

A Study on User Participation Based Outdoor and Indoor Spatial Information Building

Yongwon Cho, Jinwon Choi, and Suyeon Cho

Abstract—Recently spatial information services market is growing. In addition, consumers make to direct spatial information service more than just a service provider. It means now satisfy the needs of the consumer. So, make the name ‘User participation, Crowd mapping and Crowd sourcing’. Make it one that can be smart devices. One of seven people (all of world’s population) are now using a smart phone, future smart phones users will increasing. Because of people is constantly looking for convenience.

This study is existing research can proceed together into one, so want to propose outdoor & indoor map building based on the 3D data. Now on real-time to outdoor map built 3D data. But, we will purpose to update information on the fast indoor map for user participation build a 3D data.

Index Terms—User participation, crowd mapping, 3D reconstruction, spatial information, real-time.

I. INTRODUCTION

Now on we do not need go to places, because we can use internet map or smart phone map application service. You can see the actual appearance of the places. In the field of spatial information is continue advances, future related work seems to actively conduct.

In the field of spatial information process of building a real time digital map of the various types of information that must be collected. That service is spatial information in the field of indoor and outdoor space together without distinction to handle demand [1]. Recently, spatial information technology service deployment from real 3D space, multi-dimensional space based information service and web-based content through a variety of service [2].

South Korea government makes the 3D map by ‘V-world’. ‘V-world’ seems like ‘Google Earth’. And ‘Naver’ and ‘Daum’ map service in the aerial view, real photo view or normal view [1].

We are looking for the convenience of living a variety of techniques have been developed to be used in real life. This made possible the reality is that smart devices. Smart phone applications, instead of finding themselves on the existing can be. Typical examples, directions or ordering food, data search, contact search, public transport, such as arrival time of the service through the smart devices can be used anywhere, anytime. Percentage of smart phone users

worldwide in 2012 and the end of the 1 billion people use around the world, given the population of 7 billion people 1 out of 7 people are using the smart devices [3]. This spread is the spread of smart devices, a wide range of services as a new chapter in the fusion of interior space is increasingly emerging as important. And, according to a report by the U.S. Environmental Protection Agency said, "For about 80% on average over the entire life takes place in the room" [4].

In this study, the smart devices user increases, from various sources outdoor & indoor published image or video. The data collected by build a 3D map of panorama mode. We are used to experimental data show the final result. And this is possible, make available to indoor & outdoor 3D spatial information service of user participation.

II. IN A RECENT ISSUE OF THE TECHNICAL

A. Big Data

Big Data and efficient processing of such data, analysis, and in order to take advantage of was the emergence, Big Data is usually data volume, variety, velocity as a combination of three factors is characterized by changes [5]. Big Data and analysis techniques for processing such data, the text mining, opinion mining, social network analysis, cluster analysis has dual images similar to nested characteristics of the object together with the cluster analysis technique was used for outgoing [6].



Fig. 1. Big data (Fotolia).

B. Crowd Sourcing

When As mentioned earlier, many of Crowdsourcing development and through user participation can be consumed. Today based on the evolution of online communication technologies with the public to show the infinite possibilities [7]. Crowdsourcing is therefore beneficial to both businesses and the public to be used, a systematic procedure based on a

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clear sense of purpose can be satisfied through the participants should be provided with appropriate incentives [8].

Comparing Service Delivery Paradigms

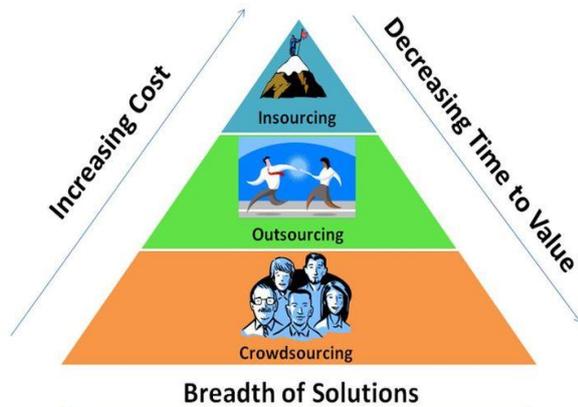


Fig. 2. The advantage of crowd sourcing (SpinAct).

