What kinds of geospatial information is required for disaster management

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Application of geospatial information has been rapidly spreading in a variety of fields as technology advances. Particularly in disaster prevention and mitigation field, it plays critical role in all stages such as visualizing of disaster risk (hazard mapping), grasping overall situation of damage, supporting rescue and relief activities, underpinning recovery and revitalization planning and sharing of disaster information. The importance of geospatial information for disaster reduction is widely recognized in international community as described in Sendai Framework for Disaster Risk Reduction 2015-2030. In this presentation, we will discuss the role of geospatial information under the situation of disaster.
We categorized the role of geospatial information in the event of disaster into four; 1) grasping the overall situation of disaster rapidly and precisely (e.g. aerial photo taking, remote sensing, aerial photo interpretation, mashup and visualization of information on map); 2) surveying the change of land in detail (e.g. crustal deformation observation, InSAR analysis); 3) providing the basis for reconstruction and revitalization (e.g. resurvey of control points, large-scale map for reconstruction planning, process management using GIS); and 4) analyzing the disaster to prepare subsequent disasters which can occur in the future (e.g. analysis of crustal deformation, fault modelling, geographic survey, update of disaster reduction plan).
To scrutinize the actual utilization of geospatial information, we carried out a questionnaire survey targeted to national and local organizations which took part in disaster management after the completion of the first stage of response for the Kanto-Tohoku heavy rain disaster in September 2015. Following five major works were extracted based on the results; damage prediction, understanding damage situation, work plan, materials for supporting emergency forces and disaster damage assessment. In particular, detailed elevation data were used for estimation of the flooded area, and aerial images were effective for understanding the disaster situation in detail. In addition, the result of interpretation for the flooded area was used to operation planning and orthographic images were utilized for a field survey and damage assessment.
In disaster response, rapidness, sureness and effectiveness of correspondence are essential. Therefore, the following two viewpoints are important for the effective use of geospatial information in disaster response; ready for use, and reliable. GSI will continuously provide useful geospatial information to support disaster response, rescue work and restoration activities under the close relationship with disaster management organizations.

Keywords: geospatioal information, disaster management, purpose of use

Dizaster prevention education using map information

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We can watch freely Land Condition Maps and Flood Control Landform Classification Maps on the Internet. We can know hazard risk from these information. We can also know hazard risk form the interpretation of topographical maps, aerial photos and old maps. The first author teaches these information in the lecture of "disaster prevention geology" in Ibaraki University. The authors would like to introduce this practice and the possibility of development to disaster prevention education for citizen.

Keywords: map information, dizaster prevention education, internet

Development and Publishing of new Seamless Geological Map 3D with Cesium

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We renewed the Seamless Geologic Map 3D which is the Web site where you can use geologic map of the all over Japan in 3D. Legend selection function and undulation emphasis function, etc. were added to this site. JavaScript library Cesium is used by new seamless geologic map 3D. Cesium is a open-source JavaScript library for world-class-3D globes, using international standard WebGL on a web browser. And, we developed library S-map which can change more than one map drawing engine newly, implement the function to which 2D/3D is changed by the Seamless Geologic Map 3D. Furthermore, we expanded the PNG Elevation Tile to equidistant cylindrical projection for drawing speed improvement.

Keywords: Seamless geological map, 3D, WebGL, Cesium, Elevation, S-map

Regional assessment and visualization for disaster evacuation plan in coastal areas of Hyogo Prefecture

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The importance of the evacuation plan for natural disasters has been recognized in the wake of the damage caused by the Tsunami of the Great East Japan Earthquake. The evacuation plan such as the designation of Tsunami Evacuation Building has been promoted by local governments in the Great NANKAI Trough Earthquake areas of coastal areas of Hyogo Prefecture. For effective evacuation planning, it is necessary to create a detailed plan in consideration of the natural and social regional characteristics. In this research, the type of study area can be classified and evaluated by the topographical conditions, the local community, the evacuation distance, the location of shelters and the total floor space of buildings. Then we presented the issues related to evacuation plan using the regional characteristics.

Keywords: Evacuation plan, Great NANKAI Trough Earthquake, Regional characteristics

A spatial relationship analysis between the high resolution PM2.5 estimated distribution and transportation network by the R and the GIS applications

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The PM2.5 is a group of suspended particulate matter in the air which aerodynamic radius is about 2.5 micrometers or less. The analysis of the spatial concentration distribution of PM2.5 are important information for the consideration on the human health. Because there are not sufficient numbers of the PM2.5 observatories, there are no enough information about it. Therefore, the high-resolution estimations are performed using the time-series analysis and the Kriging method on the observed concentration of PM2.5. In this study, a correlation analysis between the high-resolution estimated spatial concentration distribution of the PM2.5 and the transportation networks were performed using R and GIS.
The target area of this study is located at the south part of the Okayama prefecture, Japan. It has a about 40 km length from east to west and about 30 km length from north to south, and it contains the Okayama city and Kurashiki city. Observed concentration data of the PM2.5 about the region were obtained from the Okayama prefectural website of the environmental data. The geospatial data for the region were acquired from the open data which were distributed by the Japanese government-affiliated research institute. The spatial statistical analysis were performed using the R (R core team, 2015) and is its spatial statistics library maptools (Bivand and Lewin-Koh, 2014), rgdal (Bivand, Keitt and Rowlingson, 2014) and gstat (Pebesma, 2014). The geographical spatial calculation about the transportation network and the qualitative analysis of the results were performed using the QGIS (QGIS Development Team, 2015) and the Google earth (Google, 2014). Note that the rgdal and QGIS are developed under the Open Source Geospatial Foundation and constitute the part of the FOSS4G software.
At first, there is no clear relationship between the estimated spatial distribution of the PM2.5 and the buffer distance of the primary traffic network about the overall target area. At the second, some relationships were found on the subdomain area which roughly based on the geomorphology and the city area. In the case of the consideration of the spatial correlation of the high-resolution PM2.5 estimated distribution and transportation network, the determination of the analysis area by the appropriate terrain classification in addition to the density of the transportation network may be required.

