

GIS DESIGN AND APPLICATION FOR TOURISM

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ABSTRACT:

Nowadays, time is considered as valuable as gold. Once time is used sensibly, access to a lot of information is possible. People who want to go sightseeing in different places as tourists may need to have some information about those places. Determining the shortest routes to the historical places and natural beauties from their accommodation will be both timesaving and economical. Geographical Information System (GIS) technologies provide us with these possibilities. In this study, GIS design and network analysis were carried out by taking advantages of GIS possibilities for tourism.

It is likely to carry out some queries by means of Network Analyst in GIS. In this study, results of these directed towards tourism will be presented.

This study was carried out in Eminönü district, where there are a lot of historical and tourist places. For this study, Istanbul Metropolitan Municipality supplied graphical data and the internet also let us has non-graphical data.

1. INTRODUCTION

There has been a huge development in information technology recently. In addition, GIS has been commonly used in different fields such as tourism activities enabling people from different countries and cultures to interact with each other.

A network is a set of linear features that are interconnected in GIS. Common examples of networks include highways, railways, city streets, rivers, transportation routes (e.g., transit, school buses, garbage collection, and mail delivery), and utility distribution systems (e.g., electricity, telephone, water supply, and sewage). Collectively, these networks form the infrastructure of modern society. They provide the means for the movement of people and goods, the delivery of services, the flow of resources and energy, as well as the communication of information (Haggett and Chorley, 1969; Kinsky, 1963).

Network analysis is useful for organizations that manage or use networked facilities, such as utility, transmission and transportation systems. Utilities employ network models to model and analyze their distribution systems and meter-reading routes. Municipal public works departments use networks to analyze bus and trash routes, whereas businesses use them to plan and optimize the delivery of goods and services. Network analysis can also be applied to retail store planning. For instance, solving of the driving times can aid in the determination of retail store trade areas. Three principal types of network analysis are network tracing, network routing and network allocation.

Network Tracing: Network tracing determines a particular path through the network. This path is based on criteria provided by the user.

Network Routing: Network routing determines the optimal path along a linear network. The selection of the path can be based on numerous criteria, such as "shortest distance," "fastest route," "no left turns" and "minimum cost." The path can pass between two points or through several selected points.

Network Allocation: As well as one of the most important processes in the Planning and investment activities is network allocation. In other words, Network allocation is an analysis occurring at the same time of geographical entities and determination process as a point of the optimum center.

2. GIS AND NETWORK ANALYSIS

Geographical data used in Network Analysis have to be vector structure and also based on line. Arc-node topology is established for Network Analysis Query in GIS.

Network Analysis is closely related to spatial interaction modelling. A set of geographic locations interconnected in a system by a number of routes (Kinsky, 1963). A network refers to a system of lines topologically structured.

Networks may be reduced to topological graphs, which are arrays of points connected or not connected to one another by lines (Figure 1). This simplification facilitates the revelation of common topological structures of the networks. The following elements may be identified: nodes (vertices, v_1, v_7), links (e_1, e_9), and regions (r_1, r_4). Connectivity matrices for these elements in binary form may be produced (Figure 1). The number of edges (links) in the network (e), the number of vertices (nodes) in the network (v), and the number of isolated (i.e., no connecting) networks (sub graphs) (g) are employed to develop a series of topological measures to characterize the network structure (Haggett and Chorley, 1969; Kinsky, 1963). It should be noted that an edge is defined by two nodes. There are two main groups of measures: (1) Those based on gross characteristics and (2) Those based on shortest-path characteristics. These measures allow a quantitative description of the network and a comparison of one network with another.

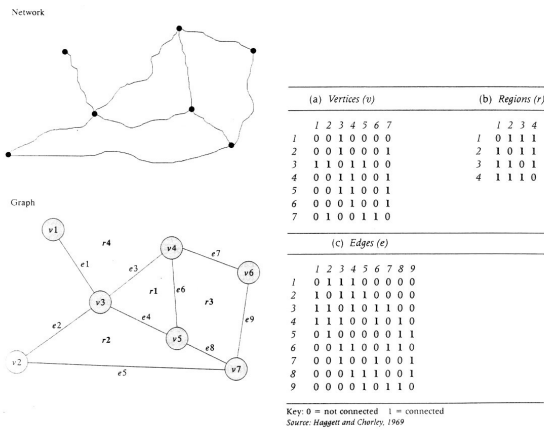


Figure 1. Connectivity Matrices derived from the Network Graph and Reduction of a Network to a graph. (Source: Haggett and Chorley, 1969)

3. GIS DESIGN AND APPLICATION FOR TOURISM AND ITS COMPONENTS

In this study, all of the GIS implementation phases were applied. In addition to this, current state and necessities were fixed on feasibility phase. Data design, process design and physical design phases were carried out on design phase. Finally, Eminönü district of Istanbul was selected as the working area in which there are a lot of tourist places. The system application phase of GIS Design and Application for Tourism was carried out. Furthermore, hardware and software used in this study are written below.

