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URBAN VEGETATION MAPPING THROUGH PIXEL-BASED IMAGE ANALYSIS OF HIGH-RESOLUTION SATELLITE IMAGERY

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Abstract

Urban vegetation and land use information are critical for sustainable environmental management in urban areas. In general, urban vegetation plays an important role for urban planning through a balance between the natural environment and the built environment. Thus, mapping of urban vegetation is important towards sustainable urban development. Remote sensing has increasingly been used to derive such information for mapping and monitoring the changes of urban vegetation. The use of remote sensing data for urban mapping has increased along with the availability of very high resolution (VHR) satellite data such as Quickbird, Worldview and Pleiades. The aims of this study is to identify and classify using remote sensing methods in the context of a vegetation mapping in the urban environment. This paper describes the use of high-resolution Pleiades imageries to extract and classify vegetation in an urban area with the use of pixel-based image analysis. Classification types in the study area were divided into vegetation and non-vegetation classes. The pixel-based method was applied, and a support vector machine algorithm was used for classification of urban vegetation. Comparison of accuracies was made from the error matrices, overall accuracy, and kappa coefficient. The overall accuracy for classification approach was 98.980% and the kappa value was 0.9795. The result shows the ability of high-resolution imagery to extract urban vegetation accurately despite the complex surface of the urban area. This information is useful to support other research applications related with urban green spaces monitoring purposes and to the state authorities for future planning in the conservation of urban vegetation areas.

Keywords: *remote sensing; urban vegetation; high resolution; pixel-based classification and support vector machine.*

1.0 INTRODUCTION

In general, vegetation in urban areas delivers crucial ecological services as a support to sustainable development policies, environmental conservation, and urban planning process (Lehman et al., 2014; Wolch et al., 2014; Niemela., 2014). Thus, mapping and monitoring the urban vegetation has become a major issue for urban planners for future development (Puissant and Roger, 2014; Wong et al., 2017). Urban vegetation is significantly different from natural vegetation because of intense human impact in their ecosystem (Rosina & Kopecke, 2016). Mapping and monitoring the urban vegetation are important tasks due to their functions such as the management of air, contribution to human well-being, and increasing the value of real estate in urban areas (Weber and Hirsch, 1992). Urban vegetation has an important role in improving air, water, and land quality, absorbing and mitigating carbon dioxide and many pollutants, lowering urban temperature, and reducing stormwater runoff (Pu, 2009; Pu et al., 2006; Weng et al., 2004). Timely and accurate acquisition of information on the status and structural change of these ecosystems is crucial to developing strategies for sustainable development and improving urban environments (Song, 2005; Yang et al., 2003). The urban vegetation inventory system is made at the local level and is traditionally produced from conventional methods such as field surveys. This information is only accessible by local coverage and are constrained from the public domain (Puissant and Rougier, 2014). As the understanding of ecosystem services is important, researchers are becoming more aware of the urban vegetation roles towards a sustainable urban ecosystem and the environment (Hashim et al., 2019). With the advance of high technology remote sensing, this technique can be a tool for integrated spatial planning to deal with urban challenges (Gasparovic & Dobrinic, 2020). Therefore, the mapping and monitoring of this urban vegetation are major issues for planners towards sustainable development of an urban area. In this context, the objectives of this work are to identify and to classify urban vegetation from a very high resolution (VHR) optical image using pixel-based classifiers. The methodology is developed, and its performance is evaluated on a dataset of the National Monument Park, Kuala Lumpur.

