

# Traveler Guide Assistant: Introducing an Application for an OpenStreetMap Based Travel Itinerary Construction

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## ABSTRACT

In this paper we describe an approach to the development of an application for user experience-centered travel itinerary construction. The developed prototype uses the OpenStreetMap API and provides the following major features: iterative tourist route construction; adding text, image and audio annotations; point of interest overview screen; access to recommendations for travelers.

## Categories and Subject Descriptors

H.4 [Information Systems Applications]: Miscellaneous;  
 H.5.2 [Information Interfaces and Presentation]: User Interfaces—*human centered design*

## General Terms

Design, Human Factors

## Keywords

Human-centric computing, Information systems, Travel

## 1. INTRODUCTION

Being an immanent human activity since probably prehistoric times, traveling is an essential part of our life, one of the obvious ways to discover the outside world. Among different factors (including journey time, hotel accommodation, well-prepared equipment, etc.), the careful forethought of the journey makes the trip successful and coming up to the traveler's expectations. What kind of tools travelers (and guides as well) do usually use in order to prepare the tour itinerary? First, they use traditional paperback editions of numerous travel guides that contain plenty of map and city plan fragments with routes, points of interests together with some stories. Figure 1 shows an example that is taken from Dorling Kindersley travel guide for Paris [6].

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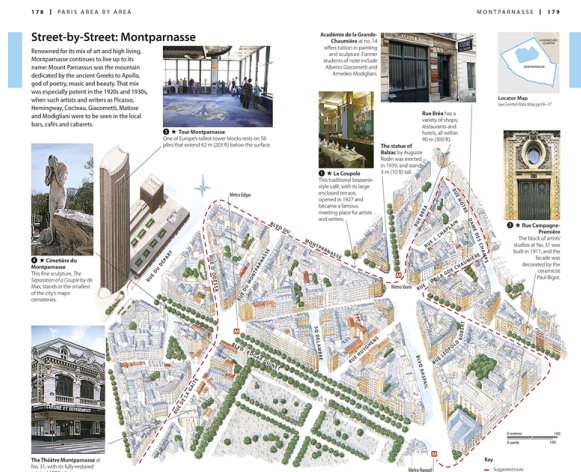


Figure 1: DK Eyewitness Travel Guide

Second, they consult different guides that are implemented as software applications (currently available on many mobile platforms). Third, they ask other people by using social networks and traveler forums like tripadvisor.com, expedia.com, etc. Finally, sometimes they construct their own itineraries, and this is the case that we address in our work above all things.

Thus, the general idea is to combine the user experience orientation and rich facilities of the present day information retrieval, processing and presentation tools for the domain of travel tour planning and construction and developing related services for the purposes of creating better infrastructure of big cities [8].

## 2. RELATED WORK

Tourism is the worldwide industry that demands huge amount of data delivery and processing. It is no wonder that nowadays numerous web resources are developed to allow people to plan their journeys and access different related services: reading travelers' reviews, comparing prices, reserving tickets, booking hotels and air flights, and so on.

Besides web resources there are research works and projects developed in the domain of information systems for tourism. In "Electronic Tour Guide for Android Mobile Platform with Multimedia Travel Book" [4] the services for creating travel

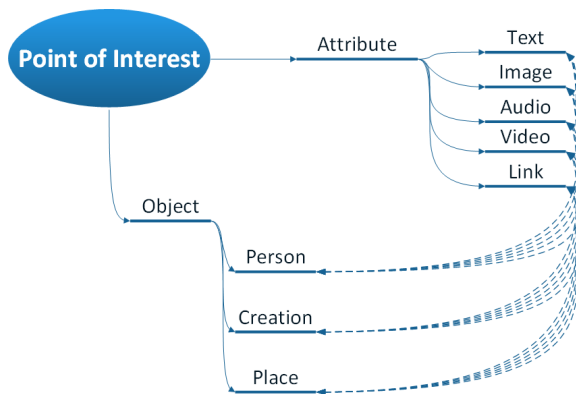
reporting in the form of a multimedia travel book are presented. Authors of “*Mobile Application for Guiding Tourist Activities: Tourist Assistant – TAIS*” [5] developed an application that generates recommendations collected on the base of other travelers’ experience and evaluations. There are also works focusing the problem of tourist route planning automation. An interesting example we can find in the work of Kachkaev and Wood from City University London presenting an approach for automated planning of leisure walks based on crowd-sourced photographic content [2].

