Urban Wiki
An online urban design system

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Abstract. This research involves the framework and design of Urban Wiki, an online urban design system employing Wiki concept. The term Urban Wiki is created by the researchers; its concepts and methodology will be introduced and presented. Urban Wiki aims to creating a networking system of urban designs, enabling the collaborative work between users around the world. The presented system framework is created and tested by the researchers from two different locations in the world. The purpose of the research is to study how the users can share effectively designing/modeling large scale urban projects. An urban project of a village scale is used to demonstrate the potentials of Urban Wiki, presenting its functions and highlighting the possible uses in the urban area. Moreover, using the created models opens up various urban paths of designing, decision-making, and sharing. Techniques employed in the design of Urban Wiki can potentially be used to build up scalable, easily navigable and extensible models of large-scale entities.

Keywords. Urban design, urban planning, networking, urban wiki, modeling systems

Introduction

Wiki concept is to allow website users to add, remove and change the content of this website without subscription. Wiki offers mass authoring and easy interacting, which introduces such an effective tool for different applications. For example, through Viki concept instead of creating pages of words that are hyper linked together, the users create pages of images that are hyperlinked together. Viki in its most basic incarnation is a visual wiki. It acts as the ultimate sticker book mash up.

The authors report in this research paper the Urban Wiki term and an online design system. Urban Wiki is a concept that concentrates on employing the wiki concept in urban design and urban projects. The online design system is a networking model tool that facilitates designing and modeling in such simple way/environment. The users of the design system introduced can be a group of interest in case of an urban project, or anonymous users for mass authoring in urban design/planning. However, the research concerns itself with the second potential of creating a website for anonymous users.

Urban Wiki

Urban Wiki has main potentials beside the wiki advantages, namely: opportunity to create a global mass authoring database of urban planning and urban design, possibility to help urban planners and urban designers in editing and modeling their designs from any place in the world, and easy to understand and use. Moreover, the urban design system introduced in the Urban Wiki is an easy-to-use design system that can be understood by any users, not exclusive to the planners and designers. The designs of urban planning and urban design are saved in the a visual database. Users can browse and zoom this visual database according to the formal properties of saved designs.

System methodology

Urban Wiki is programmed as a main Portlet. The public Web portals such as AltaVista, AOL, Excite, and Yahoo, which appeared in the mid-1990s, have portlets that provide self-contained boxes for different features like news, e-mail, weather, stock, and search. Enterprises of all sizes began to see a need for a similar starting place for their variety of internal repositories and applications. By the late 1990s, software vendors began to produce prepackaged enterprise portals, which would be toolkits for enterprises to quickly develop and deploy their own customized enterprise portal. In 2003, vendors of Java-based enterprise portals produced a standard known as JSR-168, for interoperability between enterprise portals and portlets. There are many enterprise portal vendors like, Apache Software Foundation (its product name is Jetspeed 2.1), IBM (its product name is WebSphere Portal Server 6.0.1), Microsoft Office (its product name is Sharepoint Server 2007), Oracle (its product name is Oracle WebCenter Suite), and Sun Microsystems (its product name is Sun Java System Portal Server 7.2) [http://en.wikipedia.org/wiki/ Enterprise_portal 24-9-200].

Urban Wiki portlet is a reusable interface for online applications, and it is running with JetSpeed2 framework provided by Jakarta Project. The portlet can be run through all kinds of Portal applications. Urban Wiki portlet is implemented in Java, and tested using a free Enterprise Internet Portal Framework, JetSpeed2 (by Apache Portal Project site, http://httpd. apache.org/). Three Portlet programs are in a Portal Application; the applied methodology employs the three concepts of Urban Wiki:

