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8. Use of GIS and Remote Sensing in Human Geography: A Special Reference to Urban Study

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Abstract

Human geography is the branch of geography, which studies, how and why people organize themselves across world and interact with their environment. GIS was developed in the late 1960s and it is used to study in various branches of human geography. The present paper is focused on application of GIS and RS in urban land use and to help to work on urban land use classification and its classification problem. The rate of urbanization is very high in developing countries and resent industrial era due to this is a very dynamic branch using GIS study. In urban transportation, one of the challenges is the road construction, maintenance and traffic management. The GIS is one of the major new branches of network study, which is helpful to manage these entire things, using vector data produced from raster data. In urban areas, the major problem is its huge population, which causes different issues such as collection and disposal management of solid waste. This paper also discusses scope for using GIS for Solid waste management and urban study.

Key Wards: - Remote sensing, GIS, Land-use, Road, Solid waste

Introduction

Human geography is the branch of geography, which is concerned with how and why people organize themselves across world and interact with their environments. Remote Sensing and Geographic Information Systems (GIS) applications in social science are becoming more and more frequently used throughout the world, in understanding several sub-fields of field of human Geography like Economic Geography, Population Geography, and all its branches. GIS is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. There is a wide agreement among researchers and professionals that, the use of geographic formation systems and remote sensing methodologies can contribute significantly,

to a better understanding of human interactions with problem and planning. The typical uses or norms of GIS applications in Human geography are mapping to show where things are, mapping quantities, mapping densities, finding what is inside, finding what is nearby, and mapping changes. Urbanization is an index of transformation from traditional rural economies to modern industrial one and it is continues processes. These processes have negative impact on urban Planning. It involves analyzing and predicting the urban development. In the developing countries, in spite of the increase in the number of cities and the urban population, quality of urban life is sub-standardized. Smart planning is required for better urban life where GIS and RS techniques plays crucial role in urban development planning. Urban development is indicter of socio-economic development of region. GIS is one of the best recent fields which studies, the development of an area with the help of remote sensing data. Use of various GIS Software, geospatial techniques, land cover (urban area identification), network analysis (Transport and pipe line) and solid waste management is increased day by day urban planning.

Application in Urban Land Use

The land use is the concept, which means optimal use of land by human in urban area. We can achieve this by using GIS. Using different data of remote sensing like multi-temporal satellite imagery occupied by satellite IRS series, LANDSAT series etc, spatio-temporal change were analyze using different computer best image processing software like ERDAS Imagine, Q-GIS,SAGA etc., we can study and plan urban land use.

Image classification of land use is a complicated task of extracting information from raster multiband image with the help image resolutions these are temporal resolution, radiometric resolution, spectral resolution and spatial resolution. Resulting raster image is use for classification can create thematic maps. The first task is to identify the futures using satellite image, interpretation, elements for urban area identification these are following

Size, – The size of objects can be important in description of objects and features (Settlement, industries, cars, trucks, trees, etc.). The use of size as a diagnostic characteristic both the relative and absolute sizes of objects can be important. Size can also be used in judging the significance of objects and features size of building indicate the settlement and industry size of road, gives an idea of the types of road.

Tone or Colour Different surfaces objects reflect different amounts of radiant energy. These differences are recorded as colour variations on the imagery. False colour imagery

increases the interpretability by providing a subtle tonal contrast between them. Tonal contrast can be enhanced or reduced either optically or by enhancement techniques using computers.

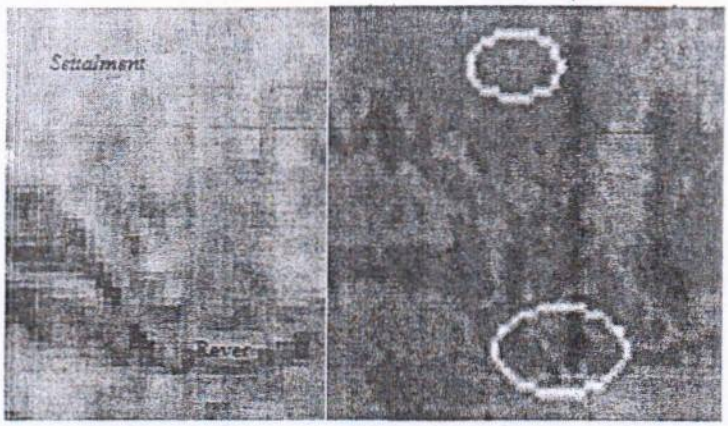
Pattern It refers to the spatial arrangements of surface features, (settlement) which are characteristics of both natural and man-made objects. Using this, we can differentiate built-up area.

