ACCURATE AGRICULTURE PRACTICES WITH THE HELP OF REMOTE DETECTION SYSTEMS AND PRACTICE POSSIBILITIES IN TURKEY

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Abstract: *Remote detection is the science of obtaining information about objects without directly touch. There are lots of satellites in the space – orbiting earth or turning simultaneously with the earth – installed by humans for various reasons.*

In this study, 3-4-5 band combinations of satellite images of Landsat 7 TM and Landsat 5 TM were used to determine cotton plant fenologically by spectral reflection values in research area. Ground control points of spectral reflection values for control were taken by Magellan 315 model with 5-15 m accuracy. With sampling method conducted at study area, educated-controlled classification analysis was made and color definitions were entered to determine the plant type to be defined. With this paper, it was put forward that by analyzing Remote Detection data, agricultural products can be analyzed and controlled much more quicker and ideally.

Key words: *Remote ,Detection, training, control ,classification*

INTRODUCTION

Today the effects of agricultural production inputs on the environment and the pressure on the reduction of costs are increasing more and more with the developing technology. This pressure increases against the physical and geographical alterability of the agricultural lands, variable soil, product and environment factors, the effects of inputs on the environment and the increase in costs. Delicate/sensitive agriculture aims to make it economic with efficient use of the inputs and in this way to reduce its effects on the environment. This can contribute to providing the equal product quality (Vatandaş And Others,2005). These objectives cause new practices to be used in agricultural activities. One of these is the remote sensing methods.

Remote Sensing covers all the record processing, analyzing, definition, interpretation, and in the end, producing information with the aim of getting useful information from the data gained by remote sensing systems. Remote sensing techniques developed with this purpose enable to determine many changes occurring in nature in time, in a quick and proper way. It is mostly used in subjects such as changes in land usage, flora, determining the plantation area and vintage estimation, meadow, forest, erosion, soil, mining, and geology. Remote Sensing used in these areas help determining and mapping the present potential very much. Sometimes the researches made only by remote sensing techniques are not adequate. These data should also be supported by other earth data.

In this study, a sample application for preparing satellite data is explained within the framework of The Southeastern Anatolia Project. This application is carried out with trained-controlled classification method.

APPLICATION OF TRAINED-CONTROLLED CLASSIFICATION METHOD

Trained Classification is an automatic classification method, but the user steps in forming education set which is the preliminary stage of the classification. Trained Classification composes the statistical base which is necessary for classification by using the advance information given about the land and land use of the area for study and it establishes the classification on this base. Before the automatic classification is started, land study is conducted in the study area in the proper time. Sample pixels are gathered for each land over the image by using the determined values. This set composed of pixel groups is called “Education Set”.

Trained Classification process finds out the statistical features of classes by analyzing the pixel values gathered for each class. And then, by using this sample features it classifies the whole image. Determining the thematic classes is the first thing to do in Trained Classification. To how many thematic classes the land which will be classified will be set apart and what these classes are should be exactly determined (Figure 1).

Fıgure 1. Application of Trained-Controlled Classification

After determining to how many thematic classes the land will be set apart and what these classes are the sample pixel sets should be gathered by a land study or with the help of a map or a source which we are sure to be true. The sample pixels used in composing the education set are constituted by gathering manually from the homogenous areas representing that class best for each thematic class. The statistic data (mean average, standard deviation, covariation matrix etc.) necessary for classification is firstly composed for this sample sets. Then, all the pixels in the image is analyzed statistically. And each pixel is assigned to the class representing the education set which shows the most similar statistical features to itself.

Such a classification is called classic or hard classification, because each pixel must merge in one of the defined classes. However, for example, assuming that the size of a pixel is 30x30 meter in Landsat TM data, more than one class can be in this area.

Fuzzy classification logic used in image classification can overcome this problem by calculating the probability of a pixel to be in other classes. But the images are usually classified by using classical classification methods and the probability of pixels to be in other classes is ignored, thus the classes similar to each other in reality and which differ from each other by soft transitions is strictly set apart. Benefiting from ancillary data in trained classification is another technique which increases the sensitivity of classification result. By analyzing the ancillary data (land use, topographical map, slope and aspect analyses) before classification in classification process and after classifying the result of the automatic classification can be changed. In order to attain a successful thematic data the classes should be determined and each education set concerning each class should be carefully composed. For this, firstly a Classification Scheme should be composed. Classification Scheme should be composed before trained classification starts. It is wrong to start the applications about the classification process before this stage is correctly and exactly completed; otherwise it may be needed to go back at any stage of classification process and to complete the missing parts about classification scheme. On table 1 the education set data gathered by GPS device at land.

TABLE 1. Education Set Data Gathered by GPD Device

Point number	Right values	Upper values	Classification
1	487551,841	4103830,603	*Cotton*
2	487838,121	4103944,602	*Cotton*
3	489631,957	4100379,386	*Cotton*
4	490133,594	4098717,794	*Cotton*
5	490964,624	4096697,691	*Cotton*
6	491236,982	4095677,220	*Trefoil*
7	491236,982	4095677,220	*Maize*
8	491625,344	4090408,191	*Empty*
9	491968,894	4090507,767	*Cotton*
10	494400,203	4097450,080	*Cotton*
11	495022,877	4097656,509	*Empty*
12	495638,411	4097812,846	*Soybean*
13	496297,002	4097654,150	*Empty*
14	497460,459	4107147,895	*Cotton*
15	497607,228	4096756,970	*Cotton*
16	497710,378	4108907,587	*Maize*
17	498424,309	4093677,504	*Cotton*
18	498537,918	4096325,764	*Cotton*
19	498617,805	4092977,412	*Center of population*
20	498825,730	4092030,413	*Cotton*
21	499038,948	4096410,733	*Empty*
22	503272,148	4108897,287	*Fruit garden*