1) Simply generating 3D objects through the 3D modeling system introduced. The design/modeling system applies the easiness of methodology, functions, and ways of creation and modifying. There are only three buttons for creating and modifying, Figure 1.
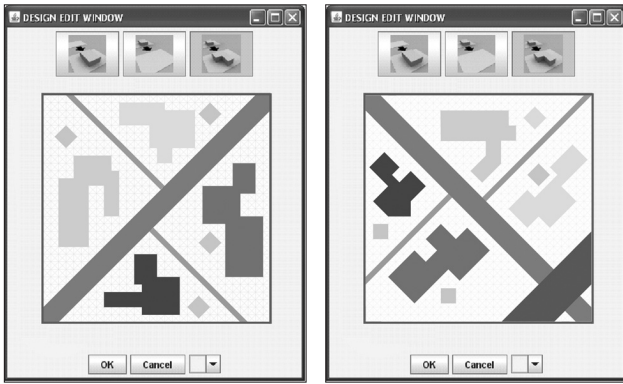
Figure 1, a and b show two 2D designs displayed in two creating windows with the three buttons of modifying (create, edit and delete).

The presented design/modeling system, focusing on forms' topologies and modifications, leaves the immaterial issues of designing for users to conceive and interpret, unlike other modeling systems that computationally apply a combination of many rules to have different transformations in one step (Abdelhameed and Kobayashi, 2007).

2) Sharing the designs in a visual urban database, users share in creating, editing, and even deleting the designs presented in the database. The processes are:

• Initial Condition: The user has to prepare two files; an initial space layout file and a file of space property list. The file of space property list has the adjacency list of a design, for example in Figure 2, the adjacency list for 14 is [30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30], and by changing some cells to a new space, e.g. 12, the list for 14 will be [30, 30, 30, 30, 30, 30, 30, 30, 30, 12, 12, 12, 12, 12, 12, 30, 30, 30, 30, 30]. The Space Layout file should have at least one design with an array of 900 (30x30) integer numbers such as (0 0 1 0 1 ... 0 0 0). Each integer number represents a space property such as 0=Street, 1=Sidewalk, and 2=House, which are defined the file of space property list, Figure 2. Users can adjust the dimensions of the array by changing the grid of creating window, for example 40x40, 50x50, etc.
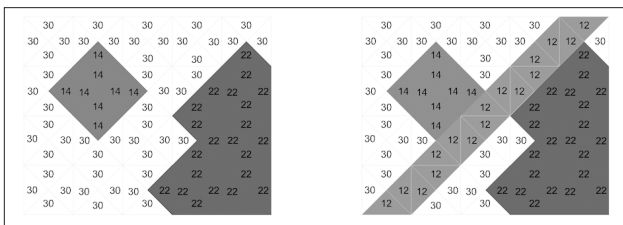

Figure 2, A part of a design showing the cells' numbers before and after modifying

• Add Design: The user can add a new Design from an existed one in the visual database, Figure 3 (Kobayashi and Abdelhameed, 2008). First, the user selects a Design that acts as a parent design. The next step is to use the editor panel to modify the design. The system checks up the modified design if it can be considered a new design or a subspecies/child design, by calculating topological changes. If it is a new Design, the layout is posted in the visual database with a link to the parent design. Otherwise, it is registered as a subspecies/child design and shown under the parent design.

• Generating 3D models: the visual database provides only the list of space layout designs, Figure 2. The other Portlet provides a list of generation files, which any user can post to generate 3D models from any space layout design, Figure 1.
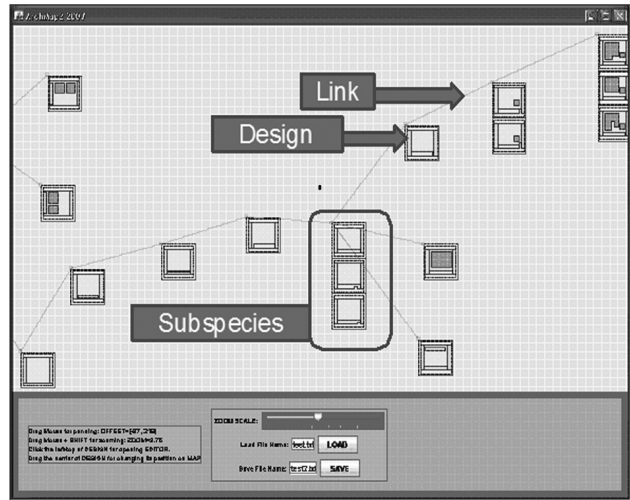

