

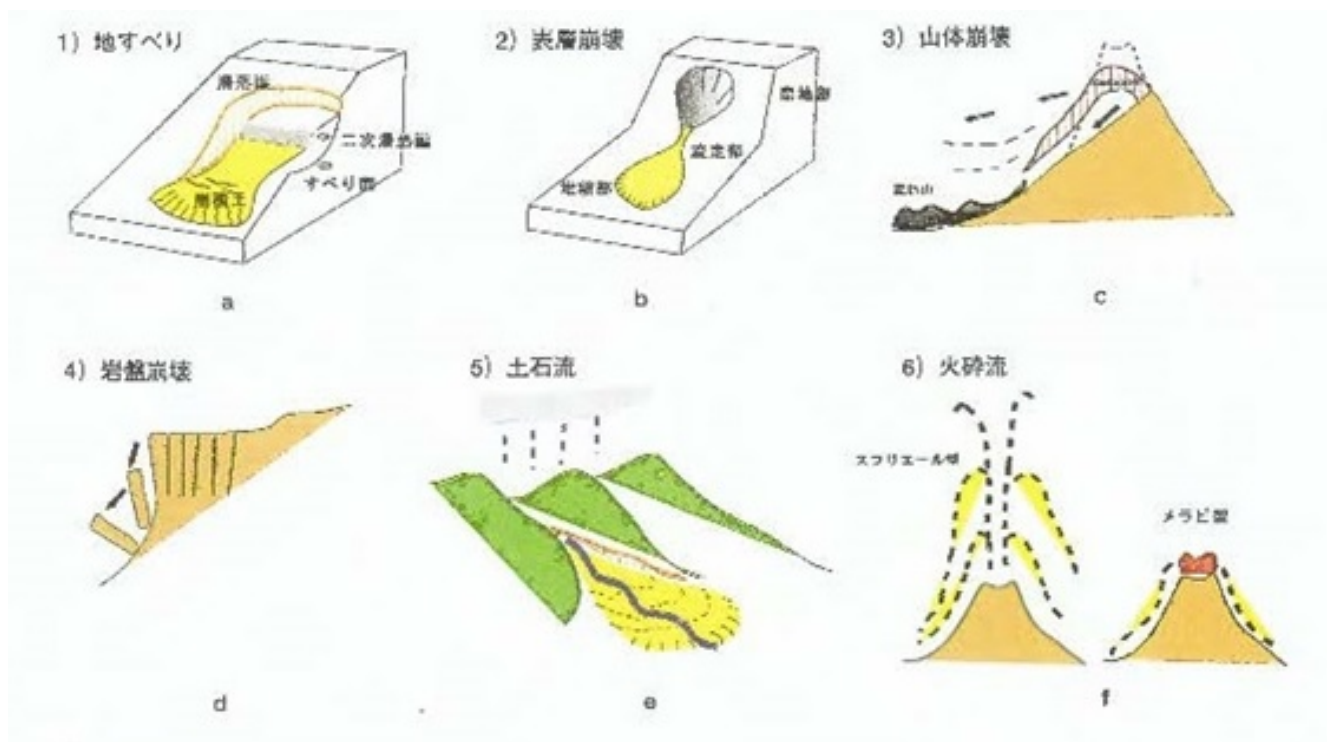
## Mass movement analysis using digital image system

\*Hiromitsu Yamagishi<sup>1</sup>, Kazuo Shimura<sup>1</sup>

1. Snin Engineering ConsultantCo. Ltd

Recently, variable digital image system based on GIS, has been getting popular and progressed much. The expression and analyses of mass movement phenomena, such as landslides and volcanic eruptions, have been also done using the digital image systems accompanied by spreading of LP data etc. In this presentation, I introduce case studies of analyses of the geomorphic phenomena in Hokkaido using such digital technology.

Keywords: GIS, digital image system, mass movement, landslide, volcanic eruption



# Acquisition of aerial photographs using drone and computing high resolution ortho mosaic imagery for utilizing as Land use/Land cover image classification

\*Kotaro Iizuka<sup>1</sup>, Masayuki Itoh<sup>1</sup>, Kazuo Watanabe<sup>2</sup>, Satomi Shiodera<sup>1</sup>

1. Center for Southeast Asian Studies, Kyoto University, 2. Research Institute for Humanity and Nature

Land use/Land cover mapping utilizing remote sensing data such as satellite imageries, is a promised method used in various fields such as for land use planning or environmental analysis, to understand the current status at the region of interest. Recent technology of satellite imageries can observe the land environment in finer spatial resolution with higher revisiting time, showing its high versatility. However, effects of cloud covers are unavoidable issues when observations are made from space, and availability of optical data is occasionally seen with lacking number of scenes for the analysis, which can even extend to months of no data. This often occurs in the tropic regions, where frequent cloud covers makes impossible to seek the land features. Unmanned Aerial Vehicle (UAV: hereafter called drones), which showed large attention in the past year with rapid development of the technology, led to increment of opportunities in the utilization of the drones as for a tool in observing and collecting data in a remote sensing way, for various environmental analysis. Due to its potential -for observing wider areas in less time consumption- it has provided the users and made it possible to collect the ground information simpler and easier. Because it flies at lower altitude than the clouds, observations of the land can even be accomplished without considering its interference.

