

# **“Keikan-Brain,” a Device that Builds Knowledge and Consciousness about a Townscape**

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## **Abstract**

The Keikan-Brain system for smartphones and personal computers has the following functions: (a) it allows users to easily collect information about a townscape; (b) it categorizes users' favorite townscapes according to accumulated data; (c) it provides appropriate townscape data based on these favorites; and (d) it supports actions to construct beautiful townscapes. In this paper, we report how these functions were developed and describe social experiments utilizing the system in a real-space workshop. We argue that the general public will become more interested in townscapes after using ICT tools such as the Keikan-Brain system, although its uses are currently very specialized. The basic functions of the system are very simple, providing a general-purpose tool to post and evaluate photos. An important facet of the Keikan-Brain system is its ability to elevate citizens' consciousness, which makes it a unique application for city planners.

## **1. Introduction**

Most countries have regulatory codes for building construction. Some regulations stipulate detailed permissions and prohibitions about a

building's facade and wall positions. In Japan, these codes often determine the building-to-land and floor-area ratios of a building, but they rarely address details of the buildings in laws and local ordinances. Moreover, in most cases, there are no rules that prescribe how a townscape made up of many buildings should look. This situation is common in many countries. Although there are hints in some areas as to what type of building is permissible, such as historic quarters and townscapes, where it is generally easy to plan an elegant scene, city areas are still subject to trial-and-error processes. In other words, determining the style of a townscape by laws and ordinances is a worldwide issue.

The ICT system developed and applied in this research project collects information about a townscape, allowing users to compare their own evaluation with those of others. This makes for high-quality, comprehensive consideration not only in districts in which there are historic buildings or novel townscapes but also in districts with ordinary, recurring features.

The Keikan-Brain system (*Keikan* means townscape in Japanese) is provided on smartphones and PCs, and has the following functions. (a) It allows users to easily collect and accumulate information (photos and evaluations) about a townscape. (b) It attempts to structure users' favorite townscapes according to the accumulated data. (c) It provides appropriate townscape data based on these favorites, and supports the action of making a beautiful townscape.

The Keikan-Brain system is based on a civic participation model and cloud-based data storage system. Awareness about the townscape is raised using information input by the citizens themselves. *Keikan*, which means townscape in Japanese, and we put a meaning to raise awareness in using a word *Brain*.



**Fig. 1.** Photos of general town in Japan: The situation and townscape in Japan is very different from the ones of Europe and the America.

Using this system, a townscape is evaluated by citizens and visitors and the results are recorded. The townscape is evaluated in four steps: (1) a site is visited, (2) a picture of the site is taken, (3) the townscape of the site is evaluated by considering several factors, and (4) the photos are sent to Keikan-Brain and saved in a database. The evaluation process is carried out on a portable device, such as a smartphone, without the need for any special applications or software. Because the evaluation system is offered through a website, many citizens and visitors can participate in the townscape evaluation simultaneously. Evaluation data and photos obtained are catalogued by the system and can be shared by users. The full database is also accessible from a website, which provides more detailed information about user evaluations. The system allows for a favorite townscape to be identified and also permits users to change their evaluation. The system inspires citizens to walk around town, encourages awareness of the townscape, and facilitates community participation in townscape design. In this paper, we report the development and implementation of these functions, and describe social experiments in a real-space workshop.

Thus, the aims of this paper are to clarify how our system can contribute to the process of administrative townscape planning, and to allow personal thoughts about a townscape to change by mentioning the outline of the intentions and functions of this system.

Japanese townscape administrators, due to strengthened civic consciousness, often host events and conduct photography contests for local citizens. Smaller districts become overwhelmed when participation is high, and they rarely have an efficient system in place to collect data. The Keikan-Brain system was designed to solve this problem by standardizing the collection and presentation of townscape information.

Ueda et al. (2003) and Takeyama et al. (2005) effectively used mobile phones to collect information about towns in the early design stage. Manabe et al. (2005, 2010) discussed the effects of mapped information systems on the administrative planning process, showing that their system could accelerate participation of those who were indifferent to city planning. Omiya et al. (2012) and Kytä et al. (2012) demonstrated the elegant user interface design of PPGIS and its application to a survey. Suzuki et al. (2010) tried to predict the selection of preferred townscape designs by calculating user preferences using ICT. The system described in this paper was carefully designed for smartphones and PCs and will soon be available to the general public. In time, it can be an effective tool for townscape and city planning.

