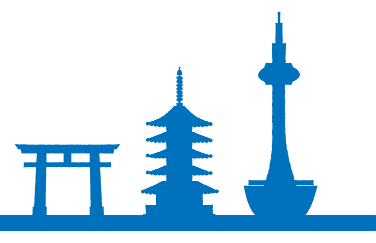


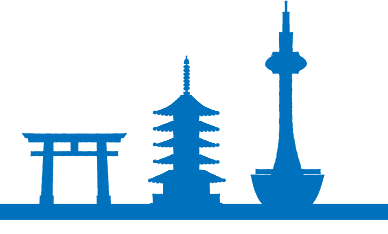
# 1. Introduction



In recent years, the utilization of bicycles has been attracting attention in various countries for reducing environmental damage, promoting health and promoting tourism.

The purpose of this study is to understand differences in the rental bicycle activities between Japanese and foreign tourists. The findings are based on the questionnaire survey and GPS log data to those tourists using rental bicycles in Kyoto city.

# 2. Overview of Research



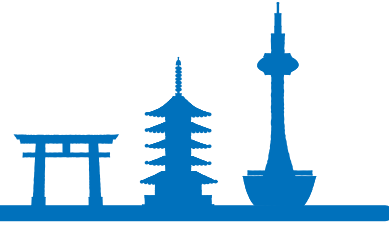
The prediction model of the usage time by the rental bicycle users was constructed using the proportional hazards model. In this study, we estimated the models not only for all tourists but also for Japanese and foreigners individually, and compared and examined the two models.

The survey overview is shown in Table 1.. Our survey consists of two surveys, questionnaire and GPS log data. Participants in this survey freely were asked to visit sightseeing areas. GPS log data were measured at 5-second intervals. From these data, we calculated usage time and travel distance, and showed the spatial distribution of travel routes and destinations.

Table 1. Survey overview

Period	November 1, 2018-November 11, 2018 (except November 9, 2018)
Shops	Kyoto Cycling Tour Project and Kyoto Eco Trip
Subjects	Japanese tourists and foreign tourists
Collection	140 samples (Japanese: 85 samples, foreigners: 55 samples)
Questionnaire content	Personal attributes (country, sex, age) How often do you ride a bicycle? Where did you visit or were you unable to visit? Why did you choose the route? What problems did you have while traveling by bicycle?
GPS log data content	ID, time, date, longitude, latitude, speed

# 3. Results



## 3-1. Analysis of Questionnaire and GPS log data

Table 2., Fig.1.,2.,3.,4.,5.,6. and 7. show the results of analysis of questionnaire and GPS log data.

There were not remarkable differences in the average travel distance and the average usage time between Japanese and foreign tourists. There were some differences in travel behavior, such as the average number of places visited, criteria for route choice and problems with the rental bicycle trip.

## 3-2. Prediction Model of the Usage Time

Table 3. is the estimation result of the prediction model of the usage time using the proportional hazards model. As shown in Table 3. and the survival curve, there was no significant difference. Therefore, it was found that there is not remarkable difference in usage time between Japanese and foreigners, but factors affecting usage time, the number of places and total travel distance, influence more significantly on Japanese tourists than foreign tourists.

Table 2. The results of analysis of questionnaire and GPS log

Average	Japanese	Foreigners
Usage time	5h 48m 27s	5h 45m 27s
Travel distance	24.1km	22.1km
Running time	3h 9m 45s	2h 58m 12s
Total facility-staying time	2h 38m 42s	2h 47m 15s
Each facility-staying time	57m 47s	1h 12m 33s
Number of places visited	3.6	3.0

