MAP-BASED BULLETIN BOARD SYSTEM FOR THE ARCHITECTURAL DESIGN STUDIO

R. HOMMA, M. MOROZUMI, K. IKI
Research Center for Higher Education, Kumamoto University
homma@ge.kumamoto-u.ac.jp
moro@arch.kumamoto-u.ac.jp
iki@arch.kumamoto-u.ac.jp

AND

Y. DEGUCHI
Graduate School of Science and Technology, Kumamoto University
051d8718@gsst.stud.kumamoto-u.ac.jp

Abstract. This paper discusses the development of a Web-based mapping system (MapBBS) to support the discussion of field surveys in an architectural design studio. It supports a hierarchical discussion of student groups according to the scale of the map.

1. Introduction

In architectural design, it is important to conduct the field survey of a site during the initial design stage. In our design studio, field surveys are conducted in groups. The exchange of opinions among group members helps in analyzing the site in greater detail, thereby facilitating a deeper understanding of the site. Thus, the development of a Web-based mapping system that supports the discussion of field surveys is required. Recently, Internet users from remote locations described certain points of interest (POIs) on a map to share information on the location by using the Web-based Geographic Information System. We are trying to introduce this to our design studio. However, the following issues pertaining to the Web-based mapping system do not support a discussion in the design studio.

1) It is necessary to prepare many maps of a targeted range at different scales. This involves considerable expenditure and is time consuming. Furthermore, the map data is not updated automatically.

2) The information and discussion with regard to locations could not be

integrated with the system. Hence, the information, images (photographs and sketches), and discussion with regard to a location could not be mutually referred to on the map.
3) The map scale could not be changed automatically based on the exchange of opinions during the discussion.
In order to resolve these issues, we developed a map-based bulletin board system (MapBBS) by the application programming interface (API) of GoogleMap.

2. Hierarchical discussions corresponding to the scale

In the early stage of an architectural design, discussions on a variety of map scales are required. Students can understand a good quality architectural design that harmonizes with the surrounding circumstances of a project by having discussions on various scales. In the design study of any architectural project, there are roughly five scale levels. The first level corresponds to the building design, where students survey a building construction site and gather materials for planning, drawing, modeling, and simulating their project. The second level corresponds to the site survey, where they take photographs not only around the site but also of the street and the neighboring buildings. The third level corresponds to the neighborhood zoning. Here, they understand the characteristics of the area, the traffic situation, and regulations. The fourth level corresponds to regional planning. In this level, they understand the traffic situation from a large area perspective, policies at the administrative level, and make a comparison with other districts. The fifth level corresponds to references of design resources. Here, they gather references of remarkable areas, similar buildings, and other related projects. A design group of students shares information on these five scales and discuss their investigation results.

However, discussions on different scales lead to confusion and arguments, thereby resulting in group work inefficiency. In particular, this is a significant problem during network collaboration. It is important to record information on investigations with images and accurate location data according to the level of the scale. Students can then study the fieldwork thoroughly by a hierarchical discussion according to the scale.
To support a hierarchical discussion according to the scale of the map, we designed a bulletin board system that synchronized with the seamless map system. Figure 1 shows the theme of a hierarchical discussion related to both the systems. Currently, CAD does not synchronize with the map system.

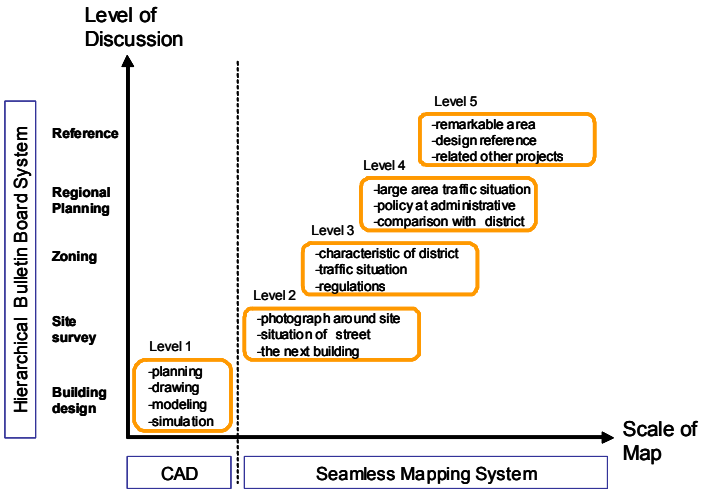

Figure1, A hierarchical discussion according to the scale of the map

3. Developing the prototype system

3.1. CONCEPT OF THE SYSTEM

This system involves the following two functions: Web-based GIS and BBS. Although the technology involved with these functions is not new, the underlying principle for the discussions on the BBS according to the map scale supports the design studio as new tool. This implies that an opinion posted on the BBS includes the attributes of the location, scale, and range of the map. These attributes enable users to refer to the map that is updated in accordance with the discussion. In particular, for a Web-based design studio, it is important to display a map within an appropriate scale and range depending on the theme of the discussion.