Somehow, many current efforts are about delivering personalized solutions allowing travelers to leverage and to share their experience and to follow major scenarios we could learn on the base of study of traveler experience not without paying special attention to the mobile technology [3, 1].

Significant contribution is *Aurigo*, the project of Georgia Institute of Technology. This system seems to be one of the most advanced applications developed recently in the domain of interactive tools for travel planning [7]. The authors attempted to combine features for manual route construction with number of automated features.

### 3. MODELING A TRAVEL ITINERARY

Let us introduce an *annotated travel itinerary* concept. Unlike to the simple route which is often the same as a path (usually the shortest one) between two points on the map, the annotated travel itinerary is more complicated. We consider this as a set of points of interest (POI) representing different attractions like architectural sights, museums, historical places, monuments, view points, etc.



**Figure 2: POI metaphor represented as a map of concepts**

As Figure 2 illustrates, many related concepts can be linked to the central POI concept. In order to create a relevant annotation (which has to be able to be visualized in a sense), one should consider including such entities as description texts, images (photos, drawing, replicas, diagrams, etc.), multimedia objects (audio or video clips), web links, notes, citations, dates, timeline connections, information about related people, places or events, to cite a few.

Figure 3 shows a diversity of data to be visualized by using rich POI annotations (for example, the case of the Eiffel Tower illustrates well how many different allusions exist that a guide take into consideration in order to introduce the tourist attraction in the best way to the visitors).



**Eiffel Tower**

The Eiffel Tower is an iron lattice tower located on the Champ de Mars in Paris, France. It was named after the engineer Alexandre Gustave Eiffel, whose company designed and built the tower.

[https://en.wikipedia.org/wiki/Eiffel\\_Tower](https://en.wikipedia.org/wiki/Eiffel_Tower)

*"I left Paris and even France because in the end, the Eiffel Tower annoyed me too much. Not only could you see it from wherever you went in the city, but you also found it everywhere, made in every material known to man, on sale in all the shop windows, an unavoidable and agonising nightmare."*

Guy de Maupassant, La Vie Errante (1890)



**Alexandre Gustave Eiffel**

Alexandre Gustave Eiffel (15 December 1832 – 27 December 1923) was a French civil engineer and architect. A graduate of the prestigious École Centrale des Arts et Manufactures of France, he made his name with various bridges for the French railway network, most famously the Garabit viaduct. He is best known for the world-famous Eiffel Tower, built for the 1889 Universal Exposition in Paris, and his contribution to designing the Statue of Liberty in New York.

[https://en.wikipedia.org/wiki/Gustave\\_Eiffel](https://en.wikipedia.org/wiki/Gustave_Eiffel)

**Also,**

Eiffel is an ISO-standardized, object-oriented programming language designed by Bertrand Meyer (an object-orientation proponent and author of Object-Oriented Software Construction) and Eiffel Software. The design of the language is closely connected with the Eiffel programming method.



**Bertrand Meyer**

Bertrand Meyer (born 1950) is a French academic, author, and consultant in the field of computer languages. He created the Eiffel programming language and the idea of design by contract.

[https://en.wikipedia.org/wiki/Bertrand\\_Meyer](https://en.wikipedia.org/wiki/Bertrand_Meyer)

[https://en.wikipedia.org/wiki/Eiffel\\_\(programming\\_language\)](https://en.wikipedia.org/wiki/Eiffel_(programming_language))

**Figure 3: Giving an idea of an annotation concept**

The popular services like Google Play or AppStore give access to applications that in most cases implement the idea of book style travel guide providing access to the plenty of facts, but without rich facilities allowing users to be creative in planning their journey and to construct their own annotated routes. Particularly, if we use Google Custom Maps service, we are able to add POI markers together with some lines, shapes, etc. Our idea is to extend these facilities and to allow users to get more POI inspired information (including pictures, encyclopedic descriptions, external links, etc.) with respect to the particular map area and personal interests. We also pay attention to partial automation of itinerary construction with special focus on requirements provided by tourist guides.

Let’s consider what an amateur or a professional guide has to do in order to prepare a travel itinerary. One possible way is to rely on electronic cartographic services. Unfortunately, currently they don’t provide enough flexibility and user interface options allowing user to be able to construct reasonably complicated travel route (if this is not about finding the shortest path while getting directions).