C. Crowd Mapping

As said, Crowd mapping is designed and built by the team behind Ushahidi, a platform that was originally built to crowd source crisis information. As the platform has evolved, so have its uses. Crowd mapping now allows users to set up their own deployments of Ushahidi without having to install it on a web server. Since its release in 2010, prominent deployment of Crowd mapping have documented the global 'occupy' protests and the 2011 London anti-cuts protest [9].

On 31 December 2010, the Ushahidi team announced Crowd mapping: Checkins, a geosocial add on to Crowd mapping that allows users to create a white label alternative to sites like Foursquare and Gowalla [4], [9]. Rather than filling out submission forms online, checkins allow Crowd mapping users to expedite data entry to their deployment, focus first on location and adding more detailed information later [10]. Ushahidi describes the effort as 'checkins with a purpose'.

D. User Participation

Wikipedia users to make their way directly participated map programs are gaining popularity recently. Focusing on user participation in Wikipedia map Global Positioning System (GPS)-equipped people to use a smartphone without any prior knowledge help us be able to create a map of the world. Participation typically made of an open-source map 'Waze' and Open Street Map there.

Israel Tal Aviv 'Waze' for the first time in 2006, began. Users are not marked on the map into a dead end when the Wise stood no way connected to the place on the map to display the next place to visit for people who can help. 'Waze' is now the driver of the 14 million people worldwide and is used to edit the map and 45,000 people living in 5,000 people in his area manager to verify the accuracy of the map is active.

Open Street Map is a 'Waze' was born with a similar purpose or non-profit model is more like Wikipedia. Open Street Map is like Wikipedia, which anyone can add information to connect to the home page and can be modified

because it is free to use. Usage of open street map homepage and searching for the place is similar to Google Maps. However, unlike Google Maps and Open Street Map is a map, not just anyone can use without having to pay a geographic information features.

Recent popular location-based social network services company Foursquare have the same characteristics of the open street map to identify the user where their friends are staying open, make sure that you had to use a street map unveiled last month.

Disaster relief organizations are also 'maps of the terrain is changed just change' increasingly rely on participatory map. Earthquake in 2010 significantly changed the topography of the entire country rescuers in Haiti is that using the example of the open street map. Nine trillion won at the time of the Haiti relief efforts using real-time information to modify the map where the terrain is changed when it arrived and prayed to inform the open street map.

Jonathan Bennett, open street map users "that there is no other way to create a map from the open street map is not inferior to the rate of progress," he said [11].

E. Indoor GIS

GIS is geographic information are integrated into a quantitative one was indifferent about the human scale of the room. So interior space contains a symbol of various services and information, or an interface (Tag, POI, etc.) are present but there is no information about its real [12].

Focusing on recent academic to integrate BIM and GIS research is actively underway. GIS is based information, BIM provides the details of the center of the building. However, the level of detail is very large grid. Indoor GIS & BIM are in nature having a point of use, and service-oriented information structure. The interior is the use of all buildings, scale, design, location, depending on the various and varied interior spaces. Scale, purpose, design, and location are different according to the morphological characteristics difficult typed. It means necessary to build an optimized DB. Stairs, escalators and elevators are difficult to define in addition to the basement floor, including a 3D information space to be implicated. Such as underground nest and the oldest man stayed in most of the telecommunication spaces are generated. This information is interior space concern the future of global companies.