## 2. Keikan-Brain on a smartphone – easy and fashionable posting –

The outline of the Keikan-Brain system is shown in Fig. 2. Each participant is assigned an ID to which posted data is relayed. As it is widely open to the Internet, anonymous ID access is enabled (Fig. 3). Users who log in anonymously can only view information about a townscape; input and evaluation options are only available to users who have signed in.

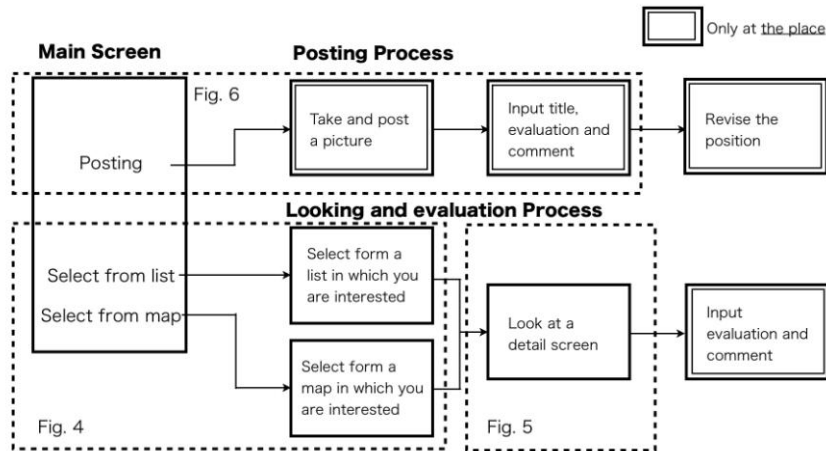


Fig. 2. Outline of this system

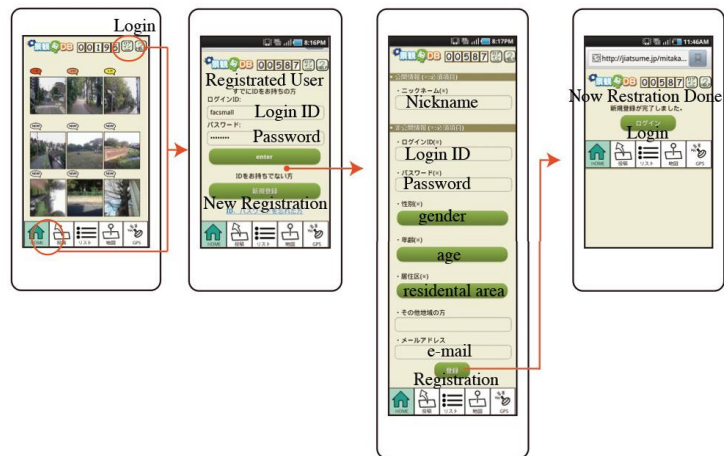


Fig. 3. Registration and Login to Smartphone Site

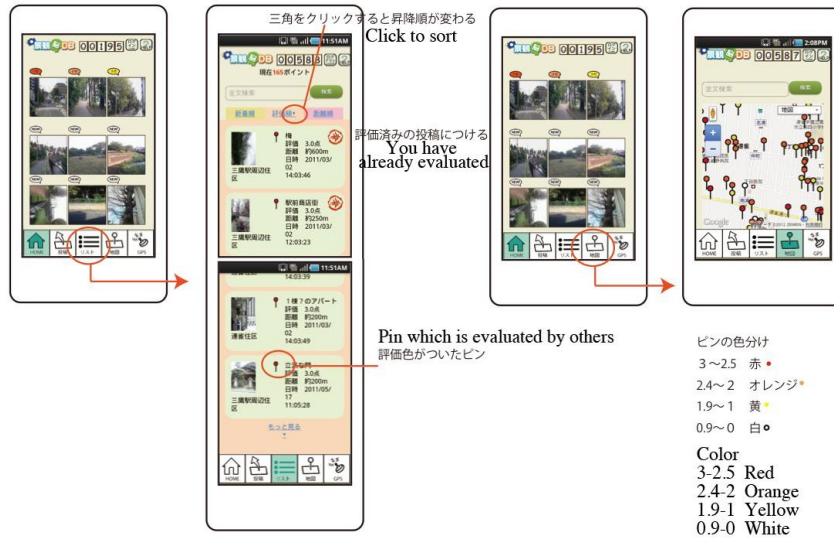


Fig. 4. List and Map on Smartphone

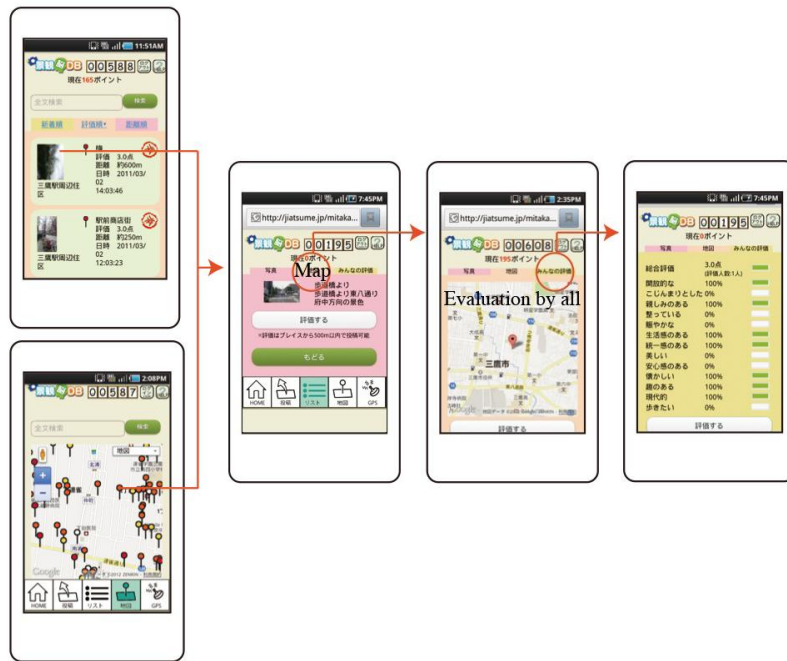


Fig. 5. Detail of Townscape Window

Users can see all of the posted townscape photos and evaluations, both as a list and on a map. Because it is easy to scroll up and down on a smartphone, the photos and evaluations are arranged in a vertical design. Users can see townscape information by scrolling down. The list can be sorted by distance from the present location, posting date, or time evaluated. On the map, positions of the posted townscapes are denoted by a “pin” with different colors to distinguish popularity. In both the list and map views, a title and comment word search is available (Fig. 4).

Users can view the details of a posted townscape when they tap a photo on the list or a pin on the map. In the detail window, tags allow for the easy selection of photos, maps, and others’ evaluations. This reduces the number of screen transitions required, making the system more user-friendly (Fig. 5).

Each set of townscape data includes six elements: title, comment, photograph, area, evaluation, and position.