The data on the above table for Kütlü Cotton Premium in Sanlıurfa province in determination of cotton plantation areas with CBS and UA on parcel border based with the aim of realization of trained classification method for use in composing education set with GPS device having sensitivity of 5-15 meter taken from the points whose coordinates were taken. These measurement values were determined as to to be at least 100meters inside in every side of the borders of the residential areas, cotton planted, maize planted areas, etc. where they represent. Furthermore, statistical information such as maximum similarity, average vector, standard deviation, covariation are used. It is determined that how much the spectral model any pixel composes after all the bands are evaluated resembles to the spectral models of education classes.

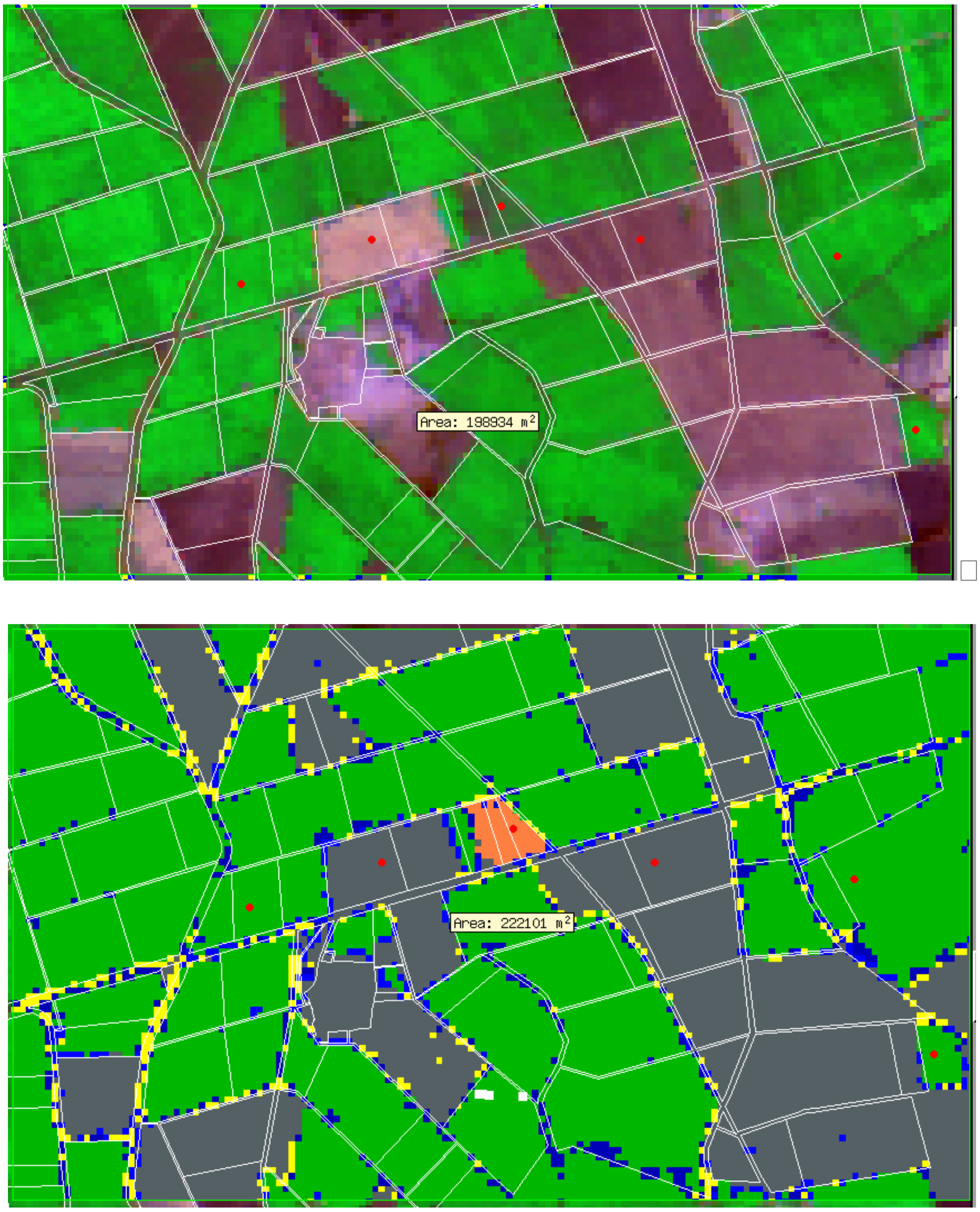

Figure 2 Vector data, coordinated satellite image and classified satellite image

Resemblance is usually expressed in percent. Pixel is assigned to the class of the spectral model that shows most resemblance (Anonomous,2003) In Figure 2 satellite image which is gained by trained classification classified Landsat 5 is seen.

In this study the satellite image of Akçamescit village is obtained by comparing the coordinated satellite image with the vectors prepared for Akçamescit village which is chosen as application area.

RESULT

After gaining the reflection values assessed according to reflection values by satellite images and comparing these with earth information it was seen that Trained

Classification method can be successfully applied in determination of cotton plantation areas with CBS and UA.

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