III. DATA COLLECTION OF USER PARTICIPATION

In this study, user participation to outdoor & indoor build to 3D map. By default, the collected to data, make to 3D modeling experimental. The collected to data by all use of the smart camera, 3D construction make to 'MATLAB' code by DLT technique. 'MATLAB' code is exist used to made DLT technique on last year. So, we want to the collected to 3D data, we choose to place. This place is exist experimental at 'Ankara House' at Seoul, Korea. This house is made by Turkish architecture.

A. Outdoor Collected Image Data

Original studies built 3D data was used to CCTV camera.

However, this study is collected to CCTV data and add to camera user picture at any position, so we will make to high quality 3D map data. That collected to smart camera were taking pictures.

locations to 3D modeling was made it.

The Fig. 7 that is possible based on these 3D modeling of user participation shown.

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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% Reconstruction using DLT method
% Programmed by D. S. KIM (2013, 03, 05)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
clear all
clc

% 3차원 좌표 입력 (14개 포인트 입력)
x = [218.507 218.544 219.241 280.086 268.801 235.621 260.238 243.595
226.382 230.725 232.280 227.706 226.651 222.968 239.202 234.932 217.580
219.529 219.676 215.738];
y = [190.230 90.210 85.285 26.081 28.989 59.435 24.821 39.080 56.584 61.546
57.496 60.743 57.640 60.750 36.683 37.685 60.589 60.548 57.612 53.964];
z = [311.363 310.063 308.929 319.866 315.686 308.270 302.028 303.466
303.855 311.755 315.716 309.721 308.625 312.123 333.571 334.197 315.719
309.577 309.600 302.796];

% 대응되는 영상 2차원 좌표값 입력 (왼쪽 영상)
u_Left = [258 243 594 736 850 956 1046 1168 1346 1069 1120 1195 1309 1379
1307 1398 1618 1537 1592 1858];
v_Left = [22 171 383 584 643 716 940 908 890 543 422 624 681 497 84 30 294
601 618 943];

% 대응되는 영상 2차원 좌표값 입력 (오른쪽 영상)
u_Right = [78 61 439 663 777 864 976 1091 1250 971 1024 1096 1211 1274 1220
1308 1504 1428 1486 1752];
v_Right = [47 196 406 606 664 736 959 925 905 562 440 640 697 512 102 48 309
614 631 951];

if length(u_Left) == length(x)
    for i=1:length(u_Left)
        X_Left(2+i,:) = [x(i) y(i) z(i) 1 0 0 0 -u_Left(i)+x(i) -u_Left(i)+y(i) -u_Left(i)+z(i)]; % 최소제곱 조정을 위한 DLT 매트릭스의 첫줄임
        X_Left(2+i,:) = [0 0 0 0 x(i) y(i) z(i) 1 -v_Left(i)+x(i) -v_Left(i)+y(i) -v_Left(i)+z(i)]; % 최소제곱 조정을 위한 DLT 매트릭스의 두 번째 줄임
        Q_Left(2+i,:) = u_Left(i); % 최소제곱 조정을 위한 DLT 매트릭스의 오른쪽 매트릭스 두 번째 줄임
    end
    for i=1:length(u_Right)
        X_Right(2+i,:) = [x(i) y(i) z(i) 1 0 0 0 -u_Right(i)+x(i) -u_Right(i)+y(i) -u_Right(i)+z(i)];
        X_Right(2+i,:) = [0 0 0 0 x(i) y(i) z(i) 1 -v_Right(i)+x(i) -v_Right(i)+y(i) -v_Right(i)+z(i)];
        Q_Right(2+i,:) = u_Right(i);
        Q_Right(2+i,:) = v_Right(i);
    end
end
    
