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STUDY CHANGE DETECTION BY USING NDVI FOR LAND COVER AND LAND USE FOR AL HIMREEN AREA

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Abstract:
Change detection method is one of the important subject of remote sensing. Which is sufficient to determine the changes for period of time to land cover and land use. In this paper used NDVI for change detection to Al Himreen area by using satellite images for land sat-7 ETM+ for 2000 and 2006 . After observation the results of standard deviation for four band to first time was 47.82. The standard deviation for same band in second time was 45.28 , so its lower about 0.02%.The standard deviation for five band to first time was 84.73 .This value low in second time at 49.13. Its lower about 0.3%. When using NDVI for these bands and calculate standard deviation was 61.14and 49.80 for first and second times respectively. The standard deviation is low about 0.11% . This method was successfully for changes detection for lands cover and lands use.

Keywords: Change detection , NDVI, land cover, land use , standard deviation

INTRODUCTION

The Changes Detection methods used for the analysis Satellite images which founded on ((NDVI) Normalized Difference Vegetation Index). The Remote Sensed of Multi-Spectral data techniques employed for discovery index of Vegetations, classification of lands cover, , water forms, open zones, scrub zones, hills zones, agricultures zone, thin and thick forest with the remote sensing data. Cover of land interpreted by calculating their Normalized Differences Vegetation Index for its classifications. Remote Sensed data from satellite images with (NDVI) and layers data used to make multi-spectral classifications. The method of Change Detection used NDVI differences can be supportive in calculating the natural features to provide support, loss assessment and device new security strategies[1].

A techniques are offered to discover lands change for multi-temporal remote sensed data set . Change detection distinguished areas on digital images that describe change features between two or more images times. Image difference is one method subtraction pixel values of image recording at first time from pixels values to second date[2]. Change detection is a technology determining changes for the precise features in time Break. Remote sensing used image to detect changes in lands used and lands covert are very prefer above other conventional survey technique because it is very efficient to assess the changes or lowering tendencies of regions[3]. Coasts are unique environments on "atmosphere, hydrosphere and lithosphere" contact other. The Coast is very important linear features on the surface of earth displayed the dynamic nature. Coastal region and its environment organization requires information by the coastlines and their changes. The change detection methods of coastlines used satellite images. Created the advantages to these methods with the new practice advanced. The proposed process created on the mixture to "histogram thresholding" and "band ratio" procedures[4]. The change detection measured of dissimilar data frame and "thematic information" can direct to more real visions in to procedure include lands covert and lands use variations. The positions and their distribution of lands covers changes are important to establish links between "policy judgments, regulatory actions and subsequent lands use events". Change detection process helps to determine the changes of land use and lands covers properties with references to information of "geo-registered multi-temporal remote sensed". It is assist to identify changes amid two times which is uncharacterized of neutral variations. When an image to an image registration "normalized difference vegetation index (NDVI)", "the enhancement vegetation index (EVI)" and "the soil-adjusted vegetation index (SAVI)" values derivative from "Landsat ETM+" datasets and the images difference algorithm applied to detect variations. The application of use "multi-temporal Landsat ETM+" images and "multi-spectral MODIS Terra EVI/NDVI time-series" the vegetation phenology metrics[5]. "NDVI" is calculate on per pixels passes to the normalized differences between the "RED" and the "NEAR INFRARED" bands from images [6].

NDVI= NER- RED/NER+RED (1)

(NER): near infrared bands value ,(RED): red band value for the cell "NDVI" difference images tracked the changes in the amount to particular period relative of biomass to the historical averages or past year. The technique highlight areas with comparative reduced or increased plant growth. The "NDVI" to difference image "$NDVI_d$" between two

times period calculated by subtracting the "NDVI" image of earlier time period "$NDVI_1$" from the time period of interest "$NDVI_2$":

$NDVI_d = NDVI_2 - NDVI_1$ (2)

Average of image is favored to monitor vegetation anomaly because these images normalized annual variations in plant growth.[7]. Techniques with the "multi-temporal and multi-spectral" satellite sensors acquired data demonstrate potentials like means detect, identify maps and variations irrespective of reason agents. The Digital changes detection at three angles, First one the dissimilar perspective of the variations at ecosystem and changes events with summarized. A Change detection amid the pairs of images "bi-temporal" and amid the time profile of images derived indicator "temporal trajectories", where applicable selections for digital images gaining times and changes intermission length definitions are discussed. The Second one, preprocessing routine either to find added direct linkages amid remote sensed data and the "biophysical phenomena", or to "temporal mosaic" images and cutting profile of time reviewed. Third is real variation detection methods themselves classified in analytic frame and estimated[8].

