A Personalized Scoring Method for Rental Property Search Considering the Surrounding Environment

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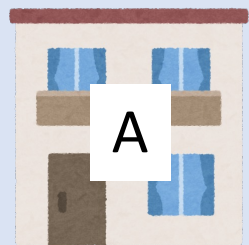
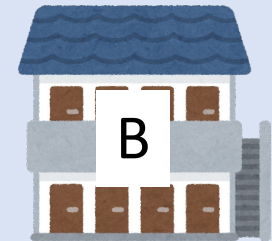1) Kyoto Sangyo University
2) Fukuoka University

Background and Purpose

Background

Rankings on rental property websites should consider the surrounding environment that matches user's age, gender, and hobby
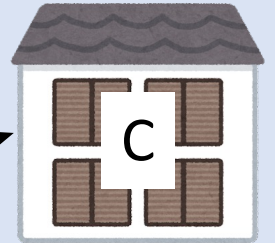
A ¥70,000 a month Café 12 min. Station 11 min.

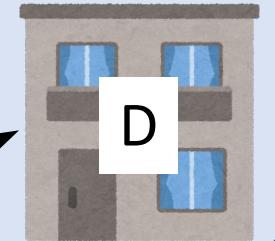C ¥90,000 a month Café 10 min. Station 12 min.

Simple sorting makes it difficult to find a balanced property…
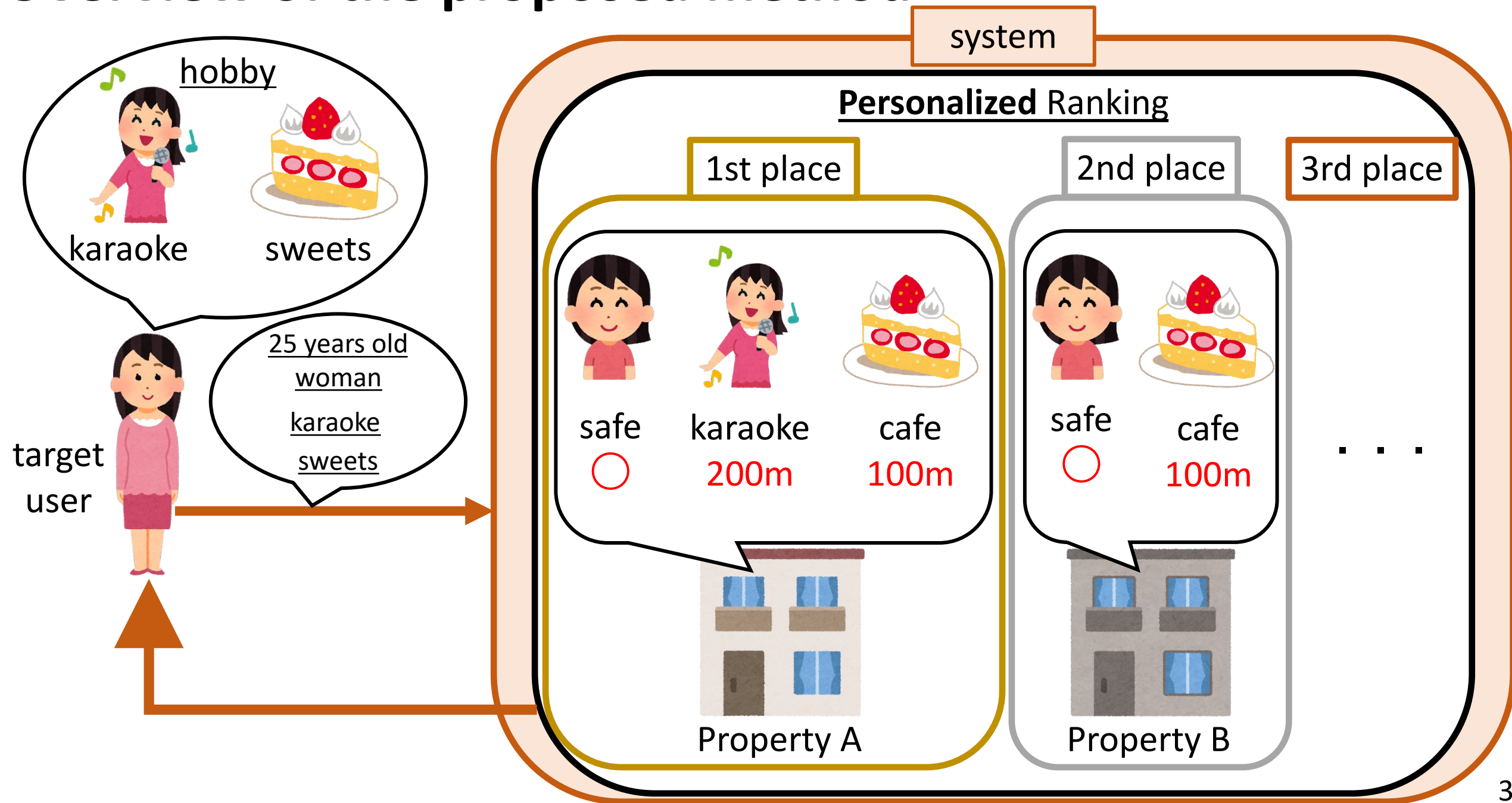
B ¥60,000 a month Café 20 min. Station 10 min.