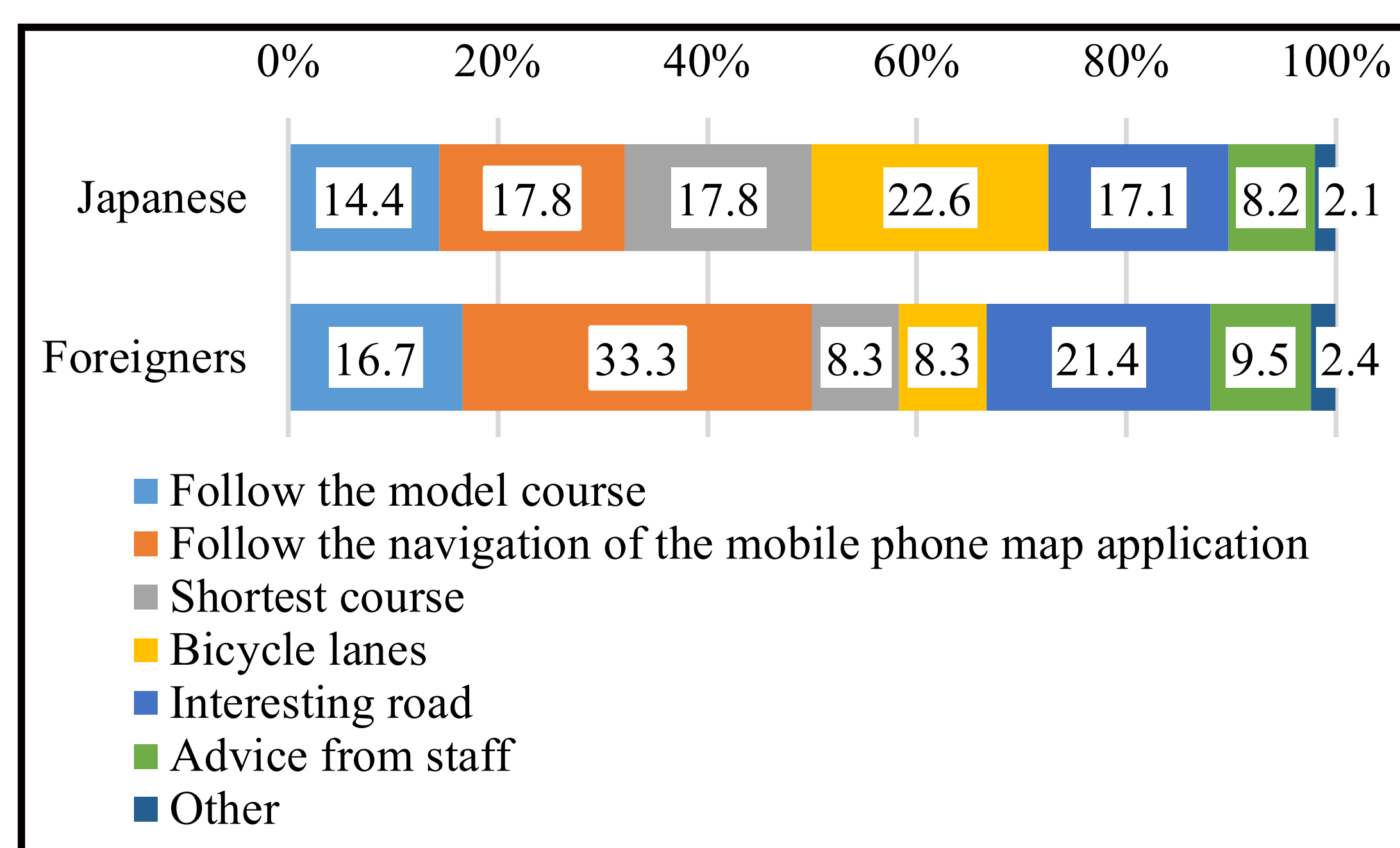


Fig.1. Criteria for route choice by cyclists

Table 3. Estimation result of the prediction model of the usage time

Covariance	All	Japanese	Foreigners
Total travel distance	-0.028 0.008 **	-0.026 0.053 .	-0.030 0.112 .
Number of places visited	-0.205 0.004 **	-0.193 0.021 *	-0.247 0.063 .
Route choice criteria 1 (Follow the navigation)	0.236 0.216	0.420 0.109	-0.031 0.916
Route choice criteria 2 (Interesting, Fun)	0.242 0.222	0.554 0.042 *	-0.131 0.664
Number of problems indicated	-0.206 0.010 **	-0.339 0.002 **	-0.072 0.505
Country	0.008 0.968	- - - -	- - - -
Concordance	0.678	0.683	0.667
Sample number	140	85	55