Users consider 13 items for each evaluation: overall rating, unity, openness, affinity, atmosphere, sense of life, modern-ness, nostalgia, well-balanced, coziness, liveliness, beauty, safety. The evaluation criteria are based on previous research in townscape assessments.

The “overall” criterion is evaluated on a four-point scale (like very much, like a little, like, average); scores are then summed and an average is displayed. Other criteria are evaluated on a two-point scale (like or not). We adopted zero or one point to avoid concentrating negative evaluations on a specific townscape. Positive evaluations lead citizens to feel a sense of pride in their city. These evaluation criteria by all are shown as a ratio of those who like the townscape.

Each set of data is posted with photos taken there. In the evaluation step, a townscape consists not only of the scenery in the photo, but also the entire townscape surrounding the evaluation site.

Users can conduct two types of evaluations on our system. The first is an evaluation of a new site that has been contributed, and the second is a follow-up evaluation.

In the new site evaluation process, the user input procedure is as follows: (1) a photo is taken and posted, (2) data is input, and (3) position information is corrected (Fig. 6). Position information is acquired automatically by GPS with some inaccuracies, but these can also be corrected manually.

In the follow-up evaluation process, users browse and evaluate townscapes posted by others. The browsing function can be used from anywhere, whereas the evaluation function can only be used within 500 meters of the townscape, encouraging users to walk around and locate a site.

