

TRIP PLANNER FOR MUSLIM TOURISTS

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1. Entrant's name: NIPPON KOEI R&D Center
2. Submission's title: Trip Planner for Muslim Tourists
3. Description of the submission:

This is an idea report about a web service for helping Muslim tourists visiting Tokyo to arrange their daily trips according to mosque locations, prayer times and restaurant locations that provide Muslim-friendly (halal) dishes.

With the approaching 2020 Tokyo Olympics and Paralympics, Japan prepares to welcome 40 million tourists next year. Among them, more than one million are expected to be from Muslim countries. Muslims have strict dietary requirements (such as they cannot consume pork or alcoholic drinks) and they need to find prayer spaces to perform daily prayers (five times a day). Japan is making an extra effort to become a touristic destination for Muslims by providing prayer rooms at stations and airports, by preparing local maps indicating halal restaurants, etc. But, accessing this information and arranging travel plans accordingly is still a hurdle.

This web service will bring together information about halal restaurants, mosques as well as public transport and help Muslim tourists not only to locate mosques, prayer rooms and restaurants, but also to arrange their trips with the use of public transport in Tokyo. All necessary information will be gathered using open data or crowdsourcing through social media like Facebook and Twitter.

An example trip plan for visiting Skytree and Ueno Park, starting from Tokyo Station is shown in Figure 1.

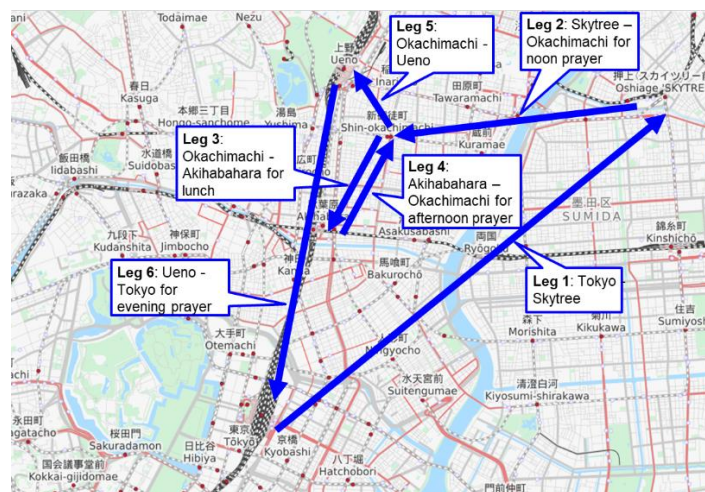


Figure 1: Trip plan example

4. Used API and Data type:

Timetable database	Timetable database of railway stations and bus stops will be generated using Public Transportation Data API and will be updated regularly.
Railway stations and bus stops database	Location database of railway stations, bus stops and served routes will be generated using Public Transportation Data API . This database will be useful for finding nearest bus stop and railway station.
Connections database	A connections database covering all railway stations and bus stops will be generated in network graph form using Public Transportation Data API . This database will be used to find alternative paths between a departure and destination pair. It will be updated regularly together with the timetable database.
Openrouteservice API	In the case that nearest mosque or restaurant is within a walking distance, a free-to-use service, Openrouteservice API (https://openrouteservice.org) will be used to calculate walking distance and duration.
Mosque database	Locations of mosques, masjids and prayer rooms in Tokyo as well as their operating hours will be obtained by asking social media users, who follow accounts related with Muslims in Japan, to share information
Prayer times database	Prayer times database will be generated using free-to-use Prayer Times API (https://aladhan.com/prayer-times-api).
Restaurant database	Locations of restaurants that provide halal dishes in Tokyo as well as types of the restaurant (Japanese, Indian, western etc.) and their operating hours will be obtained by asking social media users, who follow accounts related with Muslims in Japan, to share information
OpenStreetMap	We will use OpenStreetMap service, a free-to-use service, (https://www.openstreetmap.org) to display maps and to get onclick locations.

10. Detailed description:

Outline of the system: is shown in Figure 2. It consists of 3 search processes and a planning process. Users will access to this service through their PCs, tablets or mobile phones. There will be 3 menu items as 'Find nearest mosque', 'Find nearest restaurant' and 'Trip planner'. 'Find nearest mosque' menu will ask the user to set location and routing preferences. Then the service will return a list of 3 nearest mosques according to travel time using mosque database and public transport timetables. 'Find nearest restaurant' menu will ask the user to set location, routing preferences and restaurant preferences. Then the service will return a list of 3 nearest restaurants according to travel time using

restaurant database and public transport timetables. 'Trip planner' menu will ask the user to set departure location & time, return location & time, destinations to visit & stay times, trip settings, routing preferences and restaurant preferences. Then the service will return a trip plan to visit destinations, to perform prayers at mosques within prayer times (using a prayer times database) and to have meals at restaurants at specified times.