Texture It is defined as a repetition of a basic pattern. Texture in the image is due to tonal Repetitions in a group of objects, which are often too small to be discernible. It creates visual impression of surface roughness or smoothness of object and is a useful photo element in image Interpretation

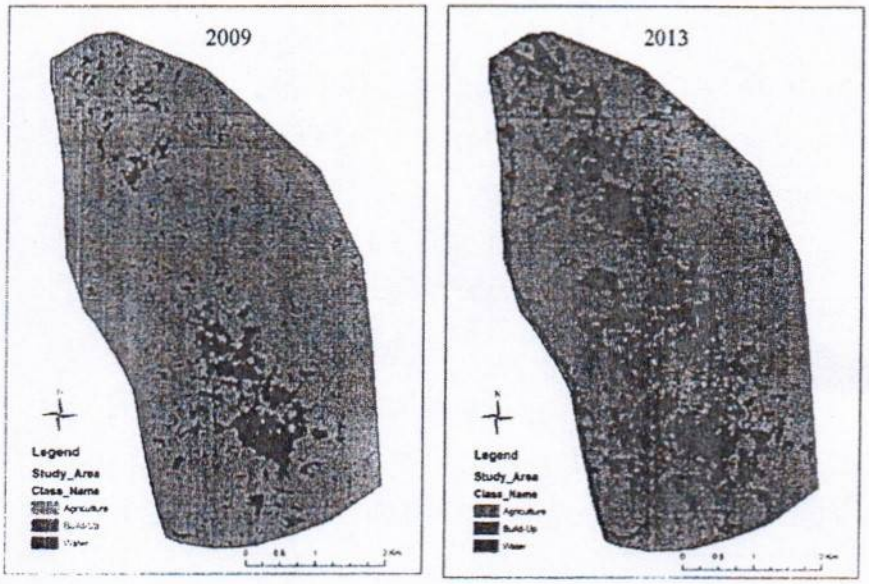
Shape It refers to the physical form of an object and is also a function scale of the image Size and shape is interrelated. In the image, shape refers to plan or top view of the object.

After identification of feature, it is turn to the image classification. It is depending on the analyst and the computer software during the classification. There are two methods for image classification unsupervised, which is involving algorithms that examine the unknown pixel in an image and aggregate them into a number of class best natural groups. The second classifier is a supervised classification, which is highly used in the field of urban and agriculture study. These are used when data is known or identified by the analyst. In this classification method, the image by simply known identity to classify pixels of unknown identity, in this classification process A) the training stage B) feature selection C) selection classification algorithm D) Post classification algorithm C) accuracy assessment.

In urban area GIS use for identification of an urban sprawl. This is worldwide phenomenon but the rate of urbanization is very fast in developing country. To detect the task of urban sprawl in GIS, the first steps is to delineation of urban area and its features and pattern of magnitude and direction of changing sprawl pattern and its effect on land use. The identification of change detection of urban area is also use of GIS using above task (ex. Map1.shows the change detection of Sangamner city surrounding area.) but it's very difficult task for analysis such kind of operation to classified the image processing. The main challenges are to identification of feature for building spectral signatures file editing. The signature file is use for classification in output, the most of the classify futures are merge into each other (ex.pictur1)



(Picture1 RGB Image and same classify image)



(Map1. Land use land cover of Sangamner city and sounding area change detection)

Application in Road Network Analysis

Road network infrastructure constitutes major part of urban transportation system. GIS based Network Analyst is a powerful extension that provides network-based spatial analysis including vehicle routing problem analysis, travel directions, closest facility, and service area analysis. This study will investigate the subject of network analysis in both raster and vector GIS, in order to compare the two spatial models. Therefore network provides the movement of people and goods, the delivery of services the flow of services as well as communication of information. Transport accessibility is an important driver of urban growth; using GIS data were best planning in the field of urban study. This application of road network analysis is done using GIS. **Data preparation and network analysis** Road Network analyses can answer a range of