※ Upper row : Parameter  
Lower row : p value  
(\*\* : 0.1% significant, \* : 1% significant, . : 5% significant)

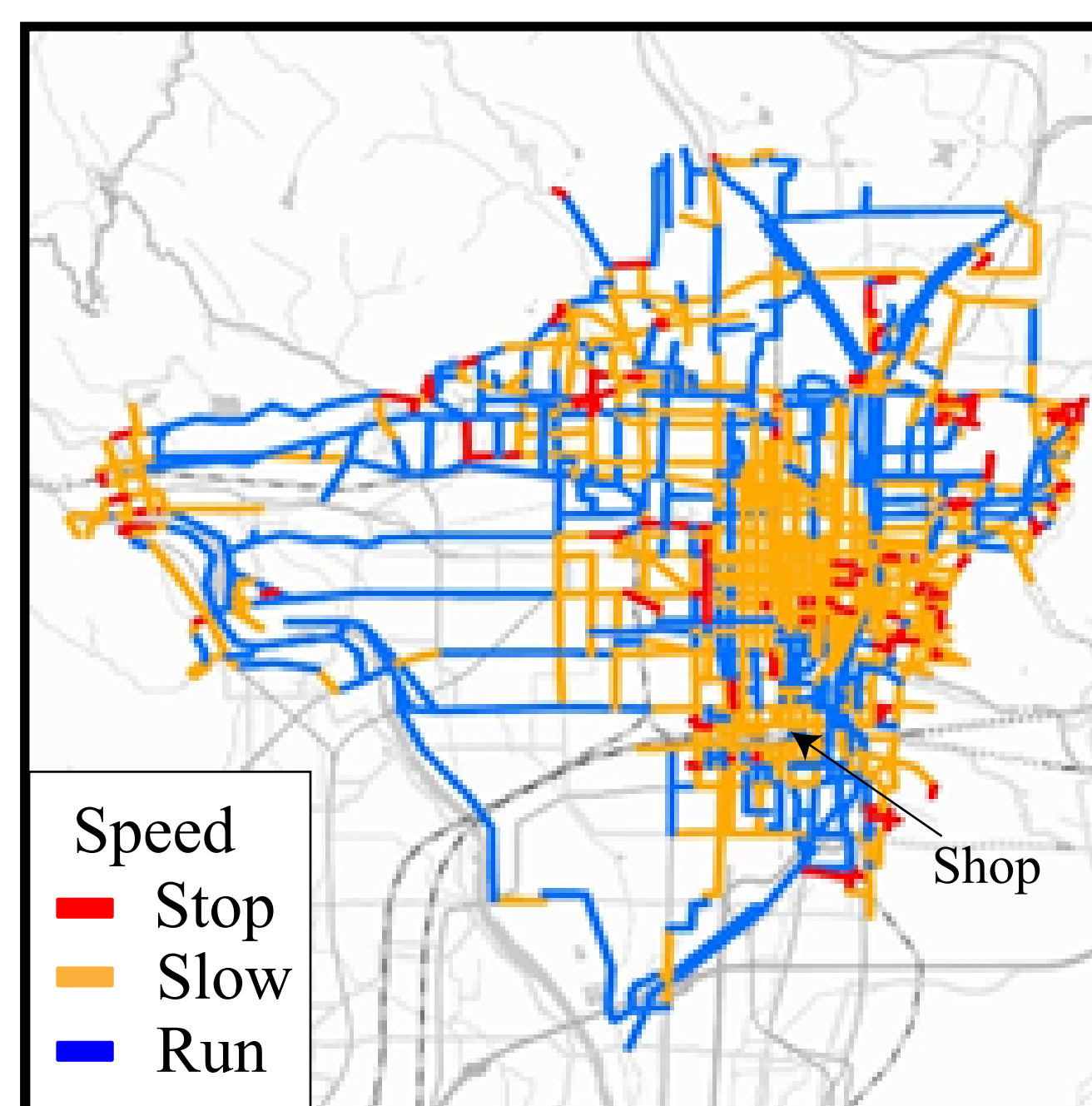


Fig.2. Speed (Japanese)