The sensed data for mapping of urban used is at highly demand with available of "very high resolution (VHR)" satellite data like "Worldview, and Pleiades". Its remote sensing data used for "urban vegetation mapping" too. "The Normalized Difference Vegetation Index (NDVI)" employed data of "VHR" to discovery the "Vegetation Index" for recognize process on land cover and no-land cover class. Land used class are calculating with their "Normalized Difference Vegetation Index" for Lands used and lands covert classifications.

Classification phase Likelihood conducted. "NDVI" extracted from images to assist process of classifications. "NDVI" method used to refer for features like vegetation at different "NDVI" thresholds value. Three classes for lands cover are contain of lowly vegetation, highly vegetation and non-vegetation area. The information is able to aid planning conservation of vegetation in land used areas[9].

The positions and the distributions of lands covert variations are significant to establish connections amid policy decisions and subsequent land-used actions. Ancient researches incorporated two period changes detection used "Landsat data" to the performance limited for application in "biological complex system". The automated protocol for first filter "MODIS", "NDVI" data to eliminate lowly data then estimation the lost data using a separate "Fourier transformation technique" to offer highly quality dataset for supporting the change detection analysis. Added limitations recognized to rough resolution of "NDVI" data included estimation changes areas might submission of change region correction factors[10]. The change detection created on object classification approach remotely sensed data introduce. The method classified are not only pixel but collections of the pixels represent existing objects in "GIS" database. The "multi spectral" bands collected by objects and different measure which can resulting from "multi spectral" bands represented the "n-dimensional" features space for the classifications. The drill areas derived automatically from the "geographical information system, GIS" database. Dissimilar input channels for the classification definite and discuss [11].

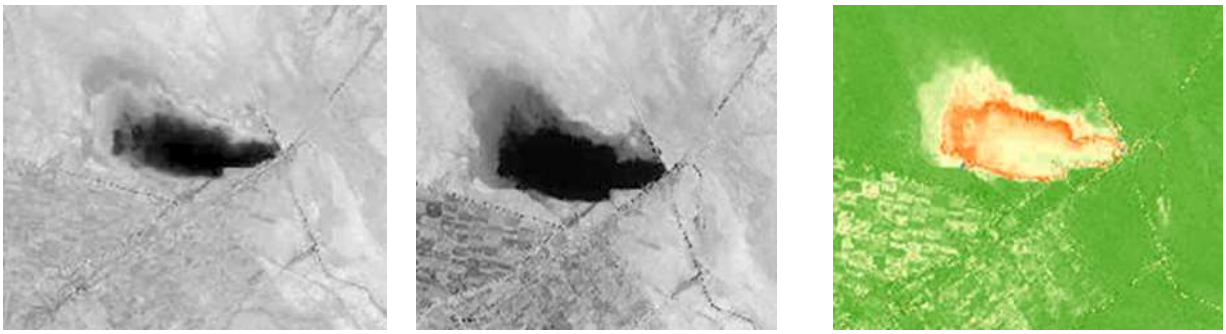
A Change detection is a process of detect different with object or a phenomena observed in the different time periods . These approaches provided dissimilar results in term of lands covert area and determined the supervised classifications provided the precise results with images of the middle spatial resolutions[12].

EXPERMINTAL WORK

Hemrean hills and theirs lake represents the studied area in this research located at the east of Iraq,The source of studied area images is landsat-7ETM+ for image 2000 and landsat-7 ETM+ for image 2006 with spatial resolution 30m for multispectral bands respectively. Change detection method by using NDVI application for two satellite images at different times for (band 4 and band 5) by using Arc GIS program.