This work focus on Indonesia as a case study where less frequent optical data can be collected due to the restriction from the clouds. The drone was utilized and multiple aerial photos were collected through the survey and processed with the Structure from Motion (SfM) technique to develop an ultra-high resolution ortho mosaicked imagery. The produced ortho mosaicked imagery was separated into a three byte binary image each representing the RGB bands, then a conventional approach was taken for image classification to obtain a categorical map of the area. The Multilayer Perceptron neural network classification was performed and segmentation classification was further performed to produce a smoother map-like classification result. The method has shown well in developing the map by using the generated image approximate 5 cm resolution which no other satellite imageries provides. Even with this short limited time of observation, it has maximized the performance for obtaining in-depth detail spatial information of the region, and using its output can lead to sound decisions for land use planning or environmental reclamation of the areas.

Keywords: Drone, Structure from Motion, Land use, Classification, Remote Sensing, Landscape

# An analysis of geographical compression effect of PM2.5 by R and GIS applications

\*Junji Yamakawa<sup>1</sup>

1. Graduate School of Natural Science and Technology, Okayama University

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 dynamic nature of the distribution of PM2.5 are important information for the consideration on the human health. To use for the purpose, relative high-resolution estimations (about 3 km), and basis on the limited obserbatories numbers, the estimations have been performing by using the time-series analysis and the Kriging method. In this study, a geographic compression effect, one of the dynamic nature of the PM2.5, were attempt to reveal by using the high-resolution estimation of the PM2.5 with 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. Observed concentration data of the PM2.5 about the region were obtained from the Okayama prefectural website of the environmental data. The DEM data were acquired from the open data which were distributed by the Japanese government-affiliated research institute. The kriging analysis were performed using the R (R core team, 2016) and its geospatial libraries such as maptools (Bivand and Lewin-Koh, 2014), rgdal (Bivand, Keitt and Rowlingson, 2014) and gstat (Pebesma, 2014). The geographical representations were performed using the QGIS (QGIS Development Team, 2017) and the Google earth (Google, 2016). The rgdal and QGIS are developed under the Open Source Geospatial Foundation and constitute the part of the FOSS4G software.

At first, a geographical subdomain that was expected to occur the geographic compression effect was selected from the research area by the series of the hight-resolution PM2.5 estimations. Then, the compression parameters such as the attack time, ratio and the release time were calculated from the estimations. The slope gradients of the subdomain were calculated by the GIS using with the DEM data. Finally, the correlation of the compression parameters and the slope gradients were analysed by the R. As the result, the degree of a geographical compression showed a relation to the amount of the slope gradients of the subdomain. The consideration of the relationship between the geographical compression and the local meteorology, especially the direction of the wind will be required further analysis.

Keywords: PM2.5, Kriging, Geostatistics, R, GIS, FOSS4G

# Representation of geospatial information for situation awareness in disaster response - Cases of 2016 Kumamoto earthquake

\*SANO Hiroaki<sup>1,2</sup>, Ryota SATO<sup>1</sup>, Makoto HANASHIMA<sup>1</sup>, Yuichiro USUDA<sup>1</sup>

1. National Research Institute for Earth Science and Disaster Resilience, 2. Tsukuba university

The National Research Institute for Earth Science and Disaster Resilience (NIED) carried out information support by collecting and sharing geospatial information in response to the 2016 Kumamoto earthquake. In this presentation, I will describe how it expressed useful information on WebGIS and helped in dealing with disasters.