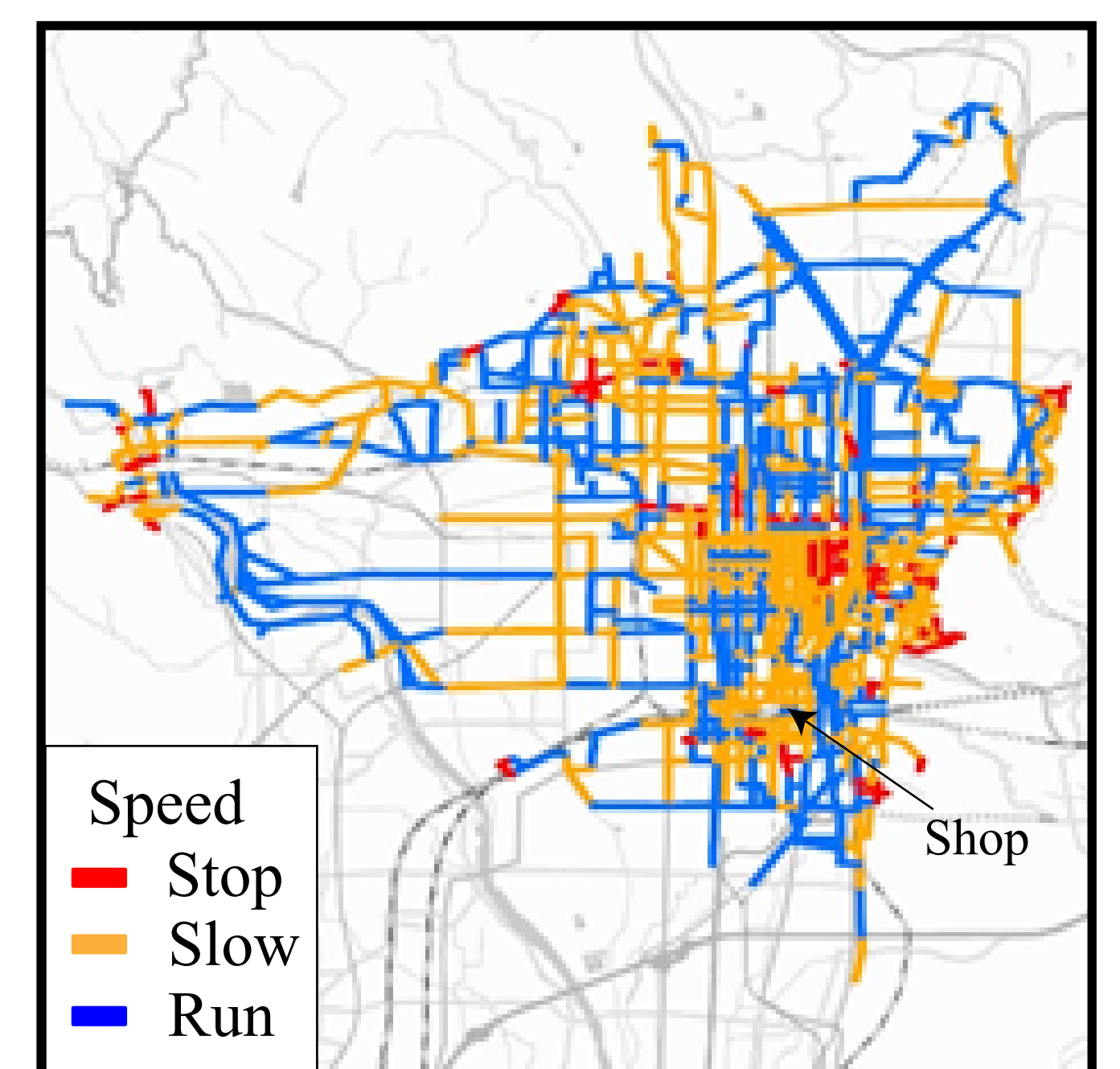


Fig.3. Speed (Foreigners)