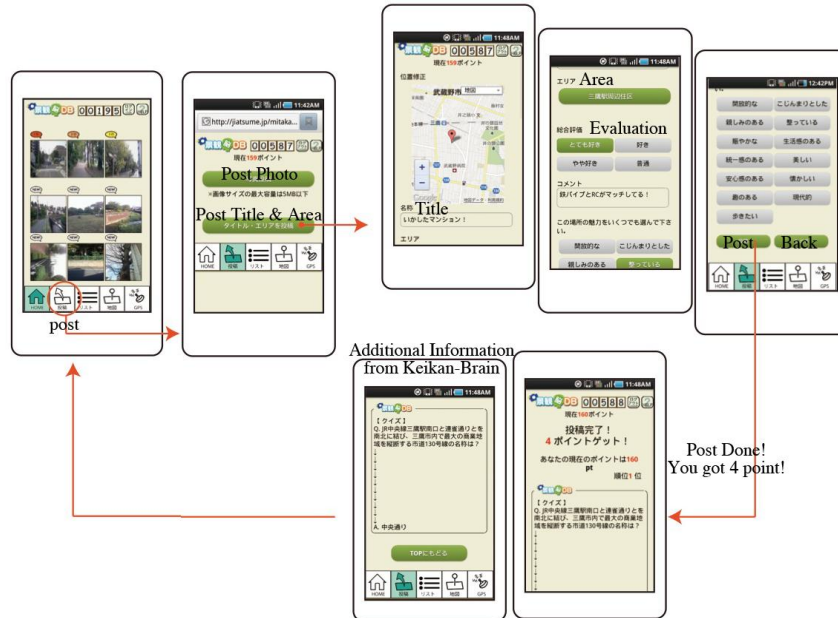


Fig. 6. Process of Posting

After the evaluation process, users can take a brief quiz or small topic about the location as little thanks to post. A score is assigned to each user in proportion to the number of evaluations contributed. The score is indicated by the browser, encouraging users to contribute more evaluations to the site.

### 3. Keikan-Brain on a personal computer

The Keikan-Brain system also runs on personal computers (PCs). The aims and functions of the PC version are as follows: (a) users can confirm and revise their posted information in a calm environment, such as their own room, after initially posting via a smartphone; (b) users can read townscape information posted by others; (c) users can read about “Recommended townscapes” and “Users who have tendencies similar to you,” which are automatically calculated based on their posted townscape and evaluation; and (d) the ranking and total points for the user, calculated by their number of postings and evaluations by others, are shown.

Users first login to “My Page.” Items (a) and (b) are functions for checking information posted by the user or others in a calm environment,

and (c) and (d) are functions for inspiring users to post by turning the system into a game (i.e., “gamification”) (Huotari et al., 2012). In addition, the system offers “Keikan-Brain Training,” a function that gives users the option to improve knowledge of their own town.



Fig. 7. Main “My Page” Window on the PC version (Upper part)



Fig. 8. Main “My Page” Window on the PC version (Lower part)

The functions of the PC version are discussed below, with screenshots of each page.



The PC version has the same account login system as the smartphone version. Users can login with a common account name and password. After login, the “My Page” shown in Fig. 7 is displayed. On the left side of the screen, the list of posted information (photos and evaluations) by themselves or by others is shown (optional). In the center of the window, a map containing posted photos is displayed. On the right side, tweets from “Keikan Project” and related users are listed.

When users scroll down, they see the screen shown in Fig. 8. This contains the “Recommended townscape,” “Users who have tendencies similar to you,” and “Ranking” sections. These elements promote a feeling of achievement by displaying the relationship and opinions of others and their ranking.

Fig. 9 shows the Keikan-Brain Training section. In this window, users can compare their own posted townscape evaluation with those posted by others, and revise their evaluation while seeing the average evaluation of others. When a user wants to change their evaluation, the photo is simply dragged and dropped on the matrix in the window. Adopting such an easy and intuitive user interface increases one’s awareness of and interest in the townscape, facilitating further opportunities to mention an evaluation.