Figure 3, visual database: Topological Design Diagram

3) Topological constraints for defining the space layout domain, a special rule was created to check if a new space layout design can be a new Design or be a Subspecies/child design. The rule is as following:

• Calculate the adjacency list for each space. If a space whose ID is 1 is adjacent to space 2, 3, and 4, the adjacency list will be (2, 3, 4), as previously illustrated in Figure 2.

• By modifying the design layout, if the adjacency list does not change, the output is registered as a subspecies. Otherwise, the design is considered a new Design.

• In the previous process, if the adjacency list is changed with more than two items at the same time, the modified design is not allowed to be added to the visual database. The user is able to add this design to the database, only when an additional design with one item changed is added before this design.

System functions

The introduced functions and applications are classified into the presented portlet programs, namely Urban Wiki, design/modeling editor, and visual urban database, Figure 4.
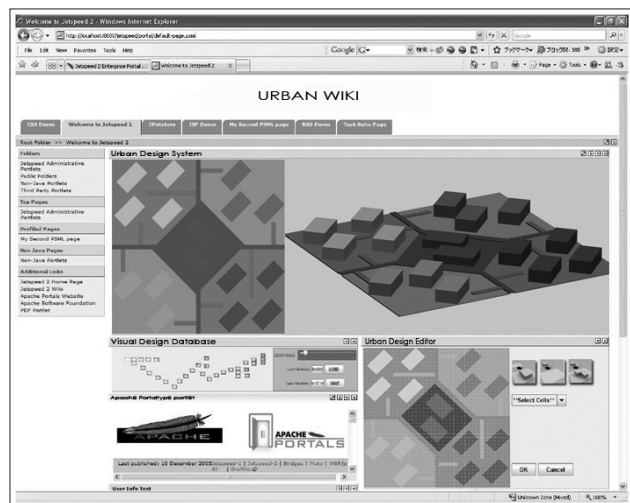

Figure 4, The Main Webpage of Urban Design System that has the three Portlet Programs. Designs are represented in Nodes in visual database Portlet.

1) Urban Wiki portlet: In the system implementation, three main objects are defined: Space, Design and Subspecies. Space is a class of a list of cells representing in a grid. Design is a class of a list of spaces, and is represented as an individual node in the designs layout. Subspecies is a class, not for a new design, rather for the design whose topology is not changed from the parent design. A new design is generally generated when a new set of spaces or a new neighborhood of conditions is created from its parent design. For example, when the size of space is changed without changing any relations to neighbor spaces, a new design is not generated but a subspecies is. The lists of all spaces, designs, and subspecies are saved in a file.

2) Design editor portlet: Urban design/modeling system has three functions stages, i.e. Input, Middle Ware, and Output. Input is space layout design; Middle ware is recognition file (model file); and Output is 3D models and rendered images.

3) Visual urban database portlet: Urban design series sharing in portal application is implemented through the following:

- Create networking application to share urban designs among users all over the globe without using any text. Database is being created where everybody can understand it.

