Comparison of Satellite Images

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Abstract— This paper deals with the research in the comparison of satellite images. Our world is developing day by day, every thing in this world changing continuously. If we observe a specific area or region of our world, then we can easily find the change on that area. Karachi is the fast growing and developing, by image processing, we are observing the change in population, built up areas and vegetation. We find these changes in Karachi by images of lansat 7 satellite, we have the data of landsat 7 imageries of 1990 and 2000. We are comparing this data after image processing. For processing the image we have the ERDAS IMAGINE 9.1 software and we are using supervise classification technique basically. We can forecast future trends of the city expansion in terms of population, built up areas and vegetation.

Index Terms— Lansat 7 satellite images, ERDAS IMAGINE 9.1, Future space, Unsupervised classification.

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INTRODUCTION

THIS millennium will be the most urbanized millennium of the World. Today, almost 50% of the world's populations are urban. The urban population currently estimated is about 3.4 billion people, is expected to double by 2020. Perhaps more significantly, it be predicted that 93% of this increase will be associated with the third world cities. If this is the case, approximately two billion people will be added to these already congested urban areas during the lifetime of just a single generation. In this context, a recent report by the World Bank about developing countries which is declaring urbanization as one of the most explosive problems of this century [1].

Urban growth and also developing areas are difficult to monitor, yet essential for the implementation of effective planning strategies. This is even more difficult in developing countries, with limited monitoring resources. One way that urban growth manifests itself is in the spatial expansion of built-up areas. There are a number of different approaches to the problem of identifying and measuring the extent of new developments. Aerial photographs and ground surveys have traditionally been used to obtain the information that is needed to update existing maps [2-4]. However, particularly in Pakistan and in developing countries in general, these data sets are of inconsistent quality, are often outdated and, in many cases, their availability cease to exist. When they do exist, the acquisition has been time consuming, bureaucratic and expensive. Remote sensing data products are helpful for detecting and monitoring urban area to study urban growth because its repetitive coverage [5].

STUDY AREA

Karachi is the capital city of the province of Sindh and the largest city of Pakistan, one of the world's largest cities in terms of population. The Karachi division occupies an area of 3527. Km^2 and 9,856,318 persons population [6]. The average annual growth rate of being 3.52 percent. The population density is 2794.53 persons per square kilometer, highest in Pakistan. In 2005 the total population of Karachi was about 15119,000 and in 2012 the total population of Karachi is 21,200,000 [7, 8]. The total urban population of the city jumped from 1,068,459 in 1951 to 14,500,000 in 2007 which means that since last fifty seven years Karachi urban population is continually on the increase. It is situated about 129 km due west of present Indus mouths. The area extends between the latitude 24º-45'North and 25º-38'North and longitude 66º-40' and 67ºEast -34' East (Figure 1).
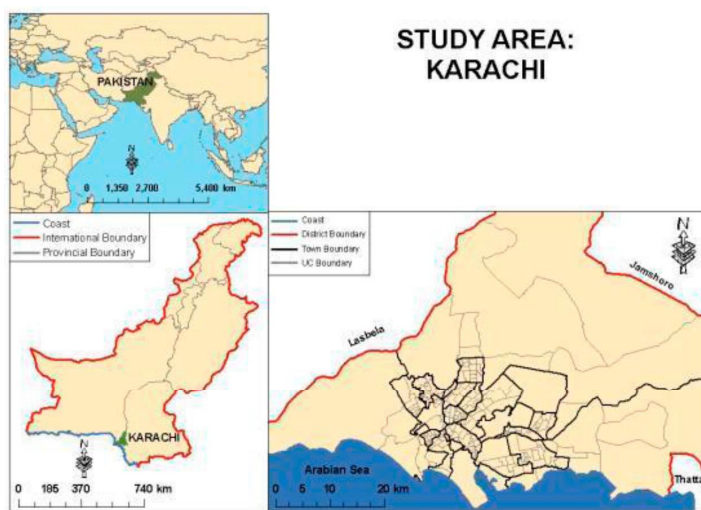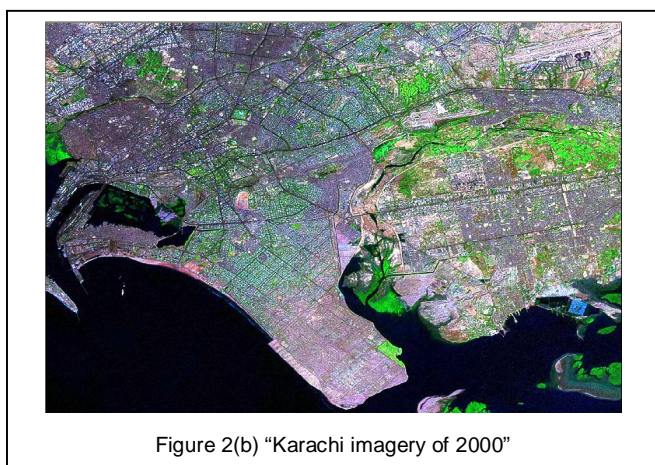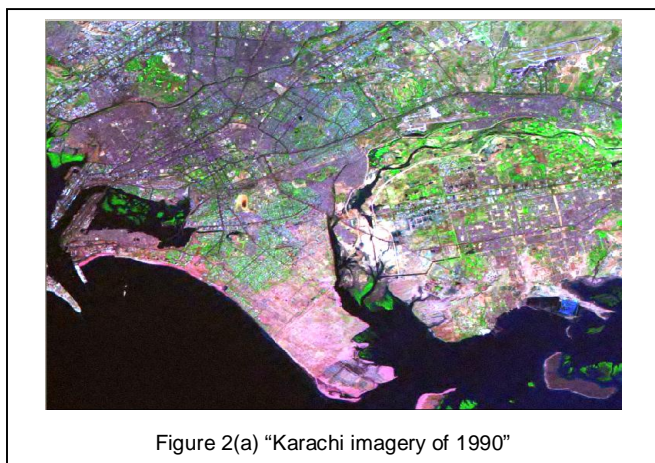