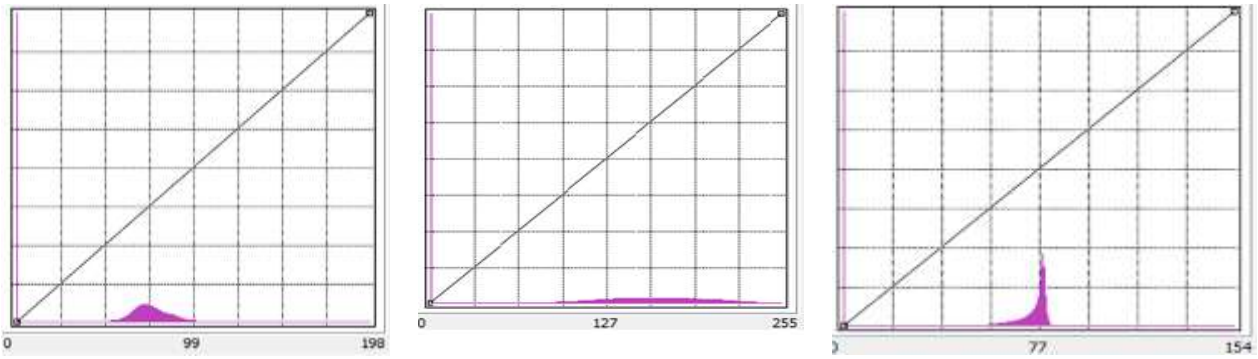
RESULT AND DISCUSSION

The results gets As illustrated in figures (1) and (3) with their histograms as illustrated in figures (2)and (4) ,as well as, calculated standard deviation ,min ,max and mean as illustrated in tables (1) and(2). Finely figure(5) shows the results of change detection.



Band 4(image2000) Band 5(image 2000) NDVI (image 2000)

FIGURE 1. Show band 4 , band 5and their NDVI for the first time

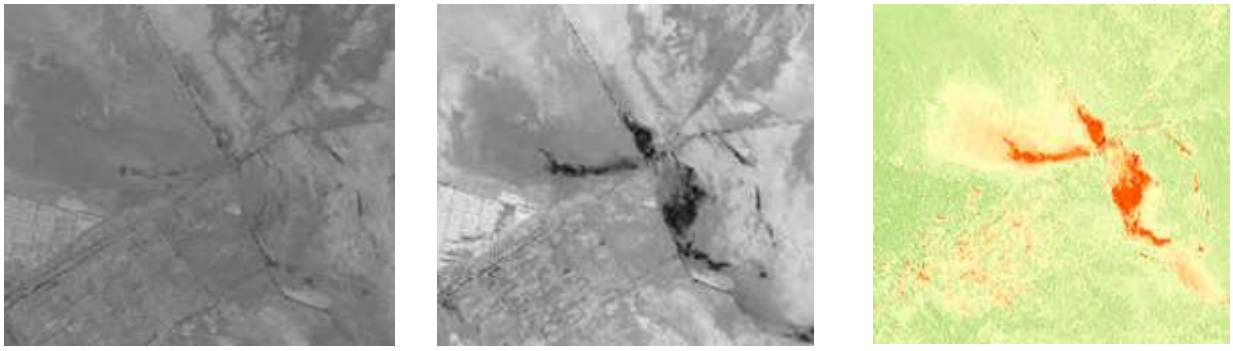


(a) (b) (c)

FIGURE 2. Show(a) histogram band 4 , (b)histogram band 5and (c) histogram their NDVI for first time

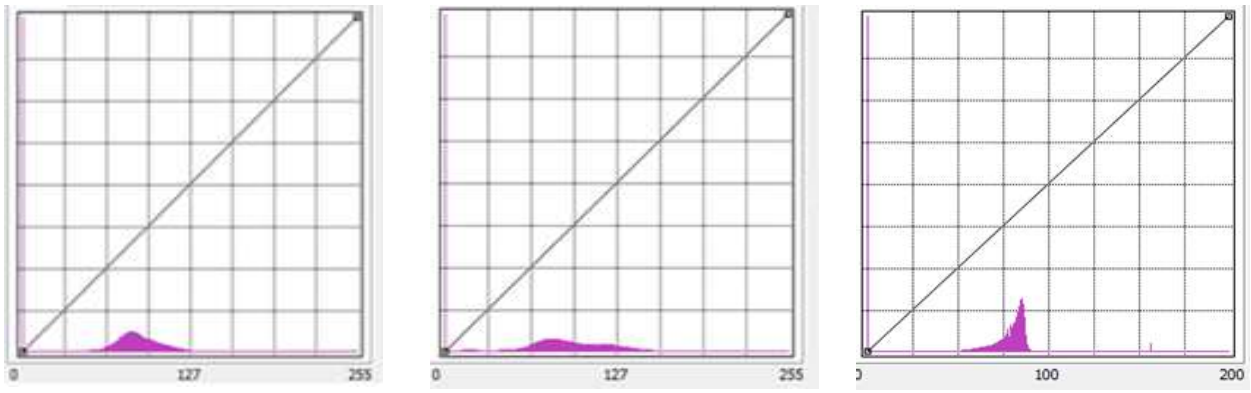
TABLE 1.show standard deviation ,min ,max and mean for first time

