DESIGN OF TOURIST INFORMATION SYSTEM (TIS) AND INTEGRATION WITH PANORAMIC IMAGING

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ABSTRACT:

Recently, panorama have become widespread by technological development on digital image. Investigation is focused on panorama by photogrammetry and image processing at last decade. Especially, panorama is useful for envision of virtual tours and travels. In the research, possibility of transferring of panoramic imaging to information system was investigated. Then an information system has designed towards tourists. It's called as Tourist Information System (TIS). Historical Peninsula of Istanbul was chosen as pilot area for TIS. First, the maps which represent pilot area were scanned. Therefore, they were obtained in digital form. Scanned maps were georeferenced in TopoL software and used as basement of information system. In the information system, four vector layers were designed. First layer represents transportation, second one represents accommodation, third one represents historical monuments and last layer represents panoramic image. As depending on types of the layers, they were digitised as polyline, node and area on georeferenced images (raster data). Photographs which were taken by Nikon Coolpix 950 Digital Camera were used in order to create Panorama. The photographs were taken on Sultanahmet Square which is the historical place in Istanbul. To determine coordinates of point, where photos were taken, were measured by handheld GPS. As a result, an Tourist Information System was designed and video image (panoramic image) was transferred to TIS as a new document.

1. VECTOR LAYERS AT TIS

TIS was build with TopoL GIS Software. Four layers were designed to present information system. Figure 1 illustrates the all layers.

First layer represent transportation. The layer is digitised as node and line. Lines show bus and tramway lanes at historical peninsula. Nodes also show the stops which belong to bus and tramway lanes.

Second layer was designed to respond accommodation need. All of hotels digitised as node at the peninsula.

Third layer includes historical monuments. At the project, four well-known monument were chosen. These are Hagia Sophia Museum, Blue Mosque, Topkapi Palace Museum and Suleymaniye Mosque. The aim of third layer is to introduce monument's various sides to tourist.
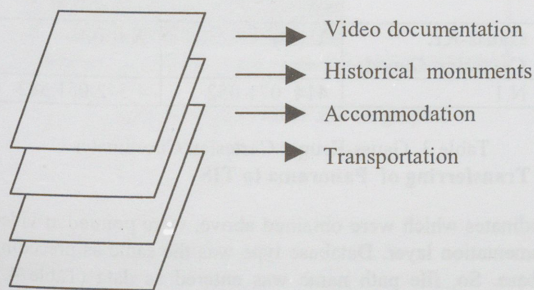

Figure 1. Vector layers

At last layer, video documentation is georeferenced. Nodes determine each Video documentation (panoramic image) at fourth layer.

2. DATABASES

At first layer lines were related with data for transportation. Database includes relationship among bus and tramway number, bus stop names, avenue and region names, length of lane, possible main stop bus names which were connected to lanes. Nodes also represent same database with lines for bus and tramway stop.

Second layer has database for hotels. Database has a lot of attributes about hotels. Each hotel has data which were hotel name, star number, venue, price, telephone, address etc.

Historical monuments' database was set up a bit different from preceding layers. Different kind of files were used as data. Each file introduced monuments. Extension of the files were doc, txt, jpg and xls format. Every monument has seven files. First file was built in txt format. It gives general information about historical building. Following four files demonstrated picture of monuments which were taken from different aspects. Sixth file has xls extension. Xls file explain specific visit possibilities. Last file has doc extension. It has information about architectural attributes of monuments.

The files were copied to project directory. File paths were entered as data (Table 1). Therefore links were created between data and database by TopoL. To provide link, NDI files which are capable of linking to TopoL were coded. After the NDI files were coded, they were saved as P0001.NDI for regional graphic. TopoL isn't capable of defining other names. The name should be L0001.NDI for lines and B0001.NDI for nodes.

Name	Item Value
Number	2
INFO	d:\tis\ayasofya.txt
PICTURE1	d:\tis\ayasof1.jpg
PICTURE2	d:\tis\ayasof2.jpg
PICTURE3	d:\tis\ayasof3.jpg
PICTURE4	d:\tis\ayasof4.jpg
VISIT	d:\tis\ayasofya.xlsi
ARCHITECH	d:\tis\ayasofya.doc

Table 1. Database was obtained at third block directory

3. INTEGRATION OF PANORAMIC IMAGE

To obtain video documentation, several steps were implemented:

1. Photographs were taken so that panoramic image can be obtained.
2. Point which photos were taken measured by handheld GPS.
3. Digital photos were transferred to computer in order to build panorama.
4. Point which was measured by GPS was determined at TIS as node graphic data.
5. At the layer, Panoramic image was linked to database.

All steps were applied by order according to some detail which emphasis at below.

3.1 Building Panoramic Image

Sultanahmet square was chosen for panoramic image. A lot of place such as Blue Mosque, Hagia Sophia Museum and other historical monuments were taken because of wide vision capabilities of panorama. Therefore, opportunity was given to show a lot of monument. To build panorama, digital camera Nikon Coolpix 950 (Figure 2), tripod were used. Trial version of 3dvista studio was also used as software. While photograph point was chosen, we paid attention to catch best view best point. So all important monument could be showed at one image.

Taking photo is beginning from Sultanahmet Mosque. After rotating 360 degree we reach Sultanahmet Mosque view again. Preceding image overlapped following image at most %50. Therefore, a cylindrical panorama was obtained. Figure 3 illustrates structure of cylindrical panorama.