HARDWARE	SOFTWARE
P III 933 Processing 40 GB HDD 256 MB RAM 17" Monitor 50 X CD Room	Microstation V8 Arc View 3.2a and Network Analyst Extension Arc Info 8.0.2

Table1. Hardware and software used in this study

Orthophotos, district boundary maps, current maps, middle lines of roads and their name are graphical components of GIS Design and Application for Tourism. In addition, non-graphical components consist of attributes of designed layers. And also, detailed information related to photos and objects is available for better recognition of query object.

In this study; middle lines of roads which have vector and graphical characteristic for network analysis, and historical and tourism places and all of the geographical objects considered as necessary items for tourism were designed as point layer. Only building layer was designed as polygon layer for imagination.

Name Of Layer	Attributes
Way	ID, Name, Type
Tram Station	ID, Name
Restaurant	ID, Name, Type of Food, Address
Bazaar	ID, Name
Public Building	ID, Name
Church	ID, Name
Public Garden	ID, Name
Palace	ID, Name, image
Turkish Bath	ID, Name, Pool, Address, Telephone, Fax, Web
Hotel	ID, Name, Category, Pool, Air Condition, Car Rental, Elevator, Room Service, Shower, Sightseeing, Coffee, Restaurant, In Room Safe, Number of Room, Cable TV, Lounge, Laundry, Meeting Room, Sauna, Pets Accepted, Fitness, Disco, Doctor Available, Address, Web, Telephone, Fax
Mosque	ID, Name, image, document
Moslem Theological School	ID, Name
Police Station	ID, Name, Telephone
Museum	ID, Name, Telephone, image
Boundary Of District	ID, Name, Area, Length

Table 2. Layers and its attributes

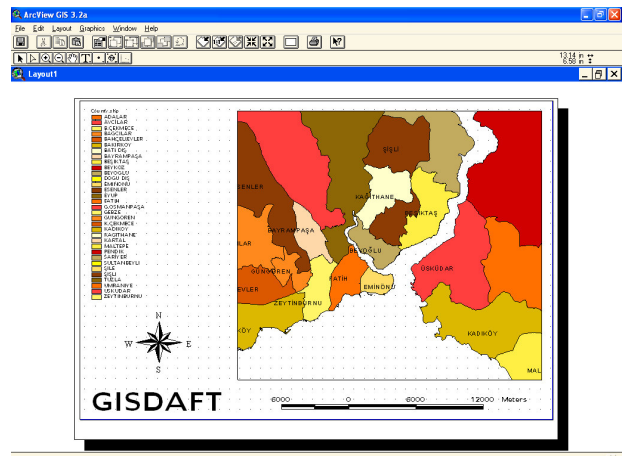


Figure 2. Boundary of District in Istanbul

4. APPLICATION

This study was carried out in Eminönü district, which has a lot of historical and tourist places. Some of the four stars hotels in Eminönü district and most important ones of those historical and tourist places were transferred to system. These results can be achieved by queries in GIS Design and Application for Tourism:

- Determination of important and necessary places for tourism.
- Determination of historical and tourist places.
- Determination of the best suitable hotel.
- Determination of the optimum plan for sightseeing places.
- Determination of the shortest distance between the selected places.