2.0 LITERATURE REVIEW

Remote sensing technology has been proven to offer an efficient approach to the classification and mapping purposes for future planning. Remotely-sensed data and imagery nowadays are able to fulfil the requirements of mapping and monitoring purposes (Erasu, 2017). Moreover, this high spatial resolution data has been used worldwide in multi-level applications for expanding undeveloped areas towards becoming developing nations (Maktav et al., 2005). Furthermore, the advance of remote sensing data enables this valuable information to benefit different levels of users such as urban planners and authorities (Latif et al., 2012; Ibrahim et al., 2015). In recent years, the advancement of remote sensing technology provides a great deal of convenient solutions for urban vegetation monitoring and mapping processes (Tooke et al., 2009; Tigges et al., 2013; Pu and Landry, 2012; Immitzer et al., 2012). The traditional methods of vegetation mapping rely on the interpretation of aerial photographs and verification with field measurements. This approach is expensive, time-consuming and labor-intensive (Kamagata et al., 2006). However, the availability of very high-resolution (VHR) remote sensing imageries such as IKONOS, Quickbird, Worldview-3 and Pleiades, and advanced classification algorithms enable the extraction of detailed information on urban vegetation covers (Zylshal et al., 2016). Furthermore, with the availability of very high-resolution imagery and digital classification approaches, the monitoring and mapping of urban vegetation can be done effectively. Some research has been conducted to classify land cover and use the information to analyse the urban green areas (Simarmata, 2012; Trisakti., 2016; Zylshal et al., 2016). Recently, the use of remote sensing data for monitoring and mapping of vegetation in urban areas is conducted using medium and high-resolution remote sensing imagery (Trisakti., 2017). The remote sensing classification approach such as automated or semi-automated classification can suppress the element of subjectivity, as well as a reproducible procedure (Belgiu et al. 2014). Thus, this research focuses on urban vegetation mapping by pixel-based classification using Pleiades high resolution remote sensing data.

In the analysis of remotely sensed data, the most important part was the classification process (Roy & Giriraj, 2008). Conventional classification methods such as pixel-based with maximum likelihood approach is widely used in the mapping of land use land cover which is based on multivariate probability density function of classes (Lillesand et al., 2008). However, advanced classification algorithms such as support vector machines (SVM) have been developed recently to improve the classification results accuracy (Deilmai et al., 2014). SVM is a supervised classification tool with non-parametric learning algorithms that does not make assumptions about the frequency distribution of the data (Belgiu & Drăguţ, 2016; Mountrakis et al., 2011). SVM is a robust, accurate and effective classifier for extracting land cover information from remotely sensed multispectral data (Gao & Liu, 2014; Nurul Iman Saiful Bahari et al., 2014). Some research has shown that the SVM algorithm approach is able to give a better classification result as compared to the conventional method (Szuster et al., 2011; Yu et al., 2012). For example, research conducted by Zylshal et al., (2016) and Hashim et al.(2019) found that extracting urban green spaces from Pléiades images using SVM classifiers produced acceptable results for the overall accuracy. Additionally, a research conducted by Ouerghemmi et al., (2018) has proven that high resolution imagery is able to identify urban vegetation species with an acceptable accuracy result and coherent distribution on the visual inspection. From the previous research, it is proven that the use of high-resolution data source and advanced classification approach will enhance the results in urban vegetation mapping in future. Therefore, the need to explore the classification techniques and algorithms to enhance the results of urban vegetation mapping is crucial in order to give accurate information on this natural resource.

3.0 RESEARCH METHODOLOGY

3.1 Research Area

The selected study area is located in the National Monument Park, Kuala Lumpur, Malaysia. The study area covers the coordinates of 3º 8' 51" N, 101º 41' 36" E. The National Monument Park is located to the north of Taman Botani Perdana, with Padang Merbok in the south-east and Bank Negara's Lanai Kijang to the east of the site. The site is contiguous with Taman Botani Perdana and is separated only by Jalan Parlimen It can be seen as an expanse of green spaces.

Figure 1: Pleiades imagery of National Monument Park, Kuala Lumpur (Source: Google earth)

3.2 Data Collection

The Satellite data used for this research are generally based on secondary data provided by the Malaysian Agency of Remote Sensing (ARSM). The specific satellite images used were Pleiades 1A Orthorectified Pan Sharpened for 2017 with less than 10% cloud cover. The details of the data used are shown in Table 1. Other supporting data is the land use map provided by the Town and Regional Planning Department for the validation of classification stage.