Figure 2. Picture of Nikon Coolpix 950 Digital Camera

Pictures were opened at 3dvista Studio by order. After alignment and stitching process, we got panorama. Panoramic image was converted to a video file. The file extension is mov. It's well-known file format for Quick Time Player. So we managed to convert an image file to video file. It gives opportunity to use easily because of common video file format. End users don't encounter any problem to play the movie file.
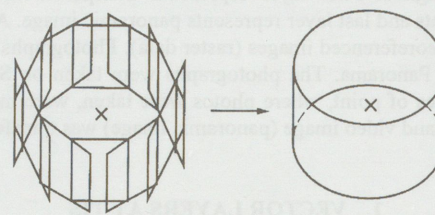

Figure 3. Cylindrical panorama

3.2 Determining Coordinates with GPS

After measurement with handheld GPS, we obtained ED50 datum Cartesian coordinates. The Cartesian coordinates should have projected to 3 degree Gauss-Kruger Cartesian coordinates. First, ellipsoidal Cartesian coordinates were converted to ellipsoidal geographic coordinates. Then, Gauss-Kruger Conform Projection was calculated from ellipsoidal geographic coordinates. Table 2 and Table 3 illustrate coordinates and projection result for GPS measurement.

Point No.	Y (m)	X (m)
N.1	666 396	4 541 618

Table 2. Coordinates which obtained from GPS

Gauss-Kr. Cartesian Coord.	Y (m)	X (m)
N.1	414 071.052	4 542 051.582

Table 3. Gauss-Kruger Cartesian Coordinates

3.3 Transferring of Panorama to TIS

Coordinates which were obtained above, were pointed at video documentation layer. Database type was the same as preceding database. So, file path name was entered as data (Table 4.). Figure 4 explains how to provide integration between panorama and TIS. Perspective view of Historical peninsula is showed in

Figure 2. According to measured point, panorama was located to information system.

Name	Item Value
Number	1
Video Documentation	D:\tis\panorama.mov

Table 4. Database link to panorama file

Location was done with TopoL software. Therefore, panorama was obtained as data.
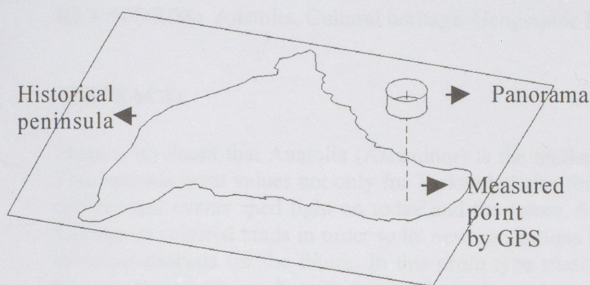

Figure 4. Integration of Panoramic Image

4. INQUIRIES

TIS has some inquiry attributes. The inquiry is capable of answering some basic questions so as to find out optimum solutions.

Inquiry is always essential part of the Geographic Information System (GIS). Therefore, databases were designed so that it could be inquired easily. Figure 5 and 6 illustrates a inquiry table and graphics answers at TIS project.
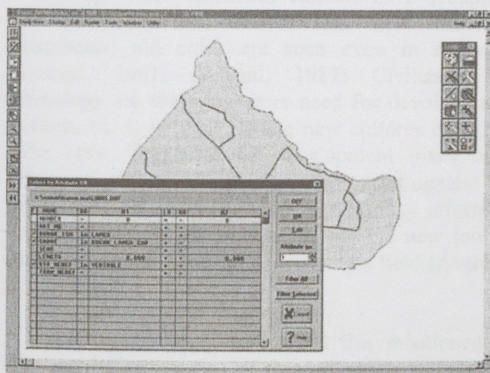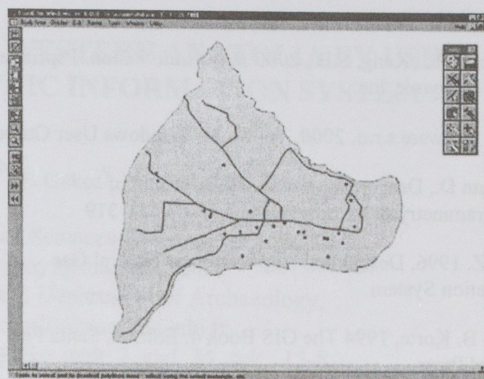

Figure 5. Inquiry table and its graphic

Figure 6. An inquiry result

TopoL allow users to inquire by either table or graphic. Therefore, user could reach a data from another data by inquires. Moreover, it is possible to find out answer from graphic data easily as shown Figure 5 and 6.

5. CONCLUSION

In the study, an information system which serves tourist and tourism, was obtained. Panoramic imaging was integrated with information system. Therefore, a visual supported information system was realized. A quick documentation possibility was provided with obtained panoramic image as transferring to TIS. The information system give opportunity for basic inquire so as to provide a reliable guidance for tourist.

Panoramic imaging is a suitable documentation method for information system. Nevertheless, panoramic images need more research work to obtain measurements from them. Therefore, a new dimension can be add to georeference of information systems. So, an information system can be produced more effectively. It can be used for other fields which are different from tourism.

By exploiting panoramic images we are able to generate relatively inexpensive yet convincing walk through representations of complex facilities which support ad-hoc measurements. These image archives are very rich source of information about the true operational status of a facility and thus are already a very valuable component of any FM database. (Chapman D., Deacon A., 1998)

Handheld GPS is a practical solving to integrate panorama with TIS.

At the work, TIS was designed for a pilot project. It should be improved to realise professional project. It needs new layer and data type depending on aim of the project. It is also necessary that a lot of association or corporation work together.

Internet, intranet and wap technologies should be supported to TIS so as to provide an effective and interactive TIS. Nowadays, small, precise handheld GPS give opportunity easy use for each tourist. If TIS connects with wireless technology, tourist will acquire a reliable guidance.

TIS can provide a standard service for tourism. Furthermore, new technologies can improve the tourism field.

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