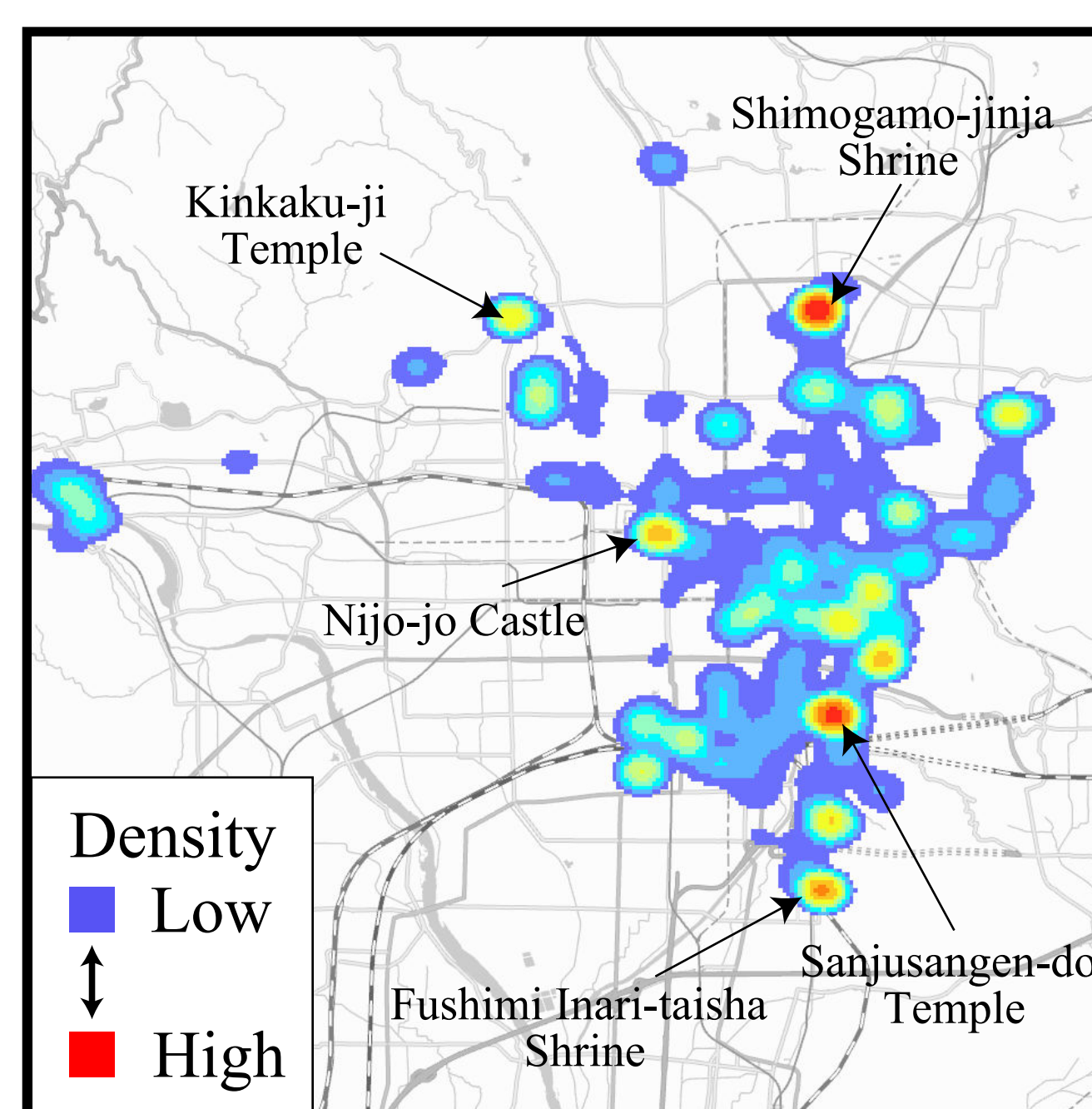


Fig.4. Movement (Japanese, 0:00 p.m.)