Table 1: Pleiades 1A data specification

Data	Date of Acquisition	Processing Level	Spectral Resolution	Spatial Resolution
Pleiades 1 A	3 Februari 2017	Orthorectified	Blue: 480 - 830 nm Green: 490 - 610 nm Red: 600 - 720 nm Near Infrared: 750 - 950 nm Panchromatic: 480 - 830 nm	2 m 0.5 m

Source: http://www.satimagigcorp.com/satellite-ssensors/pleiades-1/

3.3 Image pre-processing and Analysis

The methodology flowchart is shown in Figure 2. The overall data processing can be divided into three main processes as follows: 1) The pre-processing of the satellite images; 2) The classification stage; and 3) accessing the accuracy for the classification method. For the first stage, Pleiades imagery is obtained as standard products were geometrically and radiometrically corrected by data providers. Therefore, it can be used directly and can proceed with the second stage. In the classification stage, a uniform supervised classification was applied on the images. All images were classified by creating accurate polygons as training areas for introducing ideal classes for each image separately and by using the Support Vector Machine (SVM) algorithm. To create a closer correspondence between the maps produced, the classification was done by only considering two main classes: vegetation and non-vegetation areas. The descriptions of the main classes are presented in Table 2. The classification result was validated with a land use map as reference, and tested using confusion matrix consisting of overall accuracy, user accuracy, producer accuracy, and kappa coefficient. The final output from this study was the urban vegetation mapping with high resolution satellite imagery.

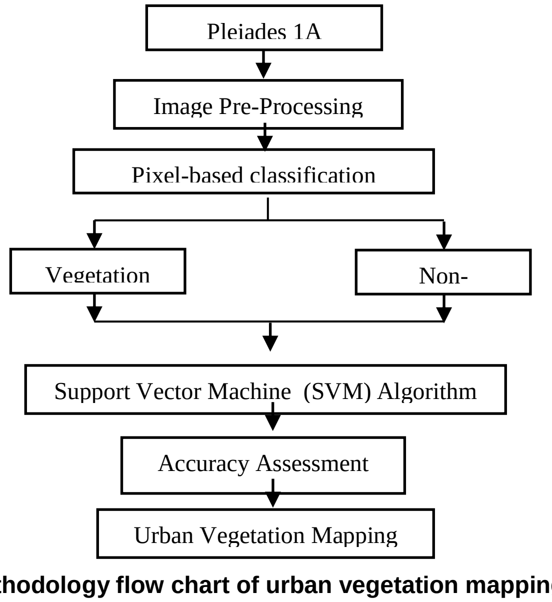

Figure 2: The methodology flow chart of urban vegetation mapping

Table 2: Description of land use/cover classes

Land use classes	Description
Vegetation	Shrub lands and semi natural vegetation, gardens, inner city tree areas, grass land and vegetable land, trees, coniferous forest and mixed forest
Non-Vegetation	Infrastructure, park and playground, building, car park and National Monument

4.0 RESULTS AND DISCUSSION

The results of urban vegetation mapping are shown in Figure 3. The classifications of the land use land cover classes were identified into vegetation and non-vegetation areas. A comparison of both techniques was based on a visual analysis of the respective land use maps outputs and on an evaluation of the corresponding accuracy assessment measures (overall, producer’s and user’s accuracies, kappa coefficient). A comparison of accuracies was made from the error matrices, overall accuracy, and kappa coefficient. The overall accuracy for the classification approach was 98.980% and a kappa value of 0.9795. Table 3 describes in detail the accuracy assessment for urban vegetation mapping with support vector machine (SVM) classification approach. The result proves the ability of very high-resolution images to extract urban vegetation accurately despite the complex surface of urban areas. This result shows that the support vector machine classification algorithm is able to extract and classify urban vegetation in urban areas moderately.

Figure 3: Urban vegetation classification with SVM classification algorithm

Table 3: Accuracy assessment result for urban vegetation classification

Year	2017	
Land Use/Land Cover	Producer's Accuracy (%)	User's Accuracy (%)
Non-Vegetation	100	98.14
Vegetation	97.79	100
Overall Accuracy	98.98%	
Kappa Coefficient	0.9795	

5.0 CONCLUSIONS

The results of this research show that pixel-based classification with the use of support vector machine (SVM) algorithm is able to provide accurate results and is useful for the generation of vegetation maps. This information will be useful for future conservation planning of green spaces in urban areas. This proves that high resolution remote sensing data with appropriate classification algorithms shows a high potential for practical use in producing and updating the vegetation maps that are required for the proper conservation and management of urban landscapes. In future, classification accuracy can be improved even further with new advanced classification approaches with the fusion of suitable high-resolution remote sensing data.