The detailed specifications of the developed system are described as follows:

a) The system displays a seamless world map; further, the map can be zoomed into and panned by this system.

b) It displays the satellite image of the map on a particular scale.

c) The user can register survey information with regard to the map. This information includes attributes such as comments, image files, title, category, registrant, group, time, latitude, longitude, scale, and password for deletion.

d) The registered information is displayed on the map as an icon or a thumbnail of the posted image.

e) When an icon is selected, information on the location appears on the map.

f) The posted information is retrieved and displayed as a thread on the BBS according to the range, scale, category, and group.

g) The system can also perform a full-text search of the comments using an arbitrary keyword.
h) The distance between two arbitrary points can be measured.
The API of GoogleMap was used as a map display function. The map and satellite image are provided by Google Inc. via the Internet. The posted image and text are managed by XML on a Web server by the BBS. An original program developed with PHP executes data transaction.

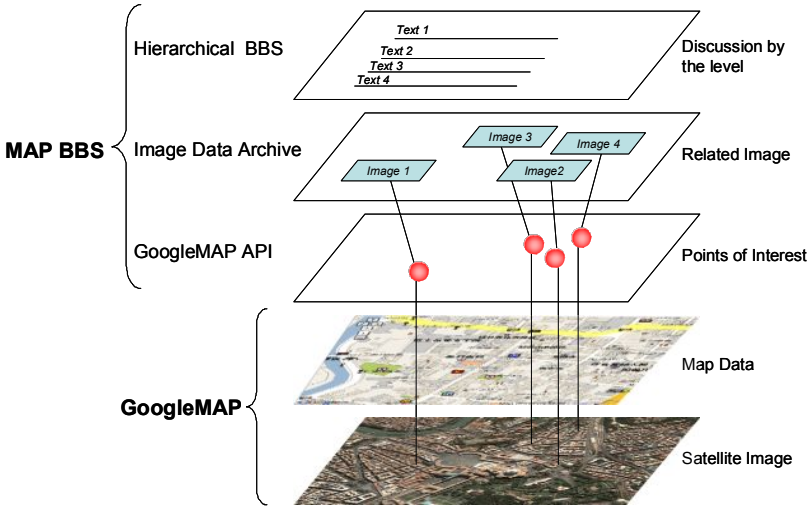

Figure2, Data structure of the map-based bulletin board system

3.2. SYSTEM INTERFACE

The system interface comprises a part of the mapping system and a part of the discussion board. Figure 3 shows the configuration of the system interface.

The main screen has the following three frames: the menu on the left-hand side, the Google map in the center, and the captions of the POIs on the right-hand side. Google Inc. provides three kinds of seamless maps that can be viewed in the map mode, satellite mode, and a dual mode. These maps cover all the regions of the world, and in Japan, detailed map data is offered by Zenrin Corp. The user can zoom and pan the map by operating the mouse. Further, the viewing mode can be easily switched by a click of the mouse. The user can register the photographs and materials obtained by field investigations as POIs on the map. The latitude, longitude, and current scale can be automatically registered by the system as data attributes by clicking the POI positions on the map. This attribute information is transferred to the BBS, which controls the thread of discussion according to the map scale. The system displays registered POIs on the map as an icon with regard to the category or as a thumbnail of the image. The user refers to the information on

a POI from a pop-up window on the map.

The discussion board supports group discussions on registered POIs. Each POI can be linked with the discussion board by clicking on the pop-up window. The discussion thread is controlled on a map scale. On a brief note, comments submitted on different scales are not displayed.