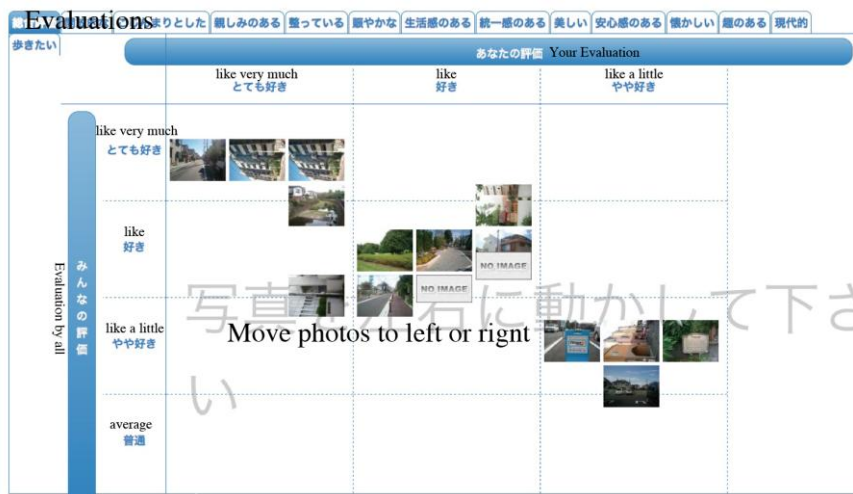


Fig. 9. “Keikan-Brain Training” Window

#### 4. Keikan-Brain with a real-space workshop

We conducted a workshop to collect data for use in the Keikan-Brain system (Fig. 10). Participants (citizens and students) walked around a neighborhood they had never visited before, and contributed pictures of their recommended townscape via a smartphone. Four workshops, called “Walk and Keikan Café,” were held in the fall of 2012, and about 600 evaluations were contributed. Participants with smartphones met at a café and were instructed to contribute pictures from within a 500-meter radius of the café. Afterward, the pictures were projected in the café while participants enjoyed tea or coffee. Newly contributed pictures were also shown on Twitter in order to reach a large section of the general public.

Workshop participants commented that they wanted to use the system in other places, it was easy to use, and so on. Unfortunately, the information used to evaluate concrete usability is not provided.

Some 10 to 20 pictures were contributed by each person during the two-hour workshop. At present (Feb. 2013), 611 pictures have been contributed, and 50 pictures are shown in Fig. 11.

Posted comments by participants had the following tendencies: (1) the townscape is extremely normal (but is evaluated affirmatively from the context of the target area); (2) the townscape is strange and gets a lot of looks but brings little pleasure to residents; (3) the townscape has a good design and improves the sense of the place; and (4) the townscape looks to be in flux and probably will change over time. The citizens confirm such a posted townscapes and will change their recognition of each person.