D ¥50,000 a month Café 20 min. Station 15 min.

Purpose

Proposal of a personalized scoring method based on the target user's age, gender, hobby, and preferences.

Overview of the proposed method

Preliminary experiment

- Purpose

  The effectiveness of the proposed method is discussed by comparing a simple ranking provided by a conventional housing website with a ranking based on the proposed personalized scoring method.

- Details
  - Target rental property data

    10 properties for rent in Nakagyo-ku, Kyoto, Japan (1K, with Bathroom/Toilet)
  - Subjects

    12 male university students
 - The following five items are considered in the personalized scoring method

    1) Rent   2) Living space   3) Convenience of transportation
    4) Convenience of shopping   5) Surroundings related to hobbies

Preliminary experiment (calculation method for each evaluation item) (i)

1. Rent

Scores of rent below the upper limit set by the subject are set to 100, and if the rent is above the upper limit, the scores are set in the range of 0 to 100

（Upper limit + 30% or more: Score 0）

Rent (value range: 0-100)

score

100

Upper limit +30%

Upper limit set by the subject

rent
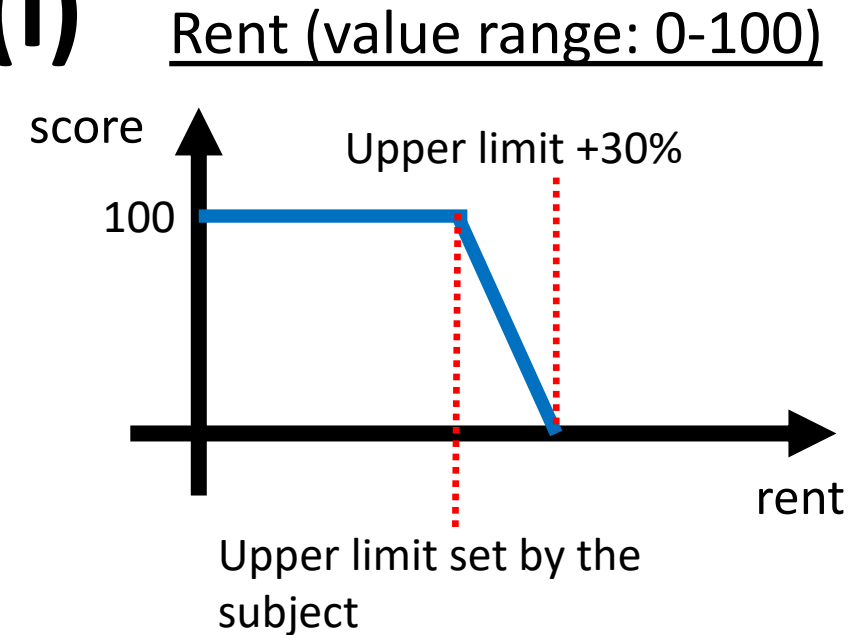
2. Living space

Scores of Living space above the lower limit set by the subject are set to 100, and if the living space is below the lower limit, the scores are set in the range of 0 to 100