Keywords: PM2.5, Transportation network, Spatial statistics, Kriging, R-language, FOSS4G

Analysis of Railway Station Space based on Social Media

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At present, the environment around railway stations are significantly changing by population growth and urban redevelopment projects due to downtown regression. Railway station of the city center in particular has an aspect as a commercial facility that is not limited to transportation, and it plays an important role. Therefore, the railway station space is changing rapidly by the diversification of needs and the changes in wayside environment. On the other hand, by rapid development of the information technology, the spread of smart devices is in progress. As the social networking service such as Twitter and Facebook has been generalized widely, the data called big data has been created. The big data and data mining in public attention in various fields will be a clue for the qualitative improvement of the city in the field of urban design.
In this study, the authors aimed at the big data and the railway station space. They used a photograph community site and Twitter in the social media with the various kinds. They are going to clarify the relationship between the railway station and its surrounding area by using the posted data. They are analyzing the collected photos and texts through social media by using GIS. They grasped the relationship between the shooting position of the photos and the egress element in the analysis of photos. And they grasped the topics on Twitter. Also, they extracted the areas with the similar characteristics on Twitter.
As a result, the authors could grasp the relationship between the railway station and its surrounding area by utilizing big data in this study.

Keywords: Railway Station, Social Media, Data mining, Spatial Analysis

Historical Landscape in Nara as Historical City

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Beautiful landscapes unified with historical buildings and natural environment are existent in Japan. In recent years, the management of historical space is shifting from protection to conservation or restoration since the enactment of the Landscape Act and the Act on Maintenance and Improvement of Historic Scenic Beauty. A lot of historical buildings, temples and shrines have been left in Nara. Besides, geo-information technology is spreading rapidly in the sophisticated information society. The using of GIS become close to us. It is used analysis historical landscape and design. In this study, the authors direct their attention to the scenic sites are drawn in historic scenic picture. On the historic scenic pictures, not only landscape of Edo period but also urban structure and people are drawn. In other words, we can understand urban landscape of the time by understanding historic scenic pictures. Therefore, the purpose of this study is to understand landscape transition by the constructing of 3-dimensional restoration model based on the historical materials. In this study, the authors use Nanto meisho shu (Collection of beauty spots in Nanto) and Yamato meisyo zue (Collection of beauty spots in Yamato). First, the authors put the scenic sites drawn in historic scenic pictures on map. They construct spatial data on GIS by using historic scenic pictures and old edition of topographic maps. And they understand urban transition by using the constructed database. Finally, they have done cityscape simulation by using CAD/CG. The restoration model in Edo period has been created based on the database of GIS. Modern urban model has been created by 3-dimensional urban model based on the aerial photos taken by the oblique aerial camera. The authors found the greatly changed area in Nara city by cityscape simulation. As a result, they could grasp the urban transition including cityscape from the Edo period to modern time.

Keywords: Nara as a historical city, urban transition, restoration

Modeling of Nightscape in Inner City

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Recently, with the rapid modernization in Japan, the nightscape has become a familiar landscape, due to the changes in lifestyle such as the increase of living hours during the night. Especially in the inner city, there are a lot of projects to light up buildings, bridges, trees, and so on. Therefore, the modern nightscape has recognized as not only familiar landscape but also urban assets for people. On the other hand, the large urban model can have been expressed conveniently and realistically, due to the rapid development of geo-information technology in recent years. We are using those technology for urban and landscape design at present. However, most of them are 3-dimensional urban models in the daytime, there are few models in the nighttime. It is important to create 3-dimensional urban model in the nighttime at present because of the growing interest in nightscape. In this study, the authors are aiming to model a nightscape, which is useful for urban design and landscape design. As the concrete method, the authors are going to use GIS and CAD/CG in fusion to model the nightscape in the inner city of Osaka. As a result, they could create the nightscape model with high probability and convenient in consideration of landscape engineering. They will create the nightscape model in other sites and verify the versatility of the modeling method in this study.

Keywords: nightscape, division of visual distance, modeling

Advanced aspects of GIS education in Taiwan

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Two major geography departments in Taiwan are those at National Taiwan University and National Taiwan Normal University in Taipei. Current situations of GIS education there were surveyed. Interviews on GIS education in high schools were also made. The results point to some advanced aspects of GIS education in Taiwan, which look useful to improve that in Japan. For example, their detailed GIS education in geography classes in high schools provides concrete information to develop such education in Japan in relation to the new high-school geography education system to be applied in 2022. This paper introduces some characteristics of advanced GIS education in Taiwan.

Keywords: GIS education, Taiwan, Japan

