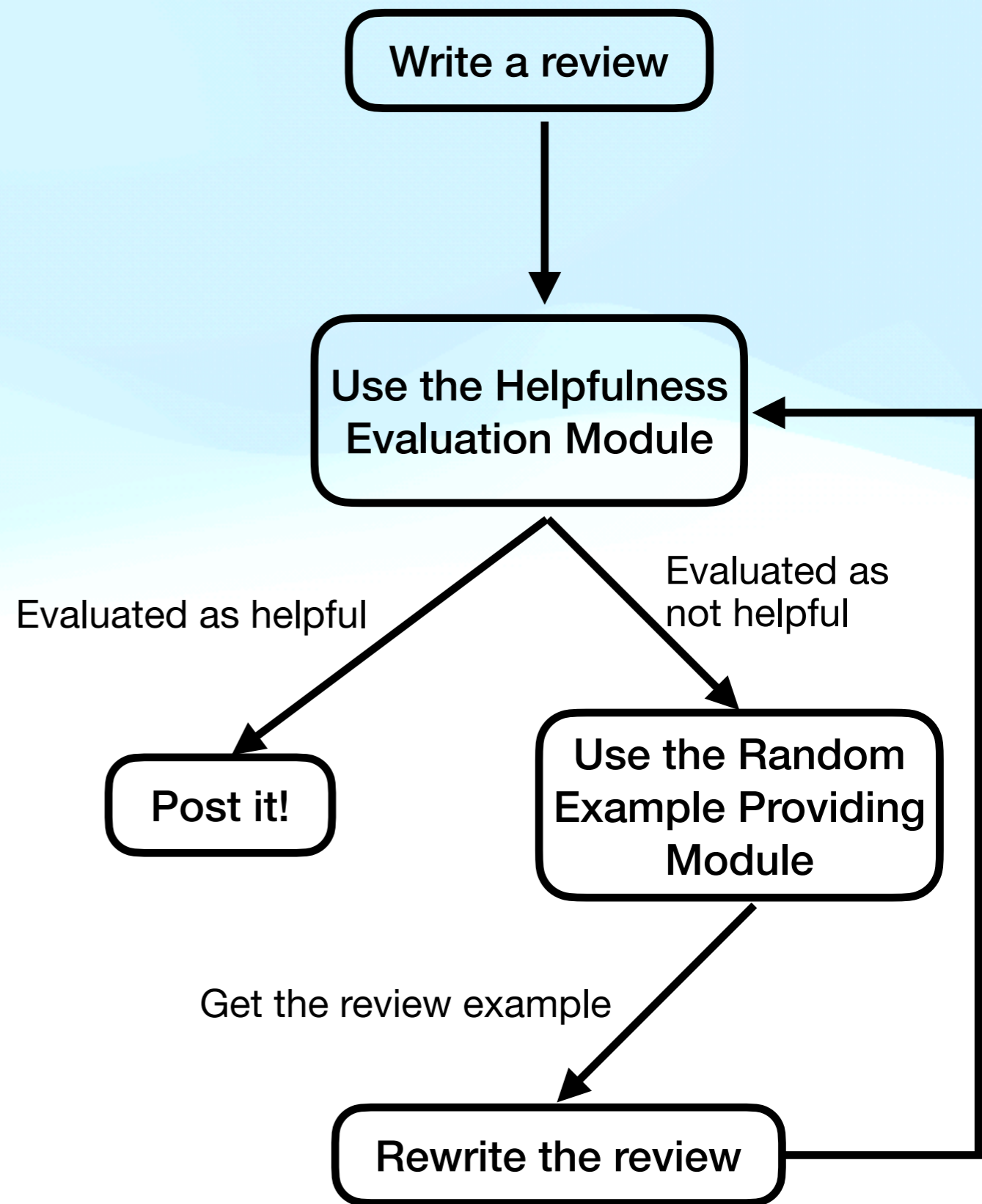*Helpfulness Evaluation Module classify reviews into helpful and not helpful.*

2. Users do not know what information is useful.→**Random Example Providing Module**

Output: Random positive or negative review

Random Example Providing Module provides example review for reference.

Flowchart of proposed system

1. Once review writing is complete, use the Helpfulness Evaluation Module.

2. If it is classified as useful, user can post a review at that moment.

3. If it is classified as not useful, user uses the Random Example Providing Module.

4. User rewrite the review with reference to the output review examples and use the Helpfulness Evaluation Module again.

Write a review

Use the Helpfulness Evaluation Module

Evaluated as helpful

Evaluated as not helpful

Post it!