（0m²: Score 0）

Living space (value range: 0-100)

score

100

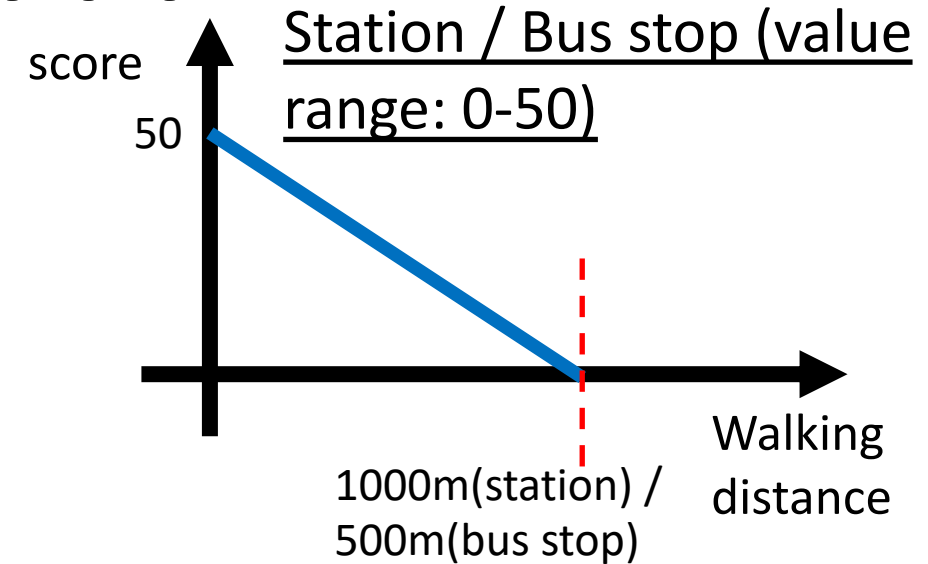Lower limit set by the subject

Living space
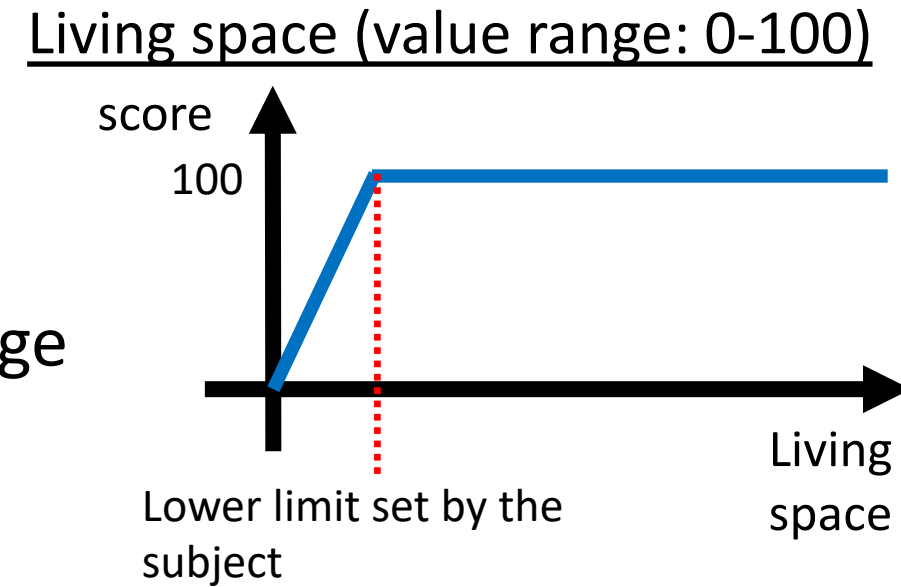
Preliminary experiment (calculation method for each evaluation item) (ii)