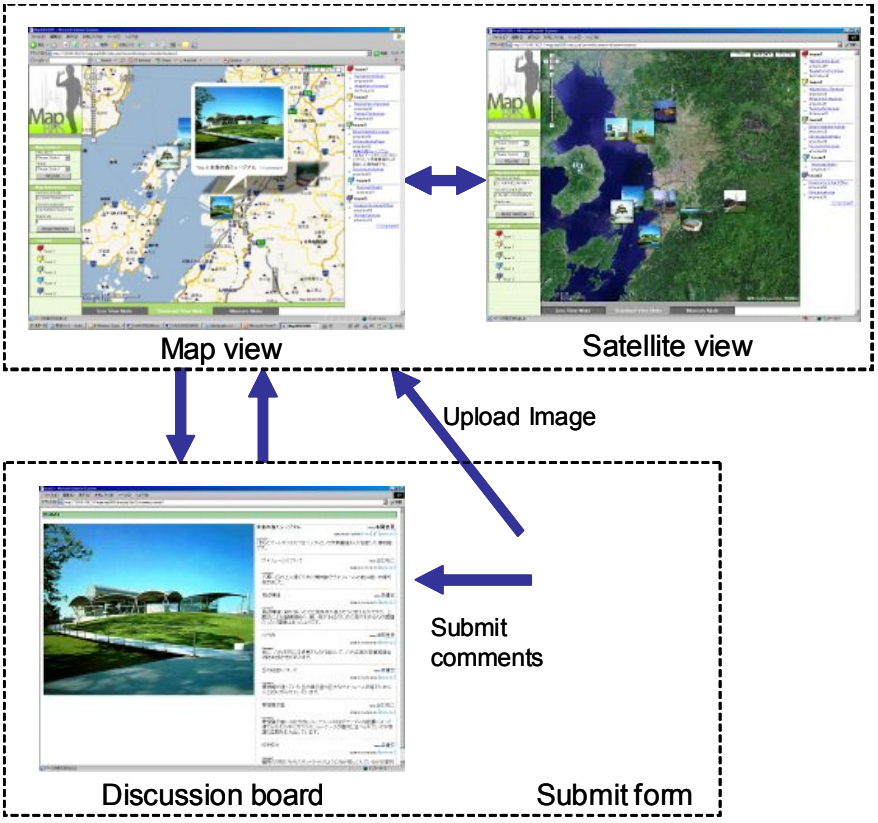

Figure3, Configuration of the system interface

4. Case study for the system evaluation

MapBBS should customize the composition of data based on the theme of the design studio. Therefore, the classification methods and POI displays of various cases on various map scales were examined by experimental projects.

4.1. CASE 1: SITE SURVEY

Case 1 involves a field survey of the region around a building site in the

design studio. In this case, the design plan was discussed through the site survey by using a map with a scale of 1:4,000. Photo images posted on the MapBBS were arranged in categories with regard to the resources, problems, and the exact location of the site in the district.

Based on the case study, it was found that the user needs information not only with regard to the content of the photograph but also the shooting position and the direction in which the photographs were taken. Because of the overlap of icons and thumbnails on the display, it is difficult to select them with the mouse. This scale is insufficient for architectural design. Presently, a detailed map is not provided by Google Inc. although a map with a minimum scale of 1:500 is necessary.

4.2. CASE 2: WORKSHOP FOR COMMUNITY DEVELOPMENT

Case 2 pertains to a workshop for community development based on the observations and group proposals. In this case, the activities of a city were discussed in a workshop by using a map with a scale of 1:15,000. The survey was conducted in separate groups for four districts. Therefore, it was essential to manage the posted data according to the discussion of each group. The data categories comprise the latest photographs of the city and the group proposals.

There is no layer in the map offered by Google Inc.; further, published information is limited. Users need to control the display of published information according to the discussed theme. For instance, users should be able to switch the display in terms of roads, rivers, buildings, greenery, or district names.

4.3. CASE 3: ARCHIVE OF DESIGN REFERENCE

Case 3 involves an archive of modern architecture; this archive serves as a design reference. In this case, the location and information with regard to a modern building were displayed using a map with a scale of 1:250,000; this map was used as the reference in the design studio. The data categories comprise architectural usage and construction time.

The discussion advanced smoothly based on the display of information on the existing project scattered over a large area. From the satellite display, the user can assess the environmental situation and land use of the surrounding buildings. It is difficult to retrieve the POIs on the map because they are widely scattered. This system cannot retrieve the area where a POI is located according to the name of the place. To solve this issue, we need a technology that converts address information into coordinate information.

In these three case studies, the authors clarified that MapBBS supported group discussions based on the scale of the map. In addition, requests to improve the system were reported.

5. Conclusion

MapBBS is still in the experimental stage. However, this system integrates the field survey information on maps of various scales, thereby enabling discussion. Therefore, this system is effective for a design studio.

In future studies, we intend to improve this system by applying it to various case studies in an actual design studio. In terms of technical improvement, the system should be capable of overlaying the data of other GISs on GoogleMap. Moreover, it is necessary to synchronize this system with CAD.

Acknowledgements

This research was partially supported by the Ministry of Education, Science, Sports and Culture, Grant-in-Aid for Scientific Research (A), 16206061, 2004.

References

Dodge, M., Doyle, S. and Smith, A. (1998) Visual Communication in Urban Planning and Urban Design , Working Paper 2; Centre for Advanced Spatial Analysis Working Papers; London; June 1998

Pereira, Gilberto Corso (2001) Urban Information Visualization - The Salvador project, Architectural Information Management, 19th eCAADe Conference Proceedings Helsinki (Finland) 29-31 August 2001, pp. 517-521

Shalaby, Tarek, Scutt, Tom and Palmer, Diane (1998) The 'Intelligent Map' as A Decision Support System for UrbanPlanners in Nottingham Using GIS Technology, Timmermans, Harry (Ed.), Fourth Design and Decision Support Systems in Architecture and Urban Planning Maastricht, the Netherlands), July 26-29, 1998

Visualization of Usable Building Space According to Planning Permission Ordinances for Public Participation in District Plan in Japan, Van Leeuwen, J.P. and H.J.P. Timmermans (eds.) Recent Advances in Design & DecisionSupport Systems in Architecture and Urban Planning, Dordrecht: Kluwer Academic Publishers, p. 85-98

Koshak, Nabeel and Flemming, Ulrich (2002) Object-Oriented Data Modeling and Warehousing to Support Urban Design, Timmermans, Harry (Ed.), Sixth Design and Decision Support Systems in Architecture and Urban Planning - Part two: Urban Planning Proceedings Avegoor, the Netherlands), 2002