Use the Random Example Providing Module

Get the review example

Rewrite the review

Helpfulness Evaluation Module
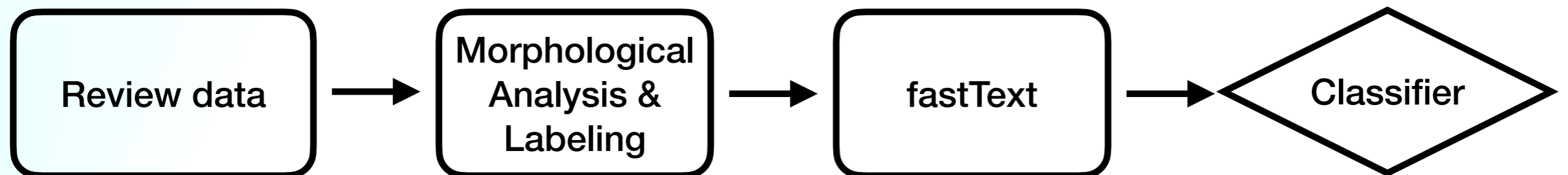## Morphological Analysis & Labeling

- The original data is in Japanese.

- We conducted morphological analysis with MeCab to separate each vocabulary.

- We annotated not helpful reviews as "label 0" and helpful reviews as "label 1".

	Reviews before and after morphological analysis & labeling
Before	Since this was my second time to buy shoes, I was able to compare my shoe size with the size of the last pair I bought, which was very helpful. I will buy shoes here from now on.
After	__label__1 Since this was my second time to buy shoes, I was able to compare my shoe size with the size of the last pair I bought, which was very helpful. I will buy shoes here from now on.

Helpfulness Evaluation Module

Review classification with fastText

- Pass morphological analysis & labeled reviews to a classifier created using **fastText**, and have it classify whether they are useful or not.

- The data used in this study is the Rakuten Ichiba market shop review dataset.
  The data used was posted from December 2018 to December 2019.

- Helpful reviews: 57,090(training) + 4,600(testing)
  Non-helpful reviews: 39,628(training) + 5,328(testing)

| Review data | → | Morphological Analysis & Labeling | → | fastText | → | Classifier |

Helpfulness Evaluation Module

Output: Classification results

↓Please put your review here↓

I just ordered a small item and it was packaged in a very large cardboard box that was in the way. It is nice that they ship with care, but it is too big.|

Helpfulness Evaluation

The review「I just ordered a small item and it was packaged in a very large cardboard box that was in the way. It is nice that they ship with care, but it is too big.」you wish to submit has a 73.1097% chance of being helpful. You can submit it.

↓Please put your review here↓

The packaging was very good and arrived the day after I ordered. I was also pleased with the free shipping and would still shop at this store. As for the product, the size was just right and the look of the product was exactly as I had imagined. I am satisfied.

Helpfulness Evaluation

The review「The packaging was very good and arrived the day after I ordered. I was also pleased with the free shipping and would still shop at this store. As for the product, the size was just right and the look of the product was exactly as I had imagined. I am satisfied.」you wish to submit has a 80.9757% chance of being helpful. Let's try to improve it a little more.

The proposed system outputs a summary text includes the classification result (helpful or not helpful) and the probability.

Random Example Providing Module

Output example of positive & negative reviews

- Two types of buttons are provided to indicate positive or negative review examples.

- Both of Positive / Negative example reviews are from Rakuten Ichiba dataset posted in December 2018.

- Users can improve their reviews by referencing these examples.

Positive sample review

Example: Last time I posted a review of a 1000mL plastic bottle that was bent. This time I bought the same product again, but this time it was improved to follow the entire bottle, whereas before only the top of the bottle was wrapped in paper as a cushioning material. I am assuming that you saw the review and made the improvement. I am more than happy that you are taking proper action. Thank you very much.