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REFERENCES

Alonzo, M., McFadden, J.P., Nowak, D.J., & Roberts, D.A. (2016) Mapping urban forest structure and function using hyperspectral imagery and LiDAR data. Urban Forestry & Urban Greening, 17, 135-147. Doi:10.1016/j.ufug.2016.04.003.

Belgiu, M., & Drăguţ, L. (2016) Random forest in remote sensing: A review of applications and future directions. ISPRS Journal of Photogrammetry and Remote Sensing, 114(Supplement C), 114, 24 –31.

Caccetta, P., Collings, S., Hingee, K., McFarlene, D., & Wu, X., (2011) Fine-scale monitoring of complex environments using remotely sensed aerial, satellite and other spatial data. International Symposium on Image and data fusion (ISIDF 2011).

Deilmai, B.R., Ahmad, B., & Zabihi, H. (2014) Comparison of two classification methods (MLC and SVM) to extract land use land cover in Johor, Malaysia. IOP Conference Series: Earth and Environmental Science 20.

Erasu, D. (2017) Remote Sensing-based urban land use/land cover change detection and monitoring. Journal of Remote Sensing & GIS, 6 (2).

Gao, Z., & Liu, X. (2014) Support vector machine and object-oriented classification for urban impervious surface extraction from satellite imagery. Paper presented at the 2014 The Third International Conference on Agro-Geoinformatics.

Gasparovic, M., & Dobrinic, D. (2020) Comparative Assessment of Machine Learning Methods for Urban Vegetation Mapping Using Multitemporal Sentinel-1 Imagery. Remote Sensing, 12(12), 1952. MDPI AG. Retrieved from http://dx.doi.org/10.3390/rs12121952.

Hashim, H., Abd Latif, Z., and Adnan, N.A (2019) Urban vegetation classification with NDVI threshold value method with very high resolution (VHR) Pleiades imagery, Int. Arch. Photogramm. Remote Sens. Spatial Inf Sci. XLII-4/W16, 237-240. https://doi.org/10.5194/isprs-archives-XLII-4-W16-237-2019.

Ibrahim, N., Ujang, U., Desa, G., & Ariffin, A. (2015) Analysing the sustainability of urban development: A review on the potential use of volunteered geographic information. ISPRS Annal of the Photogrammetry, Remote Sensing and Spatial Information Sciences. Pp. 169-174.

Immitzer, M., Atzberger, C., & Koukal, T. (2012) Tree species classification with random forest using very high spatial resolution 8-band World View-2 satellite data. Remote Sensing, Vol. 4, pp. 2661-2693.

Kamagata, N., Hara, K., Mori, M., Akamatsu, Y., Li, Y. & Hoshino, Y. (2006) A new method of vegetation mapping by object-based classification using high resolution satellite data. Journal of the Japan Society of Photogrammetry and Remote Sensing, 45(1), pp. 43-49. Doi: 10.4287/jsprs.45.43.

Latif, Z.A., Zamri, I. & Omar, H. (2012) Determination of trees species using WorldView-2 data. IEEE 8th Int. Conf. on Signal Process Application. and Technology (ICSPAT), pp. 383–387.

Lehman, I., Mathey, J. Rößler, S., Bräuer, A., Goldberg, V. (2014) Urban vegetation structure types as a methodological approach for identifying ecosystem services – Application to the analysis of micro-climatic effects. Ecological Indicators, 42, 58 – 72.

Lillesand, T.M., Kiefer, R.W. & Chipman, J.W. (2008) Remote Sensing and image interpretation 6th edition (New York: John Wiley & Sons Ltd).

Maktav, D., Erbek, F.S., & Jurgen, C. (2005) Remote Sensing of urban areas. International Journal of Remote Sensing 26, pp.655-659.