Fig. 10. Walk and Keikan Café

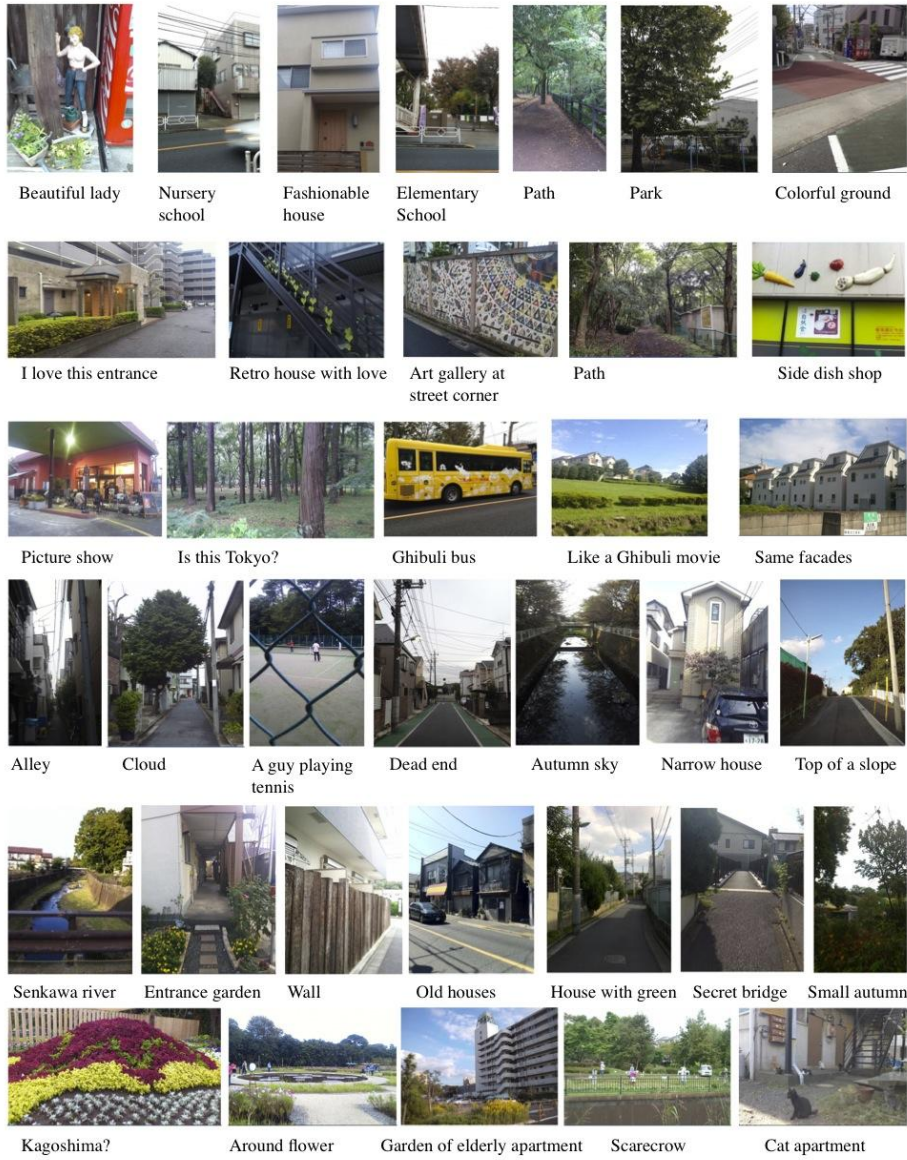


Fig. 11. Posted Pictures

## 5. Conclusions

The Keikan-Brain project aims to harness citizens' knowledge in order to improve townscape environments. Using a simple, user-friendly interface, citizens are encouraged to contribute evaluations of local townscapes via their smartphone or personal computer. Keikan-Brain incorporates gaming into the "Recommended townscapes," "Users who have tendencies similar to you," and "Ranking" portions of the evaluation process. Users are encouraged to revise their own assessment after reading other evaluations that have been posted. It is worth mentioning that many townscape photos were submitted in a short time during the workshops, and users seemed to enjoy the overall experience of contributing to the project.

The Keikan-Brain system was developed by a university research group. In this paper, we report how researchers and city administrators implemented the system. It is important to note that the efficiency of the system is limited in most cases because of the inflexibility of many Japanese administrative divisions. Keikan-Brain can also be used by other groups, such as non-profit organizations (NPOs). The NPO collects data, analyzes the results, and makes a proposal about the townscape. In addition, NPOs often have more reason to engage citizens about their townscape. Of course, private enterprises may also run the system with a commercial intent. In this case, the system still benefits residents if attention for the local civic townscape is deepened.

The Keikan-Brain system is merely a tool to collect as much information as possible about a townscape. The ultimate purpose of the system is to increase citizens' interest in their local civic scene by using the data gathered. It is expected that citizens who use the system will become more engaged with their townscape and come to offer their viewpoints with or without the support of the public sector. In this way, the Keikan-Brain system can be a very useful tool for townscape design and improvement.

The Japanese word *keikan* is a technical term, not a common word. Indeed, townscape planning itself is somewhat specialized. This is not necessarily a bad thing. The aim is for the general public to become interested in *keikan* after using ICT tools such as the Keikan-Brain system, even if its use is currently very specialized.

For city and townscape planners, the administrative process will become richer as a result of this system: citizens' interest and knowledge about civic issues will increase and regulations regarding the townscape will thus become better known. Disputes about townscape planning will not be solved by individual argumentation, but rather with evidence that citizens

have carefully considered what townscape elements are appropriate for their local area.

The basic functions of the Keikan-Brain system are simple, allowing it to serve as a general-purpose conduit to post and evaluate townscape photos. Of course, there are similar systems in use around the world, but our system's distinctive feature is its ability to change consciousness by contrasting citizens' opinions. From this viewpoint, the Keikan-Brain system is both novel and unique.

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