Negative sample review

Example: I purchased a pair of socks and they were delivered in the wrong size, color, long or short, everything. I don't understand how such a mistake can happen! The exchange was smooth, but I wasted a lot of time sending an email with a picture.
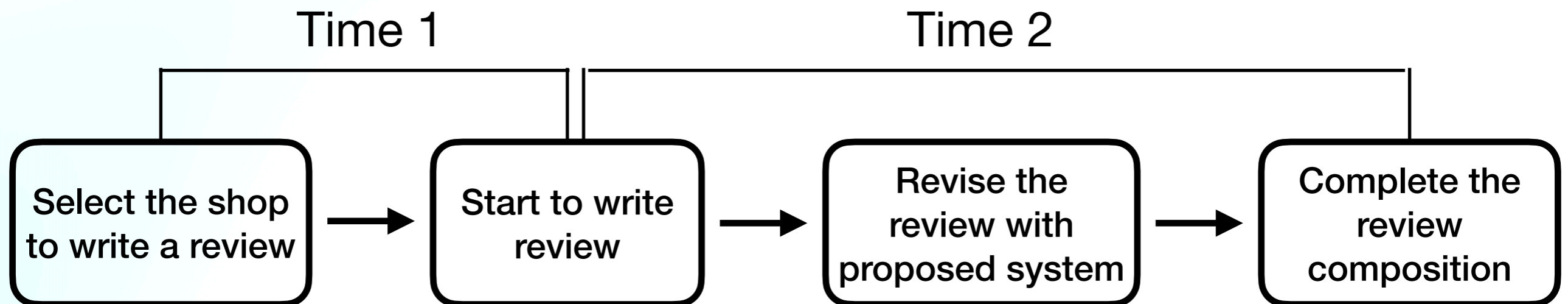
Evaluation Experiment
Experiment setting

- **Objective:** Evaluate whether both the Helpfulness Evaluation Module and Random Example Providing Module are effective in supporting helpful reviews composition.

- **Participants:** 15 male and 15 female university students aged 20-24.

- **Procedure:** Experiments A-C were performed in a different order for each participant.

  - *Experiment A:* Writing reviews without using the system

  - *Experiment B:* Writing reviews using only the Helpfulness Evaluation Module

  - Experiment C: Writing reviews using both the Helpfulness Evaluation Module and Random Example Providing Module.

Evaluation Experiment

Evaluation Aspects

1. Compare the ratio of helpful reviews obtained in each experiment.
   → Evaluate the effectiveness of each module in helpful reviews composition

2. Compare the average time taken for review composition (Time 1) and the average time taken for review revision (Time 2) in each experiment.
   → Evaluate the time reduce of each module

Time 1   Time 2

| Select the shop to write a review | → | Start to write review | → | Revise the review with proposed system | → | Complete the review composition |

Experiment Results

Evaluation Aspect 1

- The ratio of helpful reviews obtained increased in the order of experiment A→B→C.

- The effectiveness of both two modules were confirmed.

Experiment	Number (helpful reviews / all reviews obtained)	Ratio
A: No system usage	13/45	28.89%
		↓+17.78%
B: Helpfulness Evaluation Module only	21/45	46.67%
		↓+19.04%
C: Using the whole system	23/35*	65.71%

* 10 reviews that the participants did not use the Random Example Providing Module was removed from the data.

Experiment Results
Evaluation Aspect 2

- Experiment C (using the whole system) reduced the time to complete review composition by 81 seconds.

- It was confirmed that the Random Example Providing Module could save users time when writing a helpful review.

Experiment	Review composition (sec)	Review revision (sec)
A: No system usage	13.64	152.9
B: Helpfulness Evaluation Module only	15.18	537.8
C: Using the whole system	17.06	456.8

↓-81 seconds

Examples of reviews written by user

Before & After using the proposed system

	Reviews before and after using Helpfulness Evaluation Module
Before	The pants have a good texture and the color matches the photo on the website. There was no smell.
After	The pants have a good texture and the color matches the photo on the website. There was no smell. It was great that the order was shipped the day after placing the order.

	Reviews before and after using Random Example Providing Module
Before	Shipping was very fast, and it was good to protect the new smartphone I bought, but the material of the smartphone case itself feels cheap.
Example	(Omitted) I'm shocked because it was a shop I trusted!
After	Shipping was very fast, and it was good to protect the new smartphone I bought, but the material of the smartphone case itself feels cheap. It was a smartphone case featuring Shaun the Sheep, but I think I should have bought a sturdy original smartphone case.

Summary

- We have built a system to assist in writing useful reviews.

- We conducted an experiment to evaluate the effectiveness of proposed system.

- Experimental results show that both the Helpfulness Evaluation Module and Random Example Providing Module can support the composition of helpful reviews.

- In particular, the Random Example Providing Module was effective in reducing the time required to complete the writing of the review.