- Processes of searching and categorizing are made without words but with designs (a set of spaces). Design is beyond the words, and topology is the core item to implement these tasks.
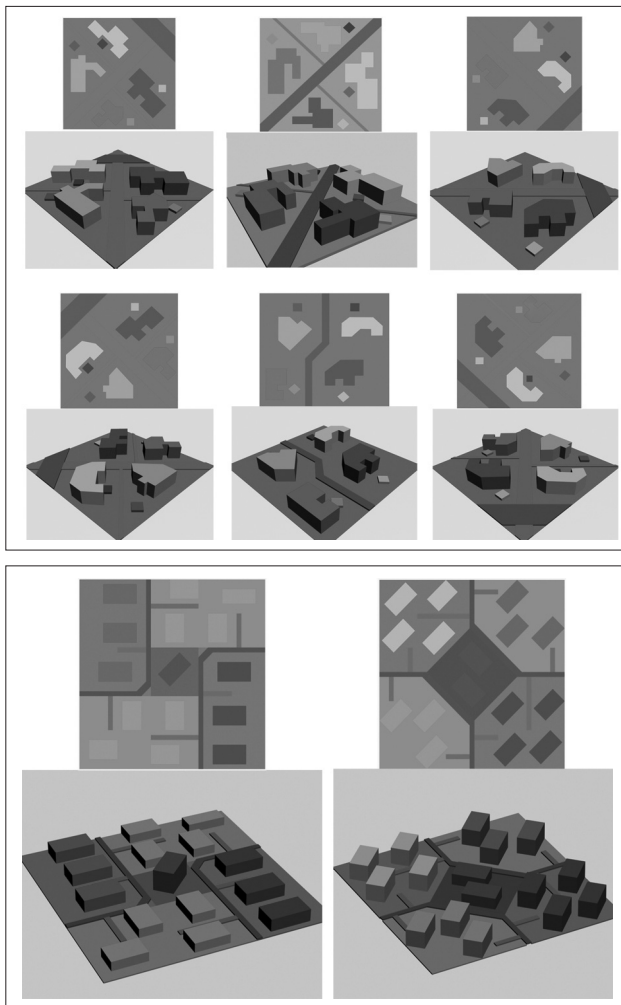

Figure 5, Different Products through Using design/modeling Portlet and Design Wiki Portlet in the Urban Design System. a: the editing window of 30x30 grid, and b: the editing window of 40x40 grid.

Urban Wiki applications

Some models are presented through the portlet of the main webpage of the Urban Wiki system, Figure 5, presenting the main functions and potentials of the online urban design/modeling system. The process to generate 3D model urban design is as follows: 1) select one urban design, multi designs or all designs in the visual database, 2) select or create generation rules, 3) 3D model is generated for each selected design, and 4) the generated models are saved as 3D formatted files. These detailed example products are displayed through a file that can be posted in the Urban Wiki system.

Users of Urban Wiki system can connect to the Internet from any geographic location in order to be able to search the visual database of Urban Wiki system for a certain urban design based on topologies and spatial relations of design spaces, which they can modify and then save as a new design. Models of Figure 5 are made by the authors on two different geographic locations.

By changing the properties of cells in the portlet's grid, new spaces are created. A space is defined as a set of cells with the same property such as house, front yard, driving way, and garage, Figure 2. As a result, an urban design with a new space is registered in the system, and the visual urban database is updated, Figure 3.

The simplicity of forms used in the presented models and in the database of Urban Wiki allows designers to personally interpret the immaterial issues of designing according to their urban interpretations. In urban design for example, the presented models may be visualized as villas or residential houses while other functions may be applicable according to designers' perception and conception. The focus on forms' topologies and modifications is an important characteristic of the proposed design system in terms of broadening how users conceive and interpret the forms created.

Discussion and conclusion

- The contribution of our research, Urban Wiki, manifests itself through: 1) the possibility of building up a visual database of 2D/3D designs, which may help in urban designing and urban planning, 2) the opportunity of creating an Interactive Visual Design Wikipedia. Users may benefit from design/urban sharing through networking, and 3) the possibility and easiness of applying mass authoring and designing generated by any number of contributors around the world. In other words, a massive number of anonymous designers may share in making a massive number of urban designs and urban plans which are classified according to their formal topological properties.

- Applications and future work for the presented research, including its main concepts of: urban design/modeling, visual urban database, and Urban Wiki Design, can be implemented in various areas of architecture and urban planning, e.g. urban project, design process, design studio, design education, design projects execution, project management, etc.

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