Figure 1

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It is bounded on the northeast and southeast by districts of Jamshoro and Thatta respectively and in the south and south-west by the Arabian Sea and in the North West by the Lasbela district of Balochistan province. It is located on the northern coast of North Arabian Sea, which gives its climate the marine touch. Physiographically it is located within the Kohistan Subdivision of the western highland Division. Geometrically Manora conglomerates have provided it a location of the sheltered harbor to serve the fertile hinterland and its most favorable geographical situation as a center of three great continents, Europe, Africa and Asia [1, 9].

SATELLITE IMAGES

In Karachi images, we notice that the areas are showing Figure 2 (a) and (b) are changing during 1990 and 2000. Figure 2 (a) and (b) is showing the raw images of the landsat 7.

Figure 2(a) "Karachi imagery of 1990"

Figure 2(b) "Karachi imagery of 2000"

HISTOGRAMES

The histogram is showing the more information of the landsat 7 images of different areas of the Karachi. Figure 3 (a) and (b) is showing the histograms of the raw images of the landsat 7.

Figure 3(a) "Histogram of image of 1990"

Figure 3(b). "Histogram of image of 2000"
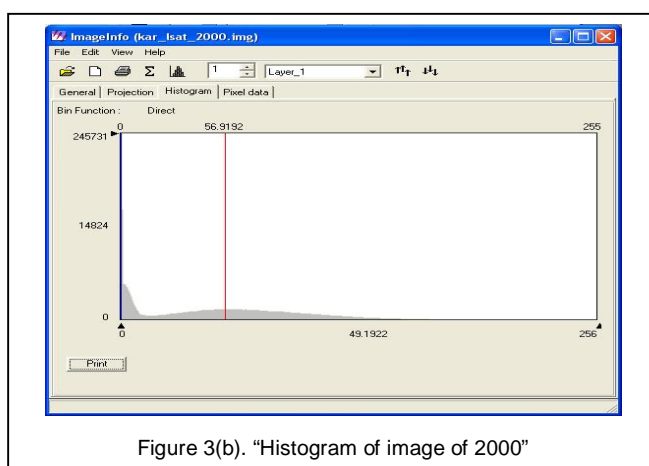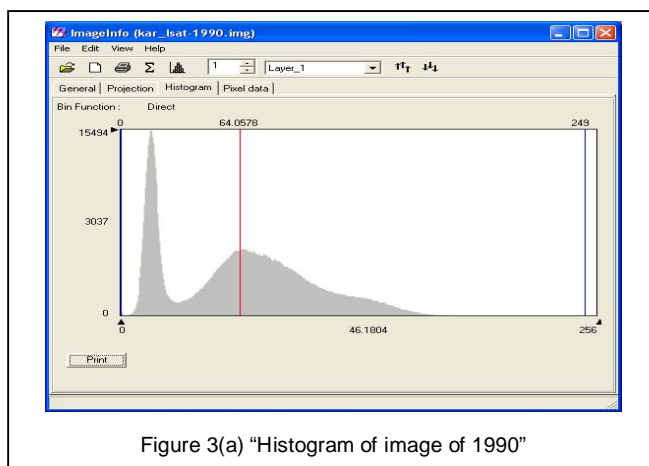
IMAGE PROCESSING TECHNIQUE

Classification is the process of sorting individual image into similar categories or clusters. There are a number of steps in the classification starting from the raw data image (1990 and 2000) and ending into classes such as a map of surface cover types (i.e. water, open lands, mangroves, residential area, malir estuary, sedimentation pattern etc). The goal there the capability of the data that we have to work with, the level of our map depends on need, and the amount of work we are willing to put forth.

To become familiar with the structure of our Karachi data set. We have looked at the basic statistic that makes up the individual bands of our imagery including the combination of two bands through indices to analyze our imagery in multispectral mode (2 or more bands at a time).