Nichol, J., & Lee, C.M. (2005) Urban vegetation monitoring in Hong Kong sing high resolution multispectral images. International Journal of Remote Sensing, 26, 903.

Niemela, J. (2014) Ecology of urban green spaces: The way forward in answering major research questions. Landscape and Urban Planning, 125, 298 – 303.
Nurul Iman Saiful, B., Asmala, A., & Burhanuddin Mohd, A. (2014) Application of support vector machine for classification of multispectral data. IOP Conference Series: Earth and Environmental Science, 20(1), 012038.
Pu, R. (2009) Broadleaf species recognition with in situ hyperspectral data. International Journal of Remote Sensing,30(11), 2759–2779.
Pu, R., Gong, P., Michishita, R., & Sasagawa, T. (2006) Assessment of multi-resolution and multi-sensor data for urban surface temperature retrieval. Remote Sensing of Environment,104, 211–225.
Pu, R.L., & Landry, S., 2012. A comparative analysis of high resolution IKONOS and World View-2 imagery for mapping urban tree species. Remote Sensing of Environment, Vol. 124, pp. 516-533.
Rougier, S., & Puissant, A. (2014) Improvements of urban vegetation segmentation and classification using multi-temporal Pleiades images. South Eastern European Journal of Earth Observation and Geomatics, 3 (2). Pp.409-414.
Roy, P., & Giriraj, A. (2008) Land use land cover analysis in Indian context. Journal of Applied Sciences, 8, pp. 1346-1353.
Simarmata, M. (2012) Kajian Ketercukupan Ruang Terbuka Hijau Berdasarkan Jumlah Penduduk Kota Pematangsiantar. Jurnal Akar, 1, pp.91-103.
Szuster, B.W., Chen, Q., & Borger, M. (2012) A comparison of classification techniques to support land cover and land use analysis in tropical coastal zones. Journal of Applied Geography 31, pp. 525-532.
Tigges, J., Lakes, T., & Hostert, P. (2013) Urban vegetation classification: Benefits of multitemporal RapidEye satellite data. Remote Sensing of Environment, Vol. 136, pp. 66-75.
Tooke, R.T., Coops, Goodwin, N.R., Voog, J.A. (2009) Extracting urban vegetation characteristics using spectral mixture analysis and tree classification. Remote Sensing of Environment, Vol. 113, pp. 398-407.
Trisakti, B. (2017) Vegetation type classification and vegetation cover percentage estimation in urban green zone using Pleiades imagery. IOP Conference Series: Earth and Environmental Science 54 (2017) 012003. Doi: 10.1088/1755-1315/54/1/012003.
W, O., S, G., G, M., & D, J. (2018) Urban vegetation mapping by airborne hyperspetral imagery; feasibility and limitations. 2018 9th Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS). doi:10.1109/whispers.2018.8747112
Weber, C. & Hirsch, J. (1992) Some urban measurement from SPOT data: Urban life quality indices. International Journal of Remote Sensing, Vol. 13, pp. 3251-3261.
Weng, Q., Lu, D., & Schubring, J. (2004) Estimation of land surface temperature–vegetation abundance relationship for urban heat island studies. Remote Sensing of Environment,89,467–483.
Wolch, J. R., Byrne, J., Newell, J. P. (2014) Urban green space, public health and environmental justice: The challenge of making cities just green enough. Landscape and Urban Planning, 125, 234 – 244.
Wong, C.H., Mew, A.A., & Perumal, B. (2017) Urban Community Forest, Bukit Persekutuan. Malaysian Nature Society. Kuala Lumpur, Malaysia.
Yu, L., Porwal, A., Holden, E.J., & Denith, M.C. (2012) Towards automatic lithological classification from remote sensing data using support vector machines. Journal of Computer & Geosciences, 45, pp. 229-239.
Zylshal, Sulma, S., Yulianto, F., Nugroho, J. T., & Sofan, P. (2016) A Support Vector Machine object-based image analysis approach on urban green space extraction using Pleiades-1A imagery, Modelling Earth Systems Environment 2(2). Doi: 10.1007/s40808-016-0108-8.

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