So people often go back to traditional values and draw the route manually on the printed maps (having much flexibility in adding different kind of written annotations, but with few possibilities to share results of their work). Also, if one is not a professional tourist guide, he or she might need managing many different points of interest on the map.

To sum up, the process of the annotated travel itinerary construction is time and efforts consuming. Moreover, there are difficulties both to maintain the completed itinerary, and to implement the itineraries with variants. An ability to support variants is very important since there are many aspects conditioning variants: difference in travelers’ age or experience, possible changes in weather condition, unexpected closing of some sights, etc.

Thus, there are reasons to create an application implementing the introduced itinerary model and supporting major use cases that we believe useful for a traveler, and not only for a traveler alone, but also for an amateur or professional tourist guide who plans routes for his or her clients.

## 4. SOFTWARE PROTOTYPE

In this section we introduce the software prototype for personalized travel itinerary construction.

As we have mentioned in the previous section, the target user is twofold, since both travelers and tourist guides can be considered as users. Below major requirements for the software prototype are listed:

- An intuitive user-friendly interface;
- Ability to create the route itself and to add the annotations containing text information, images, audio, links to web sites, etc.;
- Ability to modify the created tourist route;
- Ability to search of POI-related information on the web.

In the following subsection we describe the major components related to the above mentioned scenarios.

### 4.1 Main Frame

The main frame (see Figure 4) contains the map itself and the tabbed panel with different tools that allow creating and modifying routes.

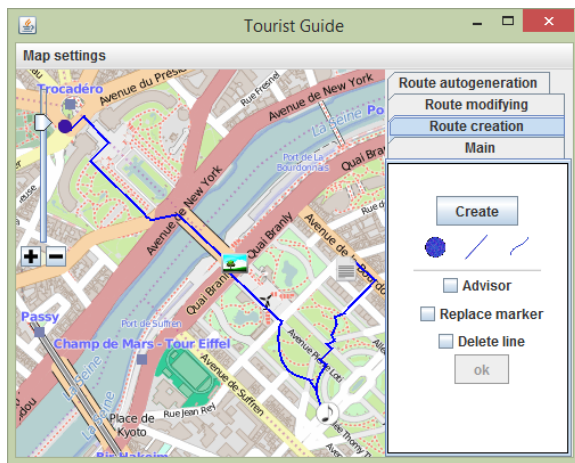


Figure 4: Main frame window with an example of constructed itinerary

#### 4.1.1 Using OpenStreetMap as a Cartography E-Service

OpenStreetMap (OSM)<sup>1</sup> is a collaborative project to create a free editable world map. Currently OSM maps cover almost the whole world. The map is quite accurate; the accuracy depends on the users' activity in the region. The service is free to use, it doesn't have any restrictions to access its API. Also, OSM provides good map database. In our application the implementation uses *JMapView* component.

#### 4.1.2 Annotated Itinerary Creation

With the help of the route creation panel user can create the annotated tourist route. This panel allows adding markers and lines, replacing markers and deleting lines. In

<sup>1</sup><http://www.openstreetmap.org>

the developed prototype a marker represents the view of annotation on the map. The icon of the marker depends on its annotation content. If the annotation contains an image, the marker would look like a photo. If the annotation contains an audio, the marker would look like the violin clef. It is important to mention that the constructed itinerary is modifiable.

### 4.2 Annotation Frame

As it was stated before, markers represent annotation views on the map. So, after clicking on the marker, the annotation frame opens. Images are loaded either from the local computer or from the Internet. The annotation frame user interface is shown in Figure 5.

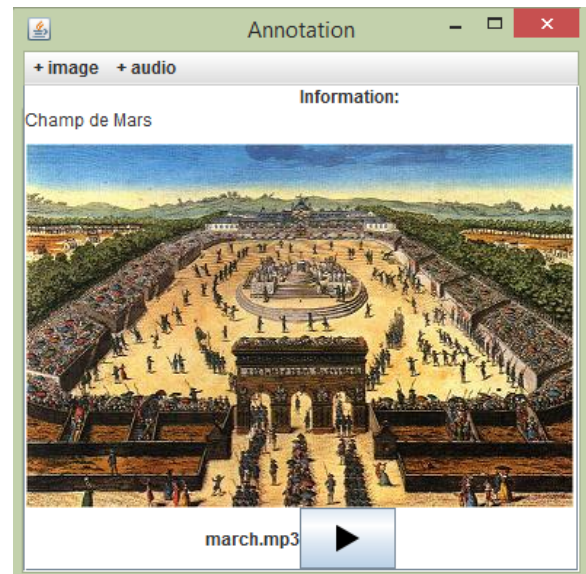


Figure 5: POI overview

### 4.3 POI Overview Window

The brief POI overview contains POI metadata. Currently they include POI address, name, related images and links (see Figure 6).