	Min	Max	Mean	Std deviation
Band 4(image2000)	0.00	198	59.03	47.82
Band 5(image2000)	0.00	255	100.42	84.73
NDVI(image2000)	0.00	154	76	61.14



Band 4(image2006) Band 5(image 2006) NDVI (image 2006)

FIGURE 3. Show band 4 , band 5and their NDVI for the second time



(a) (b) (c)

FIGURE 4. Show(a) histogram band 4 , (b)histogram band 5and (c) histogram their NDVI for the second time

TABLE 2. show standard deviation ,min ,max and mean for second time

	Min	Max	Mean	Std deviation
Band 4(image2006)	0.00	255	59.01	45.28
Band 5(image2006)	0.00	255	61.83	49.13
NDVI(image2006)	0.00	200	68.04	49.80

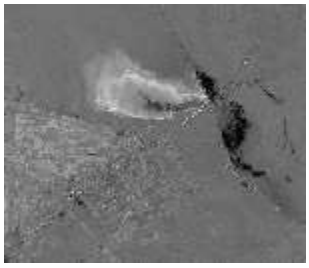


Fig (5)the result of difference "NDVI" images

CONCLUSIONS

After the observation the results of standard deviation to four band for the first time was 47.82. The standard deviation for same band in second time was 45.28, so its lower about 0.02%. The standard deviation for five band for the first time was 84.73. This value low in second time at 49.13.
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REFERENCES

1. Meera Gandhi.G,. et al., "Ndvi: Vegetation change detection using remote sensing and gis – A case study of Vellore District"., 3rd International Conference on Recent Trends in Computing, Elsevier B.V.2015.
2. Daniel J,. Hayes and Steven A,. Sader,. "Comparison of ChangeDetection Techniques for
3. Monitoring Tropical Forest Clearing and Vegetation Regrowth in a Time Series"., American society for photogrammetry and remote sensing,2001.
4. Israa Jameel Muhsin,. "Change detection of remotely sensed image using NDVI subtractive and classification methods"., Iraqi Journal of Physics,. 2016 .
5. A., Alesheikh, A., Ghorbanali, N,. Nouri., "Coastline change detection using remote sensing"., Int. J. ,Environ,. Sci. Tech., 4 (1): ,61-66, 2007.
6. Farooq Ahmad ,. "Detection of change in vegetation cover using multi-spectral and multi-temporal information for District Sargodha, .Pakistan", Scientific Information System Network of Scientific Journals from Latin America., the Caribbean,. Spain and Portugal,.2012.
7. Zuzana Maskova, Frantisek Zemek, Jan Kvet., Borel En.viroment Research 13, (2008) 417-432.
8. Dorit Gross "Monitoring Agricultural Biomass Using NDVI Time Series", Food and Agriculture Organization of the United Nations (FAO) Rome, (2005).
9. P. COPPIN ,et al ,,"Review Article Digital change detection methods in ecosystem monitoring: a review", .International Journal of Remote Sensing, .2004.
10. Haslina Hashim ,et al,. "Urban Vegetation Classification With Ndvi Threshold Value Method With Very High Resolution (Vhr) Pleiades Imagery". , The International Archives of the Photogrammetry,. Remote Sensing and Spatial Information Sciences,. , 2019 .
11. Ross S. Lunetta, et al. , "Land-Cover Change Detection Using Multi-Temporal MODIS NDVI Data", Remote Sensing of Environment,.,USA,2006.
12. Volker Walter, ."Object-based classification of remote sensing data for change detection" , ISPRS ,Journal of Photogrammetry & Remote Sensing 58. ,2004.
13. Dušan Jovanović, ..et al, "Land Cover change detection by using Remote Sensing – A Case Study of Zlatibor (Serbia)", .Geographica Pannonica , .2015.