3. Transportation convenience

Scores of transportation convenience are set in the range of 0 to 50 depending on the walking distance to the nearest station / bus stop
 (1000m (station) / 500m (bus stop): Score 0)

Station / Bus stop (value range: 0-50)

score

50

1000m(station) / 500m(bus stop)

Walking distance

4. Shopping convenience

Scores of shopping Convenience are set in the range of 0 to 50 depending on the walking distance to the nearest convenience store / supermarket
 （500m (convenience store) / 1000m(supermarket): Score 0)

Convenience store / Supermarket (value range: 0-50)

score

50

500m(Convenience store) / 1000m(Supermarket)
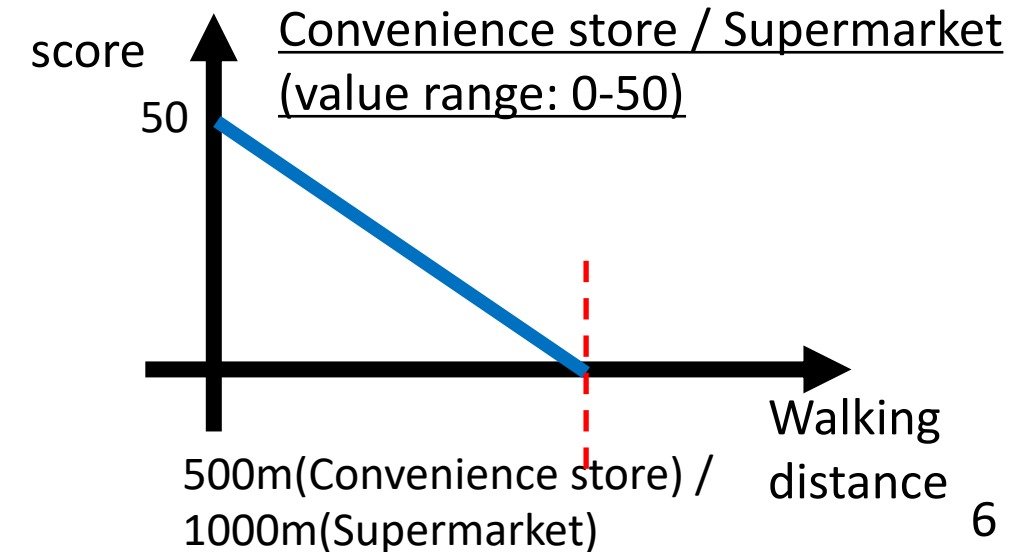
Walking distance

Preliminary experiment (calculation method for each evaluation item) (iii)

5. Surroundings related to hobbies

Scores of surroundings related to hobbies are set in the range of 0 to 50 depending on the walking distance to the nearest spot related to the subject's hobbies（1000m: Score 0）

Surrounding environment related to hobbies (value range: 0-50)