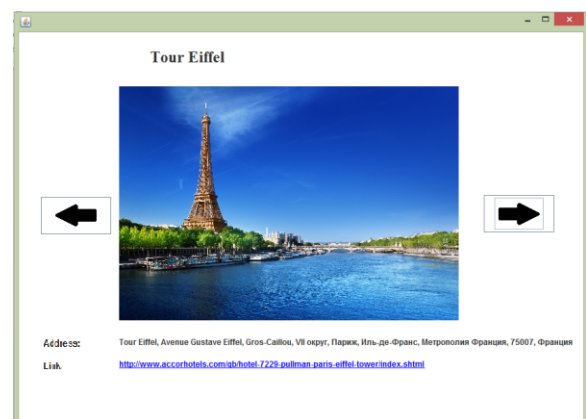


Figure 6: POI Overview Screen

To obtain the POI address by its latitude and longitude

values (got from the map) we use the methods of reverse geocoding based on *Nominatim*<sup>2</sup>, a tool to search OSM data by name and address and to generate synthetic addresses of OSM points. Below is an HTTP-request example for extracting the POI address succeeded by the JSON-structure representing the delivered address information.

```
http://nominatim.openstreetmap.org/reverse?format=json&accept-language=en&lat=48.858&lon=2.2945&zoom=18&addressdetails=1
```

```
{
  "place_id":"47281851",
  "licence":"Data © OpenStreetMap ...",
  "osm_type":"way",
  "osm_id":"5013364",
  "lat":"48.8582602",
  "lon":"2.29449905431968",
  "display_name":
    "Eiffel Tower, Avenue Gustave Eiffel,
    Gros-Caillou, 7th Arrondissement, Paris,
    Ile-de-France,
    Metropolitan France,
    75007, France",
  "address":{
    "address29":"Eiffel Tower",
    "road":"Avenue Gustave Eiffel",
    "suburb":"Gros-Caillou",
    "city_district":"7th Arrondissement",
    "city":"Paris",
    "county":"Paris",
    "state":"Ile-de-France",
    "country":"France",
    "postcode":"75007",
    "country_code":"fr"
  }
}
```

The name is obtained from the POI address.

Images and links are obtained with the help of Google Web Search API.

#### 4.4 Advisor

Users are able to select the area of search on the map in order to allow advisor component to suggest POIs considering including them to the itinerary. Figure 7 gives an idea of the advisor user interface.

### 5. CONCLUSION

In this short paper we described the software prototype for personalized interactive travel itinerary construction. In the future we plan to rethink the application architecture in order to provide support for the following requirements:

- Implementing software component to be executed on mobile devices;
- Integration with navigation facilities;
- Support for thematically oriented route construction;

<sup>2</sup><http://wiki.openstreetmap.org/wiki/Nominatim>

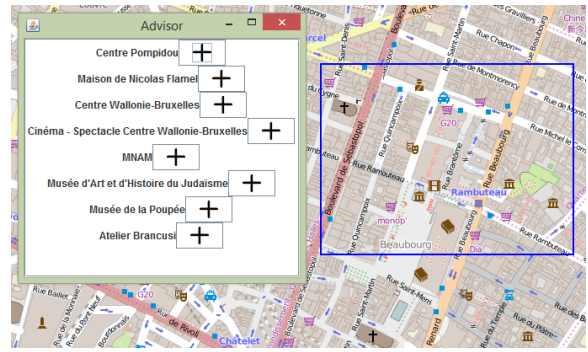


Figure 7: Advisor

- Integrations with the component for automated route generation.

The idea which differs significantly from similar applications mentioned before is to consider investigating the issue of using old maps available as images. A perspective to the ancient views accessible electronically may significantly extend the way to learn history while visiting tourist attractions all over the world.

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