Keywords: WebGIS, situation awareness, Geospatial information, 2016 Kumamoto earthquake

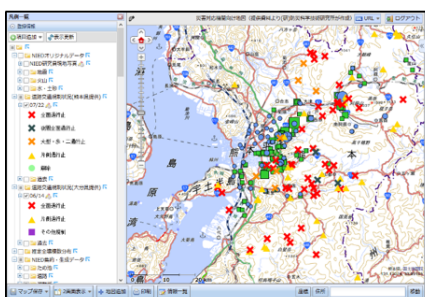


図1 災害対応機関向けに提供した地図



図2 災害情報の凡例

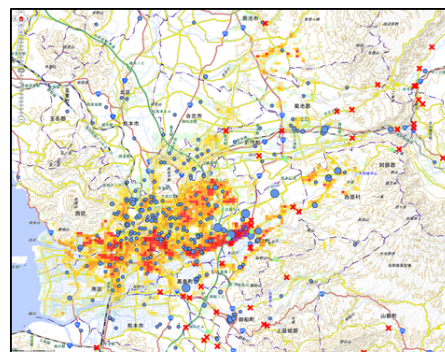


図3 避難所+推定全壊棟数分布+道路を重ね合わせた図

# The Distortion of the City in the Perceptual Space of Children

\*TAKUMI SAKAI<sup>1</sup>, Kazunari Tanaka<sup>1</sup>, Shin Yoshikawa<sup>1</sup>

1. Osaka Institute of Technology

Our country has made the cities that established an important point for the childcare support as declining birthrate measures. However, there are few places where children play in city space. The current city planning does not become the child-based measures. Thus, it is necessary to plan a city after having grasped the relationship between a children and the town.

In this study, the authors analyze a relationship between the cognitive space of the children and reality space. In previous studies, the authors analyzed the element that gave a distortion on a map by grasping a difference of the cognitive space and reality space as a distortion. As a result, the authors found the distortion of the cognitive space on distance, orientation and angle.

A purpose of this study is to grasp spaces and factors that children feel attractive by analyzing relationship between the cognitive space of the children and reality space. The authors grasp a distortion of the cognitive space from a psychology side and physical aspect. In the research method, the authors perform the questionnaires' survey to confirm the cognitive space of the children, in three elementary schools. The relationship between the shape of town and reality space are analyzed by Geographic Information System. The authors measure the distance between the elements in the cities as the network distance. The difference of the perceptual height is also find by the statistical analysis.

Keywords: cognitive space, cognitive map, child

# The Relationship Between The Borderland and The Action of Pedestrian

\*Tetsuya Yanobe<sup>1</sup>, Kazunari Tanaka<sup>1</sup>, Shin Yoshikawa<sup>1</sup>

1. Osaka Institute of Technology

In this study, the authors are going to investigate the action of pedestrian focused on the urban public space. In the urban public space, the various needs, such as the advancement of amenities and facilitation of pedestrian movement and so on, have been required. On the other hands, there are many clear border such as the outer wall and fence in the public space by separate of functionality. So, it is necessary that we create the buffer space in the present urban area. Therefore, the authors are going to analyze the borderland focused on the urban public space. In the traditional Japanese town, we find a boundary space, such as a veranda, called “Engawa”, to be put beautiful flowers. We find also a ambiguous space, such as a sidewalk to be put beautiful flowers. Many people should prefer ambiguous spaces. To make such ambiguous spaces as a borderland has a good influence on the city.

There are components such as a sidewalk, pillars, colors and trees for example. The characteristic varies regarding the space component for each target area. Therefore, in consideration of various space elements, it is necessary to choose the target area. Thus, the authors chose the a former settlement of Kobe-shi, Hyogo and examined the characteristics of this area.

In this study, the authors will clarify the existence of the domain that it is hard to catch in the city space. And it is intended to find a clue to bring it up as a town with the unities. Therefore, in the space where it is thought that some domains exist, the author will clarify the domain that it is had to arrest by clarifying the relationship between the pedestrian behavior and the space component. The method of research the author used is an analysis on action of pedestrian. We analyze the relationship between the action of pedestrian and the space component by GIS and CAD.

Keywords: urban public space, borderland, pedestrian behavior

## Understanding of Festival Space Based on “Danjiri” Festival

\*Watanabe Hideto<sup>1</sup>, Yoshikawa Shin<sup>2</sup>, Tanaka Kazunari<sup>2</sup>

1. Osaka institute of technology, 2. Osaka Institute of Technology

The festival is a valuable event historically that has been inherited and conducted for a long time by the cooperation of local residents. In the historical transition, some festivals changed their forms. On the other hand, any festivals have not changed their forms up to the present. For many people, the festival is an opportunity to enjoy urban space changed to the stage of "hare" form "ke" as the daily life. In this study, the authors define the festival space in where various elements related to the festival can be seen, and analyze the festival space expanding to urban space.

Keywords: Festival space, Historical transition, Geo spatial information technology

## Landscape Analysis of Skyline

\*Yuki Okabe<sup>1</sup>, Shi Yoshikawa<sup>1</sup>, Kazunari Tanaka<sup>1</sup>

### 1. OSAKA INSTITUTE OF TECHNOLOGY

In recent years, the urban redevelopment has been advanced in each city. To update the land-use and the urban functions, high-rise buildings have been accumulated in cities. The city of Osaka has so many high-rise building in the inner city. They have formed the urban mountain ranges. On the other hand, the city of Osaka is surrounded by the ranges of real mountains. Both of them are making the skylines in and around the city. So, the authors are going to analyze the two types of skyline.