Flow charts of mosque search process and planning process are given in Figure 3 and 4.

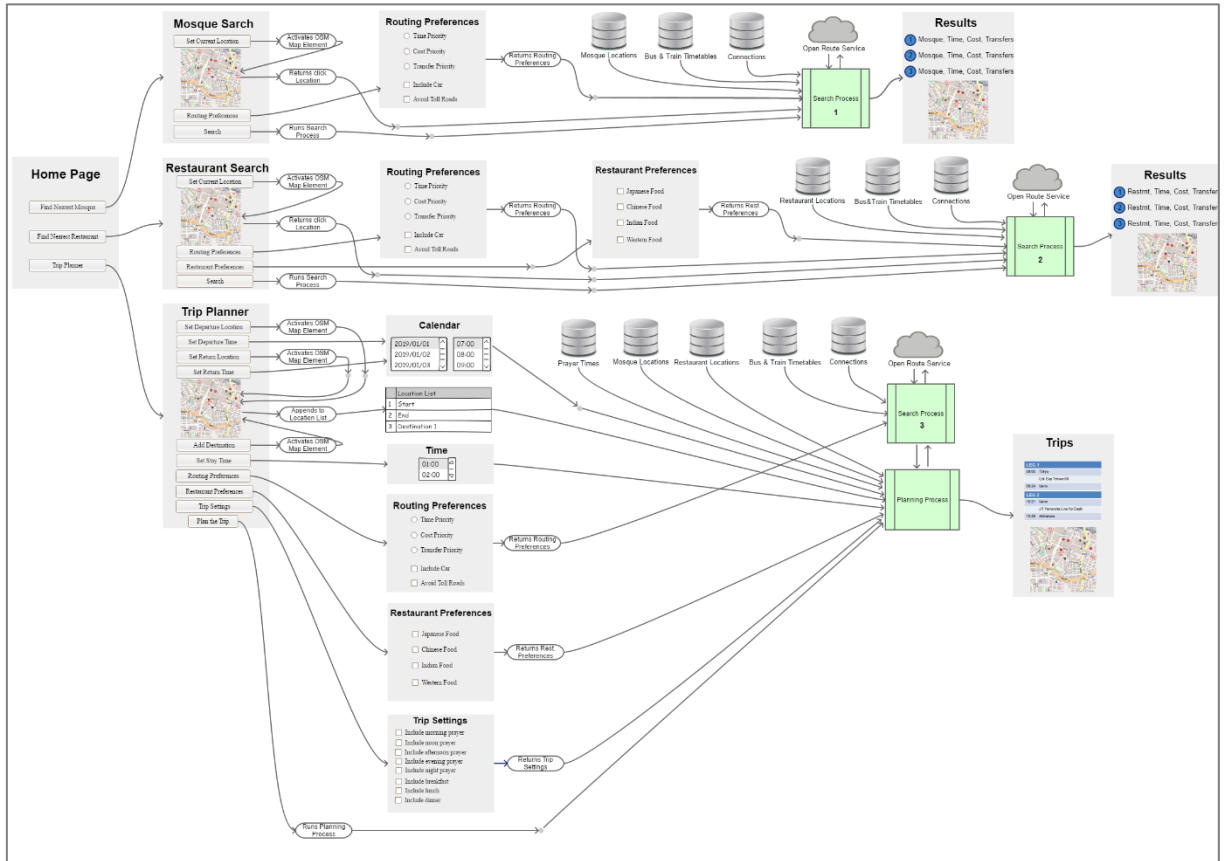


Figure 2: Outline of the system

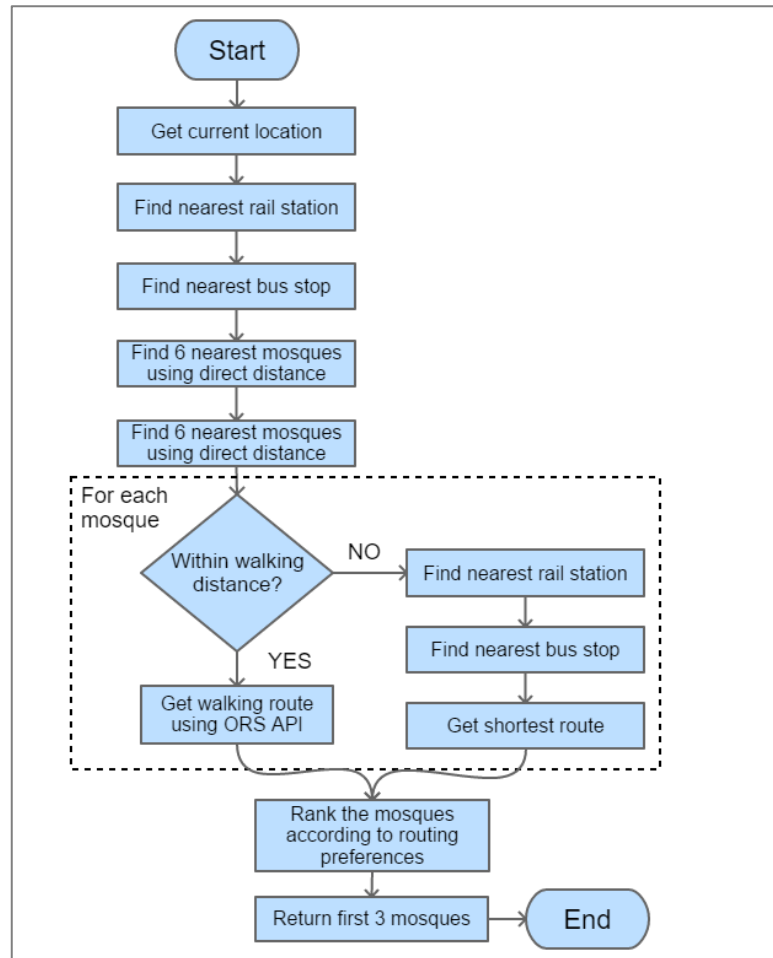


Figure 3: Mosque search process

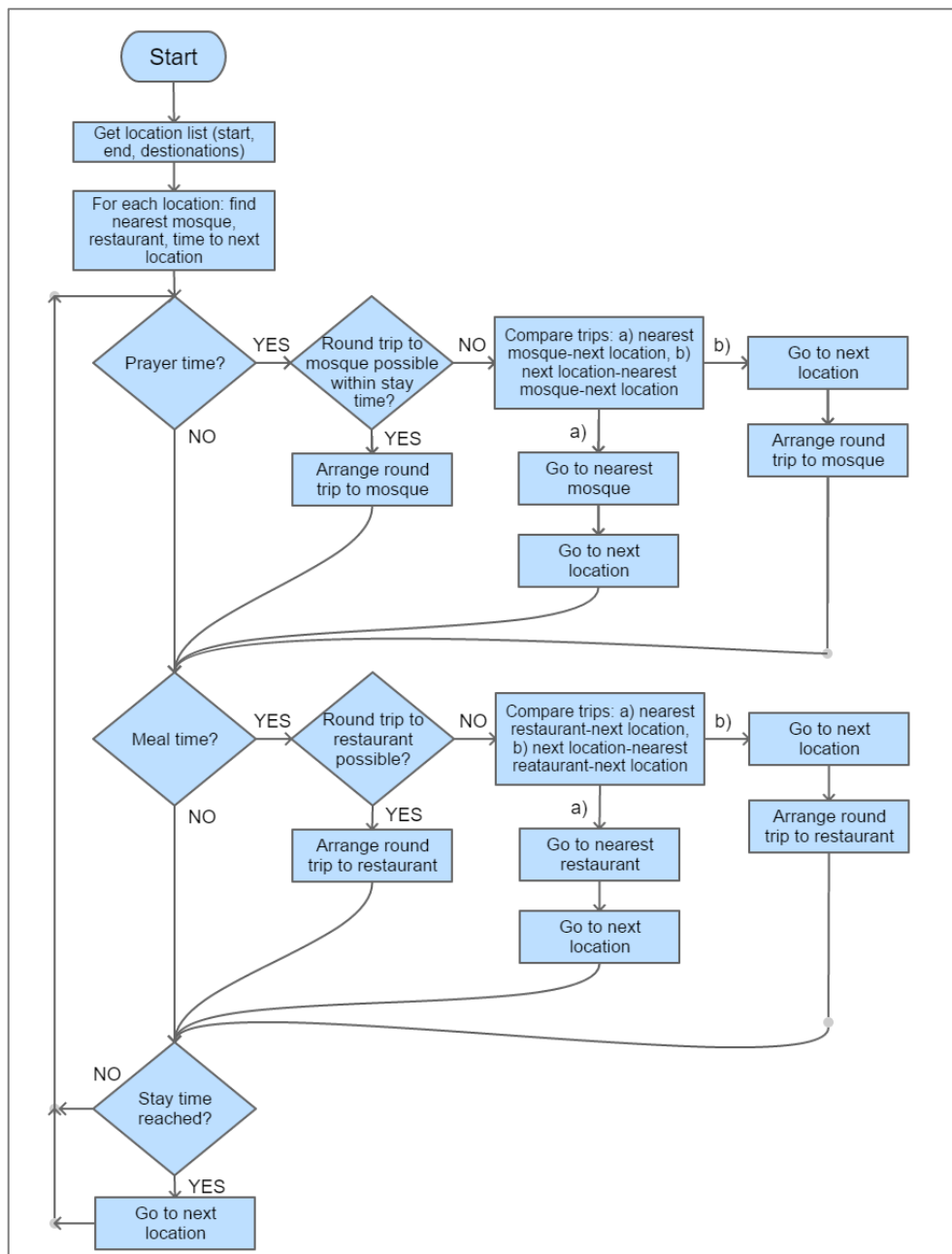


Figure 4: Trip plan process