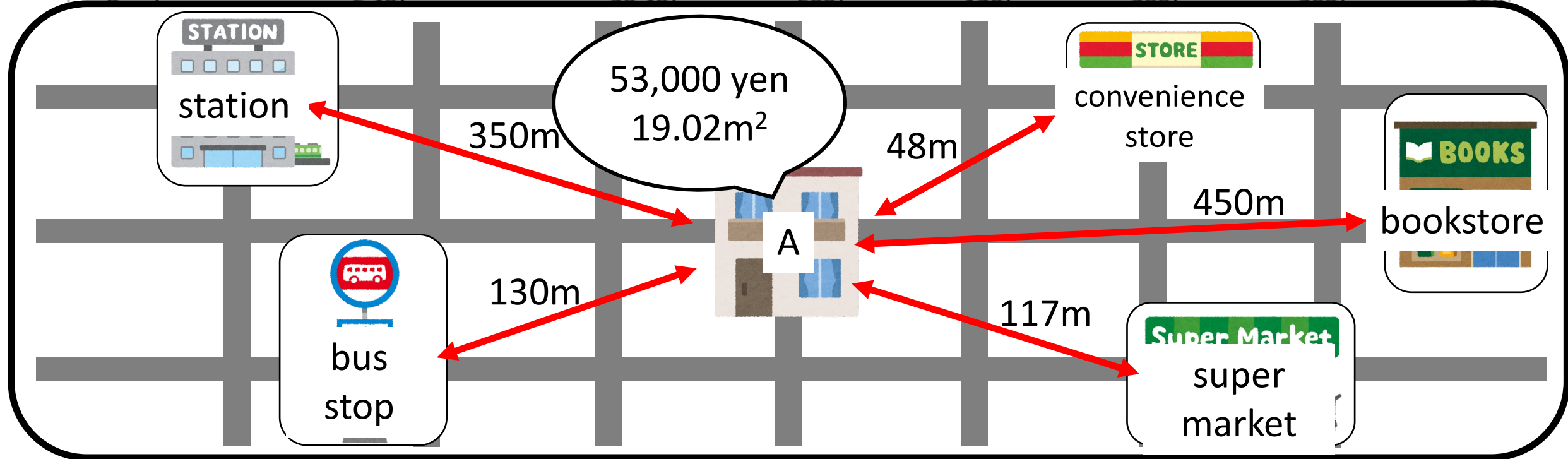| hobby	Related Spots
reading	bookstore
film appreciation	cinema
music appreciation	CD store
Sports (baseball, soccer, or other sports that can be played in the park)	park
strength training	gym
café crawling	cafe

score

50

1000m

Walking distance
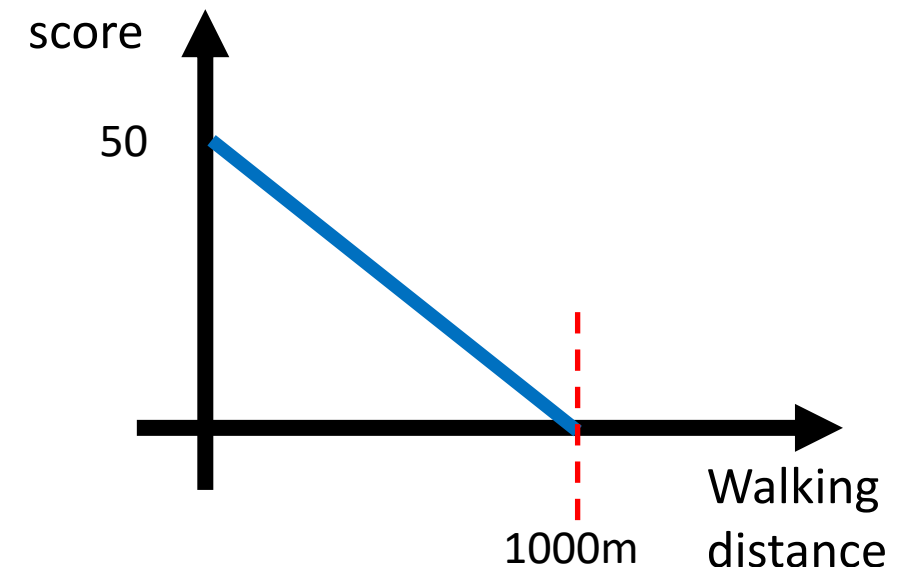
Preliminary experiment (questionnaire)