Keywords: skyline, landscape analysis, mountain range, building group



## Analysis of Green Landscape Based on Spatial Data

\*Takemura Yui<sup>1</sup>, Yoshikawa Shin<sup>2</sup>, Tanaka Kazunari<sup>2</sup>

1. Osaka institute of technology, 2. Osaka Institute of Technology

Our country is abundant in nature and the beautiful landscape has been formed through the ages. The green environment forming a beautiful landscape becomes the important landscape resource and the tourist resource in modern society. On the other hand, smart device is becoming increasingly popular. As a result, the users of social media have increased rapidly and enormous spatial data group has appeared in modern society.

In this study, the authors are going to investigate green landscape focused on the tourist spot. The green environment has become more important as a kind of landscape resource and tourist resource. The data contributed to social media is realistic data, because it is generated by human behavior. People visiting tourist spots have been contributed photographs to the photo community website. So, it is intended to understand the green landscape that people enjoy on a tourist spot.

First of all, the authors decide the area of the Nara-Park as a case study. And they built the database of the area and used Flickr and Panoramio as photo community websites for data collection. It is possible to extract attribute information including location information from the photo contributed on social media. These two photograph community websites are different in characteristics. The authors think that the most of users of Flickr are foreigners and the most of users of Panoramio are Japanese by understanding the photography positions obtained from each photograph community website and the route listed in a sightseeing magazine. And they understood the green environment in the small area by the spatial data acquired from the PentaDigiCAM. They grasped the good viewpoint field where the tourists visited by using the two kinds of data. In addition, they investigate the tourist route actually used by acquiring positional information and time information. Finally, they analyze the continuous green landscape actually viewed by the visible-invisible analysis from the tourist route.

In future, the authors are going to grasp the good viewpoint fields and tourist routes for the green landscape in a whole Nara-Park by expanding the case study area.

Keywords: Green landscape, Tourist area, Social media

# The Image Elements for the Route Selection in Urban Space

\*Ito Yoshihiko<sup>1</sup>, Tanaka Kazunari<sup>1</sup>, Yoshikawa Shin<sup>1</sup>

1. Osaka Institute of Technology

In recent years the compact city is an important concept of urban planning. To encourage using the public transportation, the consolidation of urban functions to walk is important. In the contemporary cities, the structure of the metropolitan area is complicated. The pedestrians could not move easily. If factors to be not confused are found and locate landmark to proper position, it will help city planning in new era. The purpose of this study is to appear the characteristics of the walking paths and the landmarks used by pedestrian. There is a difference between the characteristics of new visitors and high frequency visitors. Therefore, we analyzed the two separately. First of all, the authors investigated the walking route and the landmarks used of new visitors. From this result, the position relation, visibility and so on were analyzed. As a result, the characteristics of landmarks used of new visitors were discussed. Next, we investigated the walking route and the landmarks used by high frequency visitors. Analyzing the characteristics of the landmarks of in high frequency visitors, the location, the size and the property were clear. In this study, we revealed the characteristics of space grasp to focus on difference between new visitors and high frequency visitors. Results of discussing about the characteristics of each visitor, we propose the landmarks to play an effective role on route search for new visitors. Furthermore, we propose the landmark's position to be placed from result of high frequency visitors.

Keywords: route choice, landmark, geo spatial information technology

## A Study on the Cognition of the Seaside Space ~ Based on the Sea Breeze and the Wave ~

\*Hagari Yoshihide<sup>1</sup>, Kazunari Tanaka<sup>1</sup>, Shin Yoshikawa<sup>1</sup>

1. Osaka Institute of Technology

In recent years, waterfront of coastal cities have been developed. The planning include coast area has been demanded the creation of a comfortable seaside environment. In the study, the authors analyzed the parameters to evaluate the invisible environment. The method to describe the different positions of the coast for visually challenged person, for deaf and for other handicapped person were analyzed. The characteristics based on the wind; seabreeze direction in coastal cities, as the sense of touch and smell were analyzed. The characteristic based on the wave, as the sense of the auditory and visual senses were analyzed. The wind direction were cleared by the fluid analysis program. The visible and invisible area were analyzed using Open Source Geo Information System. The sound were analyzed based previous our studies. The seaside space and the coastline were expressed used the Geo Information System. It is appear that there are the types of the coasts based different sense. The differences in sensibilities are also in the combinations of sensibilities.

Keywords: Sea Side Space, Visualization, Geo Spatial Information Technology