FEATURE SPACES

Now we explore further, the multispectral nature of our imagery by mapping out the feature space. A feature space plot allows you to determine the spectral location of surface feature within our image. In some ways this is similar to the signature plots that we made earlier. However, it differs in that we examine the association between two bands in a scatter plot and

locate within that scatter plot, the spectral location of various features (agric, trees, water etc). Examine the feature spaces importance because it allows us to make quantitative comparisons between cover types on the ground. This process is the exploratory phase of classification.
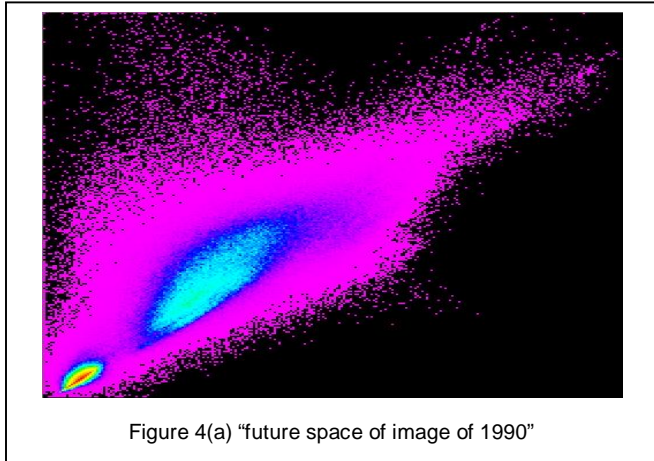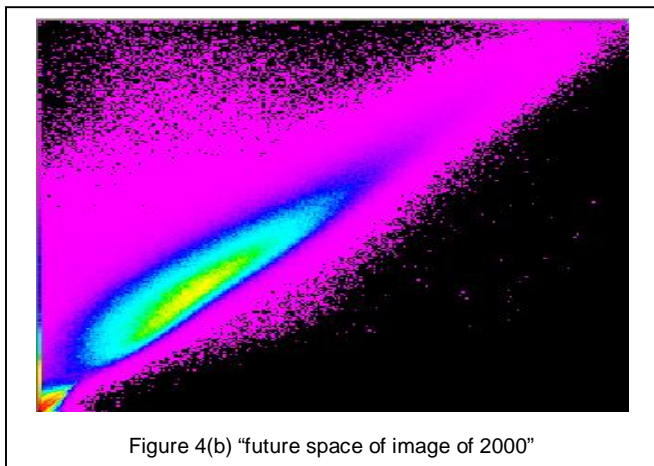

Figure 4(a) "future space of image of 1990"

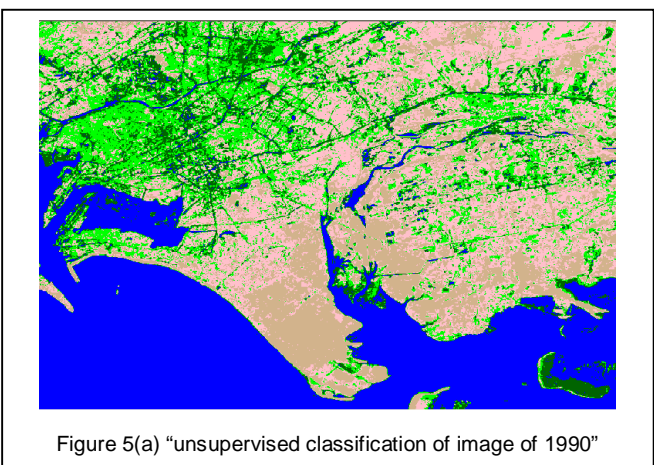Figure 4(b) "future space of image of 2000"

RESULTS

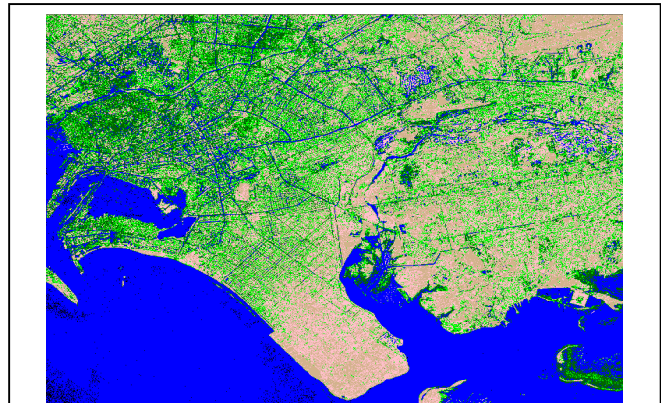Figure 5(a) "unsupervised classification of image of 1990"

Figure 5(b) "unsupervised classification of image of 2000"

CONCLUSION

From the above image processing techniques, we can easily observe by comparing in the images of the land set 7 1990 and 2000 that the population and vegetations are increasing, similarly this area is also developing clearly.

ACKNOWLEDGMENT

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