Route search algorithm: Route search algorithm between given origin destination points (bus stops or rail stations) is explained in Figure 5. First, several route alternatives between origin and destination points are extracted using connections graph, with distance-based nth shortest path search method. Then, for each route alternative, total travel time including transfers are calculated based on timetables. Finally, routes are ranked according to routing preferences and first 3 alternatives are returned.

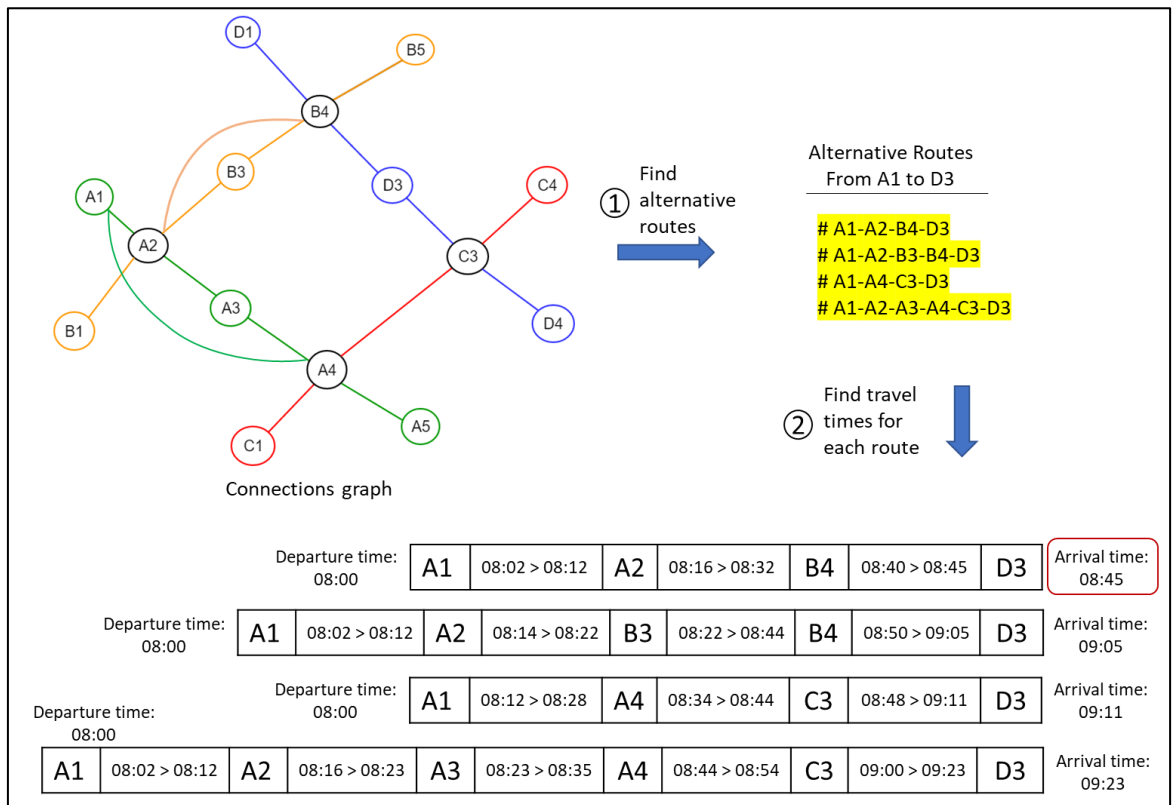


Figure 5: Route search algorithm