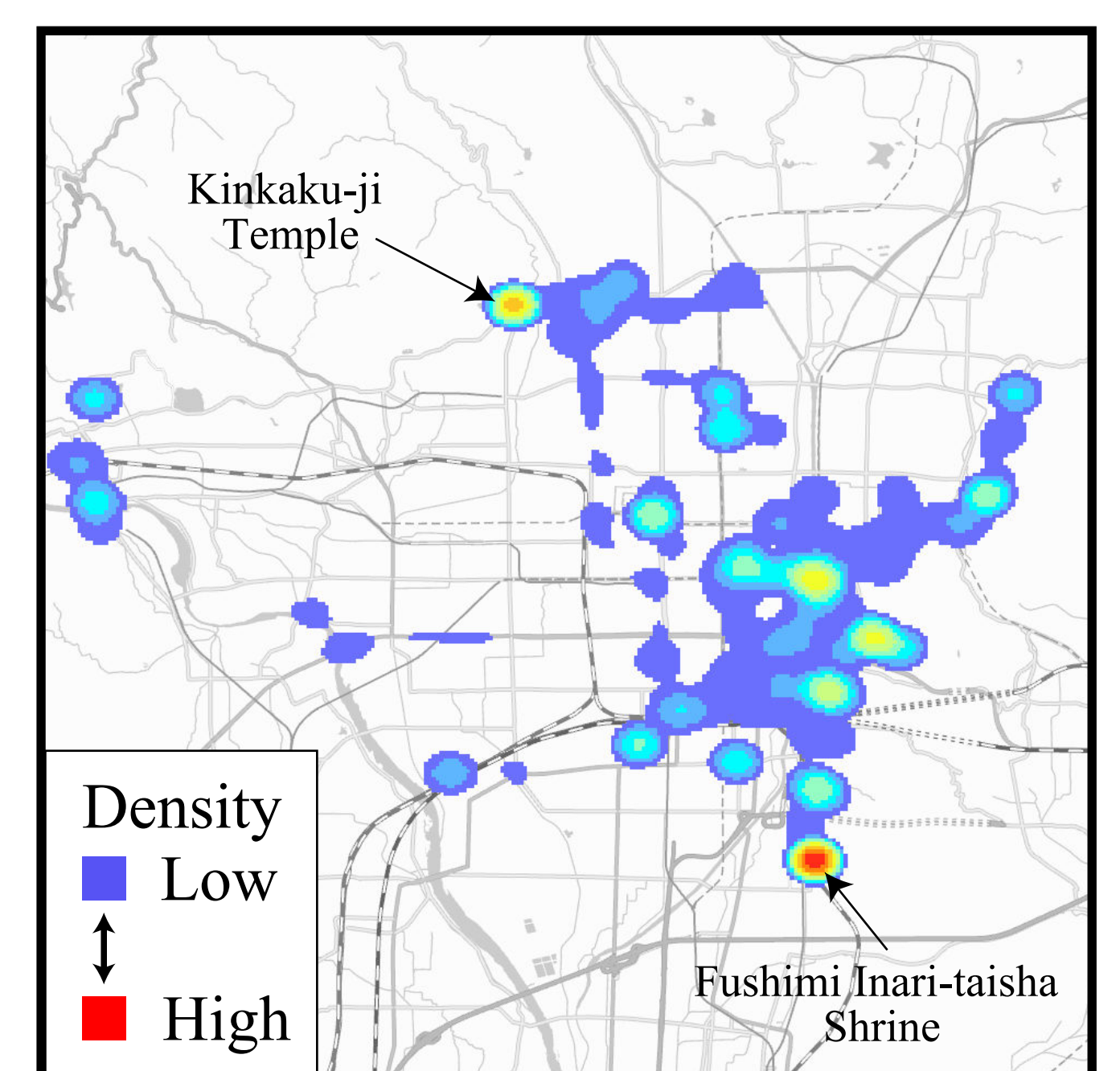


Fig.5. Movement (Foreigners, 0:00 p.m.)

