Satellite Images Classification in Geographic Information Systems

S.K.M. ABUJAYYAB[1], I.R. KARAS[1], B.N. BOGAZ[1], F. ZENCIR[1] and M. GONUL[1]

[1]Karabuk University, Karabuk/Turkey, s.jayyab@hotmail.com
[1] Karabuk University, Karabuk/Turkey, irkaras@gmail.com
[1] Karabuk University, Karabuk/Turkey, busranurbogaz@hotmail.com
[1] Karabuk University, Karabuk/Turkey, fundazencir.fz@gmail.com
[1] Karabuk University, Karabuk/Turkey, mihriban556gnl@gmail.com

Abstract – **Satellite image classification is a significant portion of the pattern recognition, image analysis and remote sensing RS. The aim of this study is to classify the Sentinal-2A satellite image to produce build up area maps by using geographic information systems GIS. Build up maps classification is carried out based on supervised classification. ArcGIS software were used to perform the analysis. Düzce area used as cases study to produce the outcomes. The performance accuracy was 85% for classification. The result showed that classification in GIS environment can be applied easily, accurately and without complexity for end-users.**

Keywords - **satellite images classification, Sentinal-2A images, build up area, GIS, RS.**

I. INTRODUCTION

Remote sensing became significant and effective technology for land cover data gathering and analysis. Remote sensing can quickly provide reliable data about the earth at different resolutions and different time intervals. The outcomes of data collection stage in remote sensing is satellite images.

In order to obtained useful data (for instance maps of land cover and urban areas) from raw satellite image, several steps need to be apply. Numerous statistical analyzes and statistical interpretation techniques utilized to gain information about urban areas from the raw satellite images. The most important method used to urban areas is to classify the images of remote sensed data.

The general purpose of the classification process is to group objects with the same spectral characteristics on the earth. The goal is to separate each pixel in the satellite images into different groups according to their spectral characteristics. Then, assign the pixel to the corresponding cluster on the earth according to their reflectance values.

In the classification process, two approaches, commonly referred to as controlled and uncontrolled classification are used. The controlled classifcation approach, which performs classification by using the training data set, is the most preferred method due to its high performance accuracy [1].

ArcGIS software contains both database manager and set of spatial functionalities. ArcGIS allow to end-users to store and analysis spatial data of valuation factors across the desired geographic landscape [2]. So, ArcGIS is suitable environment to perform satellite image classification.

The objective of this paper is to perform satellite image classification in order to produce urban areas maps. Classification environment is geographic information systems GIS.

II. METHODOLOGY

This section handling the methodology of applying satellite image classification in geographic information systems environment Figure 1. Düzce city in north west of turkey used as cased study. Sentinal-2A satellite image used to perform classification and produce urban areas map. Sentinal-2A image is Multispectral image and consisting 12 different spectral bands.
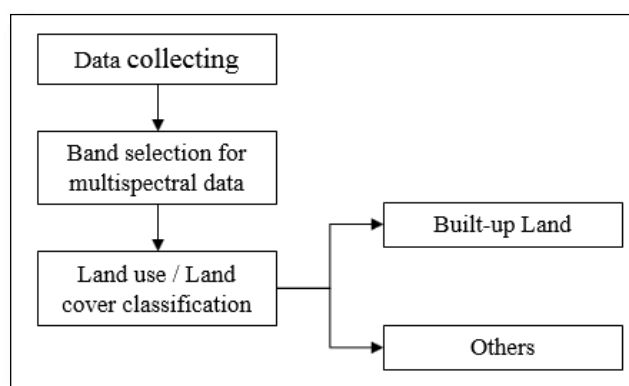

Figure 1 Satellite image classification methodology

2.1. Satellite image collection

Sentinal-2A image obtained from United States Geological Survey (USGS) earth explorer website. Based on the

availability of the data, an up to date (March 5, 2019.) and not cloudy image downloaded Figure 2. Then, image migrated to ArcGIS software.
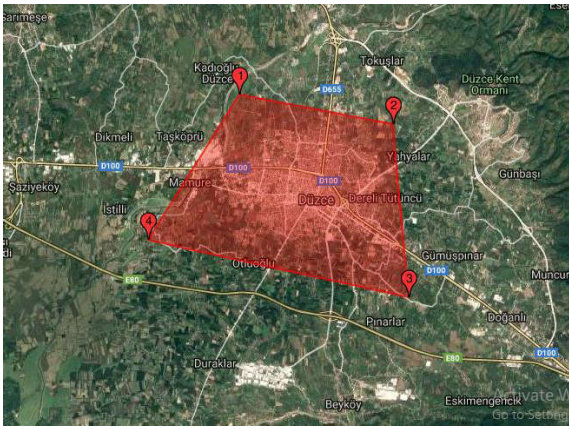

