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Land Cover Classification Using Deep Learning Based On High Spatial Resolution Satellite Imagery

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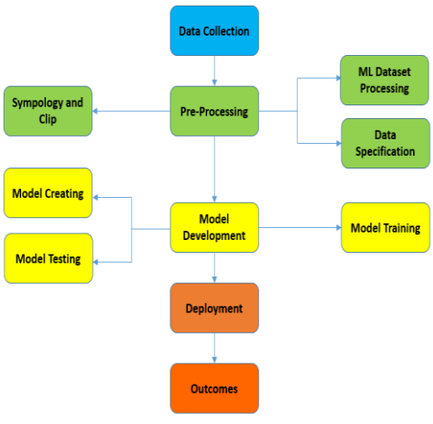
ABSTRACT

Remote sensing(UA) images reveal a significant portion of Geographic Information Systems (GIS) data.The reliability of information obtained from satellite imagery can be enhanced by the participation of auxiliary data in the classification process. The purpose of this study is to classify the Sentinel 2A satellite images we received for the European side of Istanbul.To make this classification, ArgGIS, the geographic information system, and Matlab, the platform on which we can create deep learning architectures using applications and visualization tools, have been used.So we were able to determine the accuracy of the classifications we had made with deep learning. Accuracy 95.83% has been obtained for the classification we have done in our field of study.As a result, classification detection in GIS environment is easy and accurate for users.

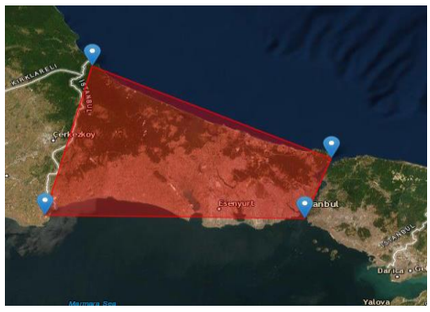
INTRODUCTION

In this project, remote sensing techniques were used to obtain and analyze and classify information about the Earth and its objects through measuring instruments placed on platforms in the atmosphere or space at a certain distance from the Earth. Remote sensing and classification studies are used in many areas such as determining the diversity of agricultural products, monitoring the phenological development of agricultural products, planned agricultural management, land cover and use detection. Remote sensing (RS) provides data to the Geographic Information System. GIS analyzes, queries and visualizes numerical data.

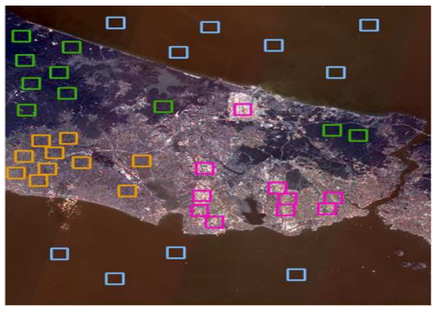
METHODOLOGY



Sentinel-2a images from USGS have been moved to ArcGIS software. While taking these images, it was paid attention to be cloudless and noiseless.



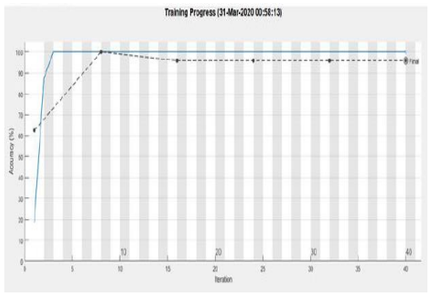
As a result of the studies, data were obtained in the categories of water, building, forest and agricultural area in the working area, each of which was 10 pieces. Thus, the accuracy assessment of the classification results was carried out using 40 randomly selected checkpoints obtained by the field study. Class matrix of these points and corresponding control references and error matrices are created. This data set has been trained in the recently popular deep learning method, and this trained data has been passed through an accuracy filter.



RESULTS

The Sentinel-2A satellite was used in this study. Sentinel-2 is a next-generation satellite with visible bands with a temporal resolution of 5 days and a spatial resolution of Near-Infrared to 10m. To get a better accuracy rate, images with 10m resolution and less than cloud ratio (less than 10%) were selected.

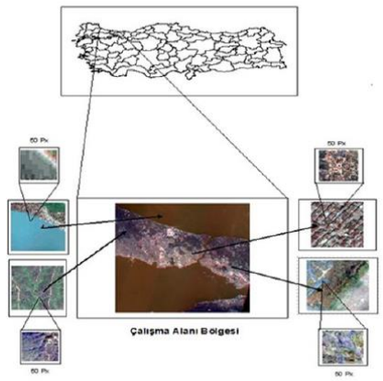
The main purpose of this article is to apply satellite image classification in urban areas. This study was developed using new generation Sentinel-2A images and deep learning techniques to reach land cover / use classes in the Istanbul European side test area, which is of great importance, especially with fertile farmland. As a result of our study we achieved our accuracy rate of 95.83 %



Results	
Validation accuracy:	95.83%
Training finished:	Reached final iteration
Training Time	
Start time:	31-Mar-2020 00:58:13
Elapsed time:	5 sec

CONCLUSION

Recommended data set for better accuracy, it consists of 10 classes covering 13 different spectral bands with a total of 1000 labeled and geo-referenced images. In general, the free Sentinel-2 satellite images available offer a wide range of possible applications. This study is the first important step to take advantage of the large number of available satellite data that allows tracking Earth's land surfaces on a large scale in deep learning. The proposed dataset can be used for multiple real-world Earth observation applications.



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