questions related to linear networks. Road map was prepare by encoding the study area from the GIS environment using GIS software like Arc-gis, Q-gis shape file using study area, base map as well as it is also possible to built the road network from Google earth software. At the preparation of road digitization we need to considered the attributes and implemented in the geodatabase of same linear data. In India **Road Class Type** is the main attribute of road network in this type, the road network like single, double etc. Type of lane is also the sub function of road class. **Name of Road:** In this attribute we need to give the road name of road number for easy identification. **Condition of Road:** this is third most important attribute to identify the metal or unmetal road. We can also use the traffic flow attribute. Using this data we apply number of application for road network **least cost and short Route Analysis:** The Least cost and Short route analysis highlight shortest connection between two pleases based on travel distance road condition road type with the help of traffic flow conditions available on the route network at a particular day with time. The network analyst is makes it is easy to show the short and Least cost rote analysis layers, this is depend on the travel time, travel distance, type of vehicle, road condition, and the date and time. These all will be used as an factor for identification of Least and short route analysis, the starting time of traveling which produce different results based on the day condition, the restrictions on the analysis, such as the road directions and condition. The ability to ignore invalid network locations may cause the analysis to fail. After adjusting the best route analysis settings, we choose the start location and the end location, and then using the best route solver tool to generate the best route between these two locations.

Road Accident In urban area, a major problem of road network is the road accident because of the poor management of traffic flow. It is possible to develop a GIS database to store urban traffic accident data in digital format, with the help of above spatial data attribute. For that, we need to use macro data, namely statistic traffic accident data on road to analyze reasons of the accident in terms of driver, pedestrian, vehicle road condition and traffic management. Using this analysis, we reduce accident parentage, traffic rush and the travel time of people.

Service Area Management In urban area, there are emergency services, the first is ambulance service and second is fire service. These are main services that collapse due to miss or poor management of traffic flow. With the help of GIS using above spatial attributes, we also manage this services using network analysis and also using buffer analysis for new stations of service area management.

Application in Solid Waste Management

Solid waste management is the most important application in GIS. In recent time Solid waste is a major issue facing in increasing urbanization. Municipal solid waste management is one of the major problems faced by city. There are main two issues faced by municipal planners that are collection of solid waste and its disposals. Due to increasing population in urban area Solid waste is generated in association with almost every activity of man depending upon the nature wastes that takes place in every house, apartment, commercial and individual facility as well as in the streets, parks, and even vacant areas. With the help of network analysis the collection of solid waste and its disposal is possible by collecting the primary and secondary solid waste from the city. The use of GIS and Aerial photography is in class by itself for planning landsite selection of solid waste disposals. In the case of solid waste disposal we need to rhythm a plane in this application, multi criteria planning techniques to find the suitable location for solid waste management. In this analysis we need various type of geographic data among which land use data is most important in these paper that is describe in first application is on this. For this land use we require multiband image like land-sat or LISS image. In second step involves the processing of the topographic data which are produce from toposheet. Recently the Digital Elevation data is also collected using Satellite like SRTM or CARTOSAT. These data are use for making Digital Elevation Model for identification of slope. Slope identification has considerable importance for the transport network data, water storage data, and soil data. We need layers of multi data map for multi criteria planning. All these criteria where specified to assume that dump site solid waste would be outside the buffer zone. According to location and size of city criteria where specified like almost equals to plane area which having low slope angle, 500m away from the main road, 500 meters away from water bodies, Located area not crossed by major roads., The site is not in areas of active agricultural land or near land under development, 20 kilometers away from the nearest population center. Using this criteria and multi layer of map data were followed by using the GIS platform. We overlay these entire layers with the help of this multi criteria analysis. As resulted we get the best location for solid waste disposals.

Conclusion

GIS is capable of extracting urban land use information with the help of Remote Sensing Satellite data. This can be observing by its capabilities, as well as multispectral capabilities. It is

a powerful tool for mapping and monitoring the land use changes in the urban core and in the peripheral land use planning? This will help to reduce unplanned urban sprawl and the associated loss of natural surrounding and biodiversity. In the road network planning, GIS is one of the outsmart tools for planning of road network to investigate Least cost and short Route identification. By deploying emergency services planning, we can reduce the cances of road accident, traffic rush and the travel time. The GIS simulation of urban activities to evaluate different urban development alternatives in the GIS framework needs to be explored for added advantage. Land use planning, transport planning, and solid waste collection and disposal planning these all can benefit for this information. Rapid development in city poses several challenges including problems associated with urbanization for urban managers and policy makers.

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