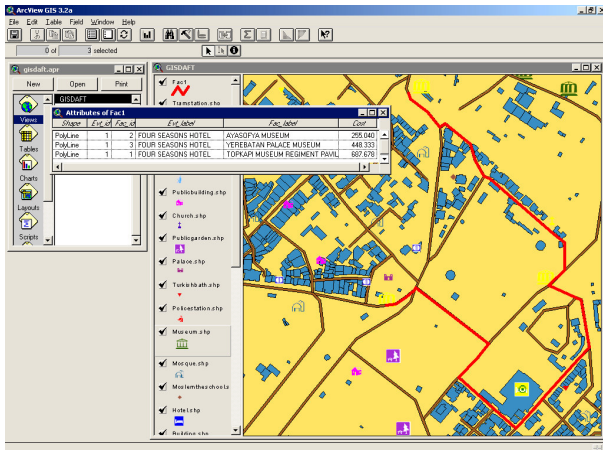


Figure 3. Distance between museums and Optimum Sightseeing Planning

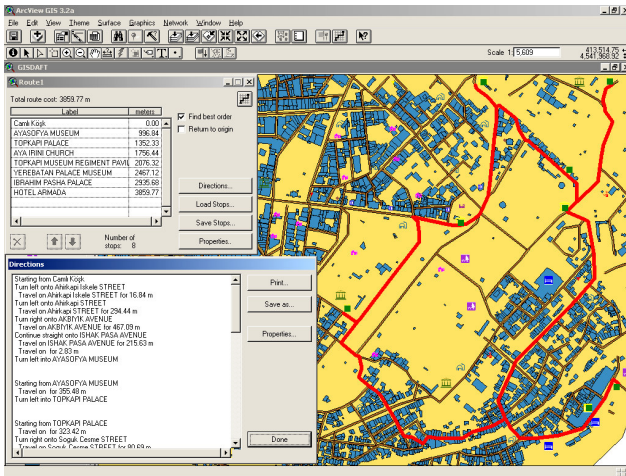


Figure 4. Optimum planning result of network analysis query

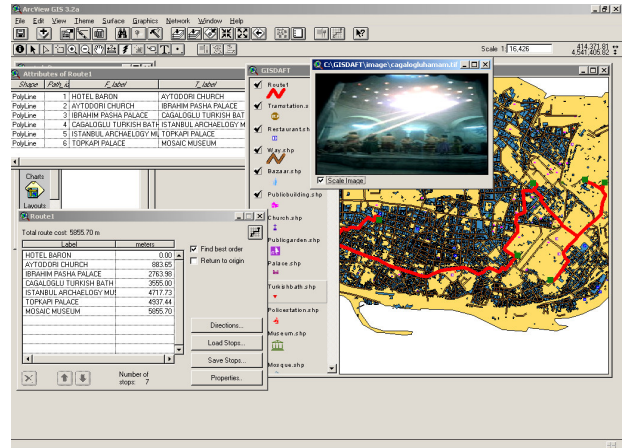


Figure 5. Detailed information about object and optimum route for sightseeing

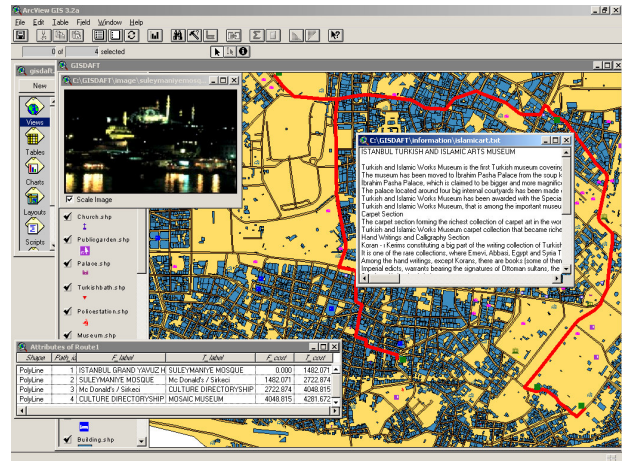


Figure 6. Route plan, document and image about query objects

5. PROBLEMS AND SUGGESTIONS

There were not standards among the data during the system creating process and some problems occurred during transferring the graphical data to the GIS. Afterwards, the standards were formed between graphical and non-graphical data. All of the problems among the graphical data were solved by Arc Info Software.

Tourism has been considered to be one of the crucial industries in the world due to being source of income. It also enables people from different cultures to interact with each other. Therefore, every country must be conscious of tourism and make use of GIS directed towards tourism effectively. Every country should advertise her history, architectural characteristics of buildings in order to make them known all over the world. These details can be obtained in a query by forming a spatial connection with GIS.

6. CONCLUSION

In this study; optimum planning for sightseeing, query of geographical data, obtaining the visual and detailed information about the geographical data and network analysis applications were carried out.

GIS design and application for tourism and network analysis help users to supply optimum planning for tourism. Moreover, users seem to save time via GIS design. In the future, importance of GIS will continue increasingly.

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