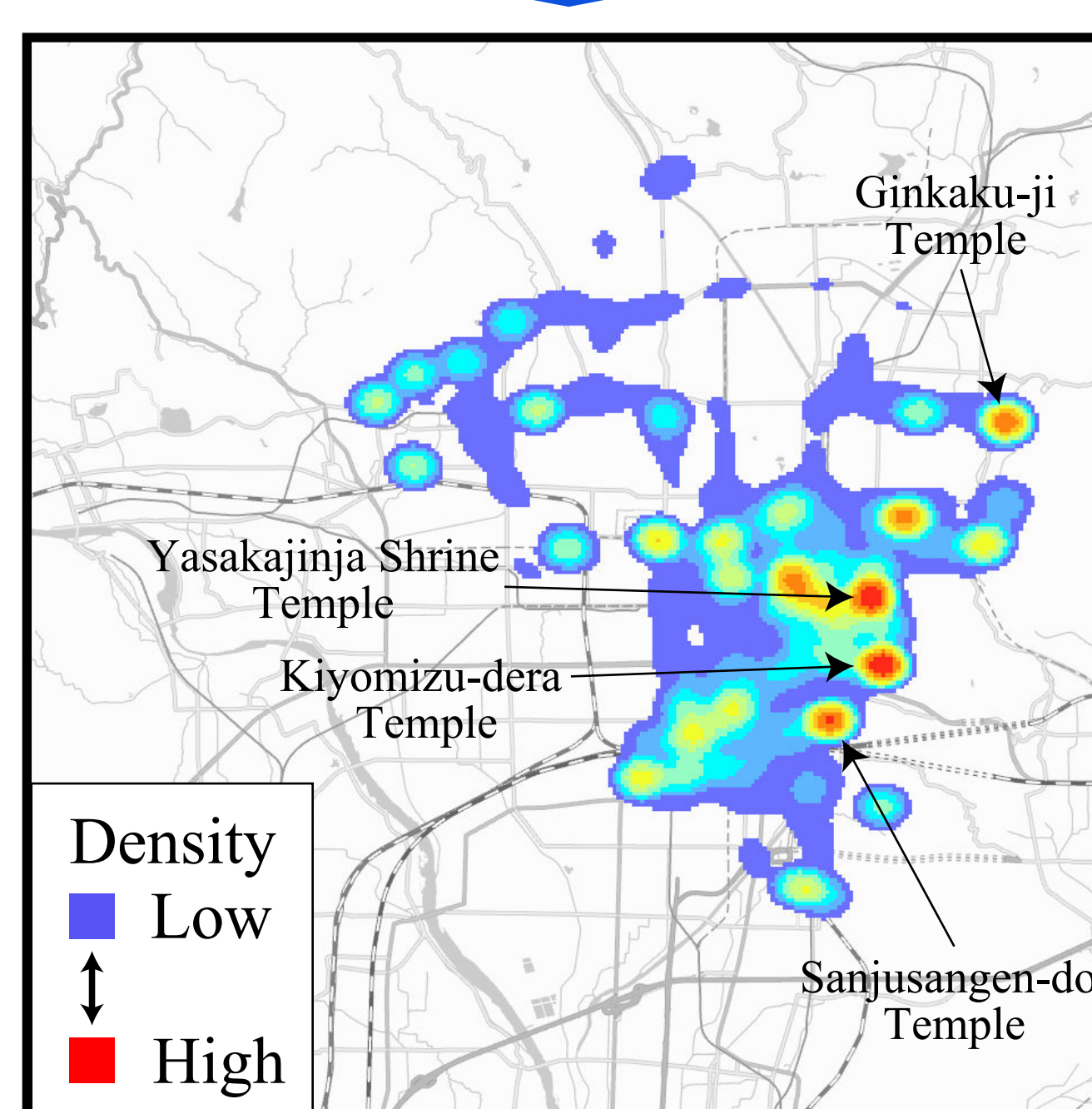


Fig.6. Movement (Japanese, 3:00 p.m.)