Each subject was asked to rank 10 rental properties (A-J) in the order in which they would like to live, and this was used as the Ground Truth
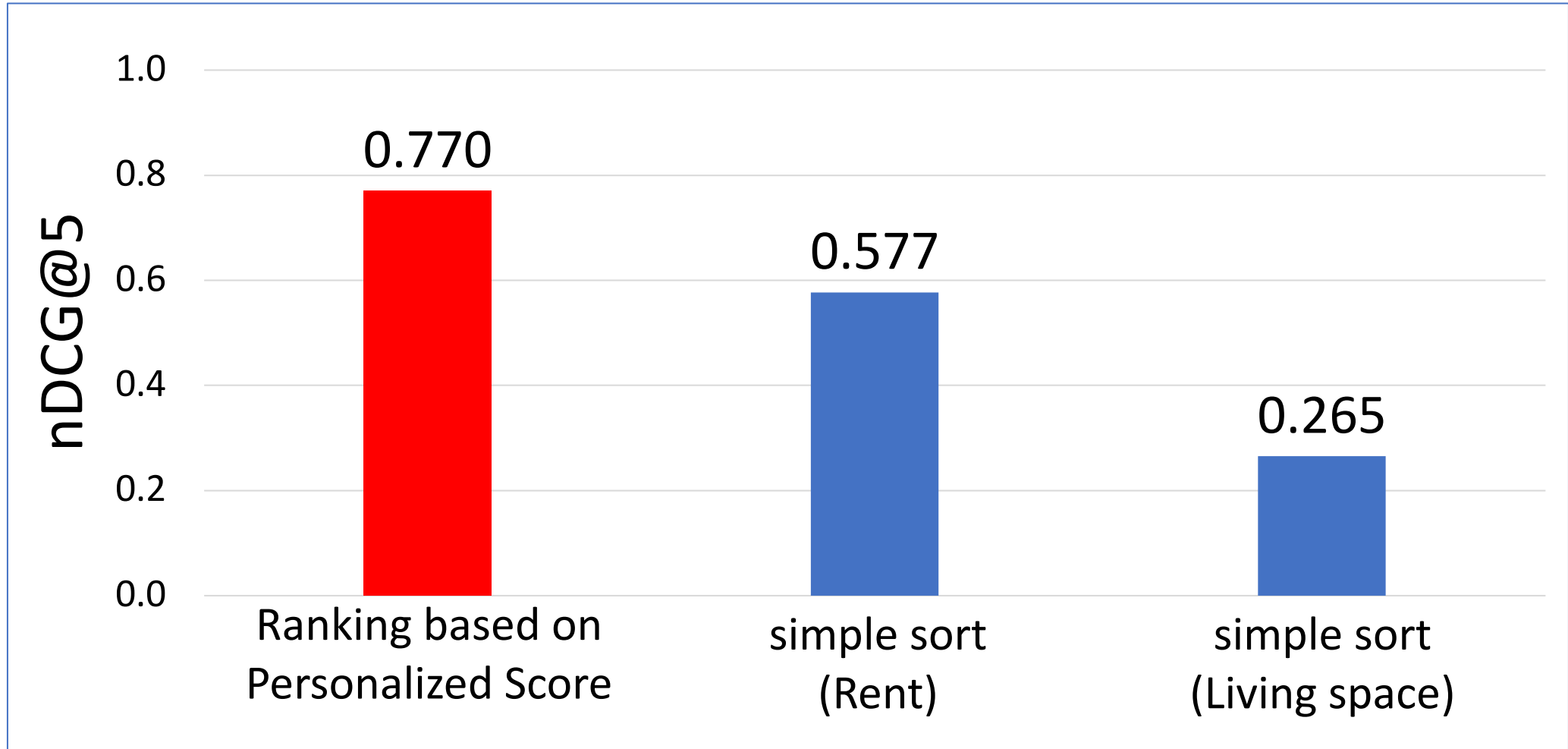
Spots related to each subject's hobbies

物件名	賃料（単位：万円）	専有面積（単位：m²）	徒歩距離（単位：m）				
			交通		買い物		趣味
			駅	バス停	コンビニ	スーパー	？？？
A	5.30	19.02	350	130	48	117	450

station
350m
53,000 yen
19.02m²
48m
convenience store
450m
bookstore
A
130m
bus stop
117m
super market

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Experimental results

Comparison of ranking accuracy between the proposed method
and baseline method based on nDCG@5

Consideration

The ranking of the proposed method based on the personalized score achieved the best result in nDCG@5.

$\rightarrow$ The experimental results demonstrated that considering multiple evaluation items (including the surrounding environment) can improve the accuracy of the ranking.

Summary

- Personalized scoring method for rental properties based on the surrounding environment
- The experimental results showed the effectiveness of the proposed method

Future work

- To new evaluation items
- To improve the calculation method for each evaluation item