```

Fig. 3. 3D reconstruction of DLT technique (MATLAB code).



Fig. 4. Take a photo at 'Ankara House' Seoul, Korea (Yongwon Cho).

B. Indoor Collected Image Data

This study is different from previous studies, outdoor & indoor built to 3D map about user participation to spatial information service. So, collected to data for smart camera at any positions. It is used in a Virtual Builders program 'Gong Builder' through the indoor space will be 3D modeling.

This study will to provide outdoor & indoor spatial information service. And it offers to user participation, a better way accurate information and high quality spatial information service that the consumer is not boring and difficult to purpose.

The Fig. 6 is the Virtual Builders 'Gong Builder' program through the room look like the work of modeling.

In many parts of panorama pictures taken from any



Fig. 5. Take a photo at 'Ankara House' Seoul, Korea.

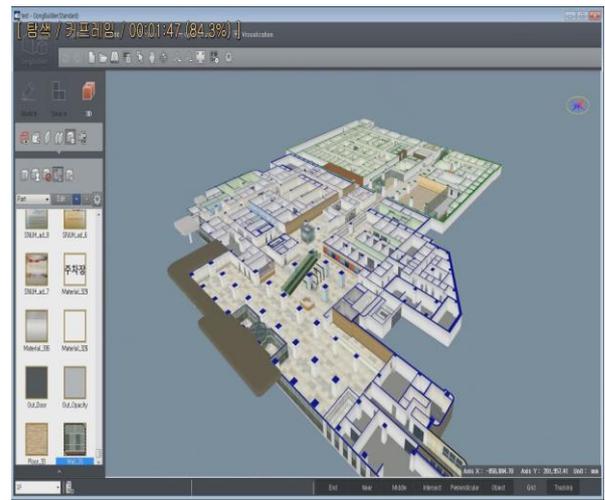


Fig. 6. Handling to program 'Gong Builder'.



Fig. 7. User participation photos on location (Ankara House).

IV. TEST RESULT

We purposed that provide to outdoor & indoor spatial information service. So, this service is focus to user

participation for collected to data at any position. Make to 3D modeling. But, this suggest is shows very difficult. Because of show to exact location and outdoor & indoor fusion viewer service is engineer's effort. So, we had problem solved and now on we show outdoor & indoor spatial information 3D map service [13].



Fig. 8. Incheon international airport indoor navigation (virtual builders).

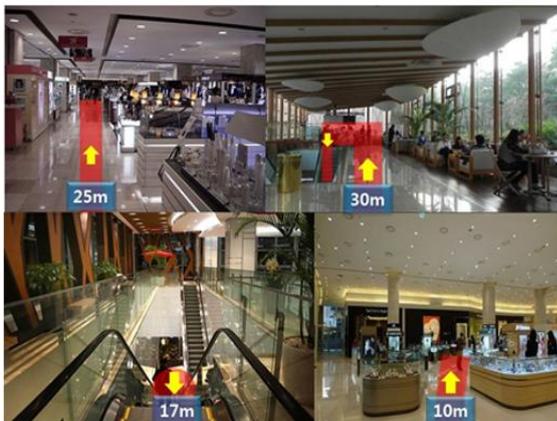


Fig. 9. LBS platform indoor map application, 'SKY POLL' (Yongwon Cho).

'SKY POLL' application is main author made at Lotte Department store experimentation. Now this application is

not serviced [14]. Because this is only test model. This application is looking for locate indoor WiFi, department store to find methods that can provide the service is proposed. 'SKY POLL' purpose at franchise stores. So we can find easily service to smart phone.

In the figure below, produced in 'Immersive Media' outdoor & indoor spatial information 3D map service [15].



Fig. 10. Indoor and outdoor map service (immersive media).

V. CONCLUSION

Recently spatial information trends to requirement of consumer provide service. It is service consumers are direct handling or make to spatial information service than just a service provided. It means user participation to spatial information service.

Many spatial information services companies have investment cost of spatial information service or developed serviced. So, this study is available to user participation build to spatial information service and shown the test model.

In this study, outdoor & indoor spatial information service market is not only in Korea but also possibility in Southeast Asia. Later on, user participation to outdoor & indoor spatial information service more big scale buildings, public buildings or city will select to test the high-quality of outdoor & indoor spatial information service.

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