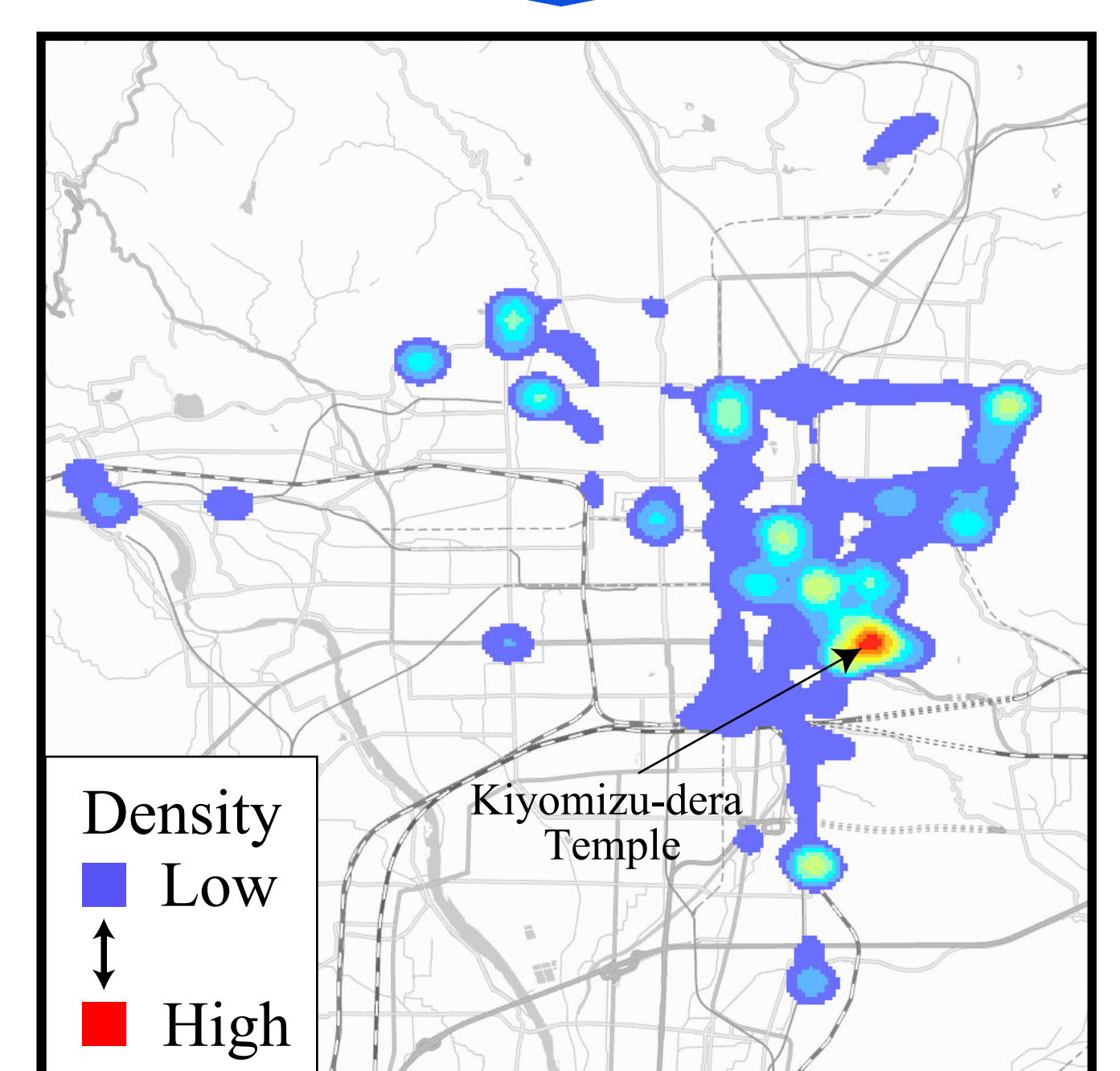


Fig.7. Movement (Foreigners, 3:00 p.m.)