Figure 2 Satellite image collection (Sentinal-2A image collection)

2.3 Urban areas classification

The most important stage in this paper is to perform satellite image classification. The first step is build the training samples. The samples were built in ArcGIS training sample manger Figure 3. Samples were classified to two classes (urban or building areas and others).
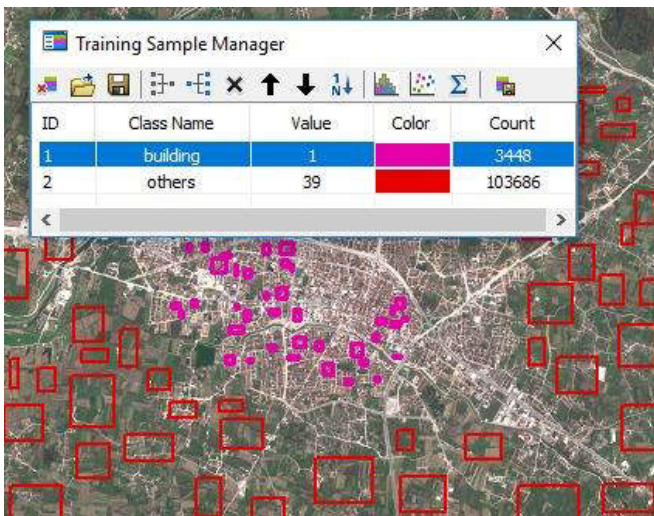

Figure 3 ArcGIS training sample manger

The second step is to performing the classification using any classification method. In this paper Maximum Likelihood Classification tool utilized to execute the classification for Düzce study area Figure 4. After train the model, all pixels in Düzce- Sentinal-2A image assigned to the corresponding classes. Since there is target data in the training sample manger, thus this is controlled classification.
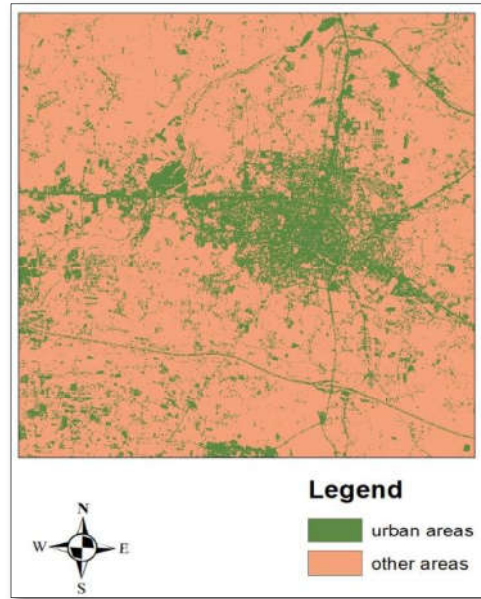

Figure 4 urban areas of Düzce study area after Sentinal-2A satellite image classification

III. DISCUSSION AND CONCLUSION

Spatial information about urban areas is an important factor for decision makers to perform planning. The aim of this article is to implement satellite image classification for urban areas in GIS environment. Sentinal-2A satellite image used to perform classification. satellite image. Sentinal-2A satellite image obtained from USGS earth explorer website. Cloudy and unclear satellite images is not suitable for image classification and producing urban areas maps. ArcGIS training sample manger used to build the training samples. Maximum Likelihood Classification tool utilized to execute the classification for Düzce study area. The consequence exhibited that performing satellite image classification in GIS environment can be implement straightforwardly, precisely and without difficulty for end-users.

REFERENCES

[1] http://www.irfanakar.com/turkish/sunumlar/UA_CBS/Uzaktan%20Algýlama%20ERDAS%20Bilgi/uydu_goruntulerinin_siniflandirilmasi_dogruluk_analizi.PDF
[2] S. W. Gatheru, D. Nyika, Application Of Geographic Information System In Property Valuation, International Journal of Scientific & Technology Research Volume 4, Issue 08, August 2015
[3] Hagen, Nathan; Kudenov, Michael W. "Review of snapshot spectral imaging technologies". Spie. Digital Library. Optical Engineering. Archived from the original on 20 September 2015. Retrieved 2 February 2017.