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Deforestation Factors Using Classification Techniques – a Survey

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ABSTRACT *Forests serve a number of ecological purposes including important roles in the water cycle, providing habitat for plant which are most useful in medicines. Deforestation is the conversion of forested areas to non-forest land use such as arable land, urban use, logged area or wasteland. It is a process leading to a temporary or permanent deterioration in the density or structure of vegetation cover or its species composition. Deforestation has been attributed to socio-demographic factors, such as population growth and the political economy of class structure, and specific exploitation activities like growth in population, commercial logging, construction of roads, forest farming, agriculture, fuel wood gathering and other factors. But it is most important to know the factors in destruction of forests like the amount and location, the rate and speed and the causes of deforestation.Data collection techniques for forest inventories range from selecting ground surveys to using topographic maps, remote sensing. The composition and viability of a forest may be determined using a combination of remote sensing images and geographical information system. Classification is a method in which it defines small areas, on the image which are representative of each desired land cover category. The main aim of this paper is to study deforestation factors using data mining techniques to analyze the effects on forests loss are direct or indirect.*

1. Introduction

Among demographic factors (61%), only in-migration of colonizing settlers into sparsely populated forest areas, with the consequence of increasing population density shows a notable influence on deforestation[6]. Policies that influence the rate of Conversion of forest to other land use, or encourage afforestation and reforestation of deforested lands have the potential to have a large impact on concentrations of atmospheric CO2 [9].Remote sensing is a very powerful tool in the provision of such information. It involves the acquisition of information about an object, area or phenomenon through the analysis of data acquired by a device that is not in contact with the object, phenomenon or area under investigation [13]. Through the analysis of remotely sensed data, we can analyze change detection and monitoring of forest destruction can be done. The knowledge acquired from this information forms a basis for decision making in efforts to address the deforestation menace[7]. Satellite remote sensing in conjunction with GIS has been widely applied and been recognized as a powerful and effective tool in detecting land use and land cover change [22]. Deforestation is the one of the key point in the negotiations under the climate convention.

1.1 Forest

A forest, also referred to as a wood or the woods, is an area with a high density of trees. About 30% of the global total land area is covered by forests.The forests fulfill many roles. They provide renewable raw materials and energy, maintain biological diversity, mitigate climate change, protect land and water resources, provide recreation facilities, improve air quality and help alleviate poverty. Forests are precious national resource which not only play significant role in national condor but help in pollution control and maintaining logical balance. These offer a number of direct indirect advantages which have been realizedin time immemorial.

Advantages

Forests provide valuable timber for domestic and commercial use.

- Industries like paper, matt making, plywood, sports goods and furniture at directly based on raw materials derived from forest.
- Forests supply a number of minor produce which are utilized in different industries and domestic uses. These include gum and resins, tannin material, medicines, herbs, honey, spices, etc.
- Forests offer employment to about 4 million people to earn their livelihood in forest based occupations, i.e., lumbering, sawing, furniture making, forest produce collecting, etc.
- Auction of forests for commercial use fetches annual income to state exchequer.
- Export of forest products earns valuable foreign exchange to the country.
- Grazing of cattle in the forests helps in dairy farming and cattle rising.
- Forests are the natural habitat for wild life and birds which attract tourists, holiday makers and hunters. These may be developed as very good picnic or tourist centers in the form of wild life sanctuaries and national parks which have good employment and income generating potential.

1.2 Deforestation:

Combating deforestation requires factual information on what is going on in our forests.Deforestation has been attributed to socio-demographic factors, such as population growth and the political economy of class structure, and specific exploitation activities like commercial logging.

The conversion of forested land to non-forested land as a direct result of humanactivities. Deforestation refers to a non-temporary change of land use from forest to other land use or to the depletion of forest crown cover to less than 10

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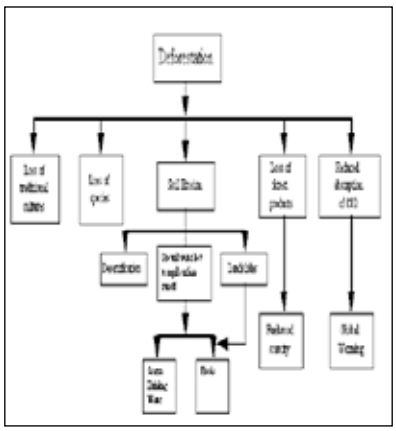
percent. Deforestation mainly conversion of forests to agricultural land, is continuing at an alarmingly high rate. Forest area decreased worldwide by 0.22% per year. In India Deforestation caused a lot of environmental disturbances and current trend is continuing downhill.

Deforestation is contributor to Global Warming as Trees, water etc significantly effect.Deforestation increases soil erosion and results in declines in biodiversity.



0.3Classification:
Classification is a classic data mining function that classify items in a set of data into predefined set of categories or classes. The main goal of classification it to accurately predict the target class for each case in the data. Classification methods makes use of mathematical techniques like decision trees, statistics etc.

There are two different classification methods: Unsupervised and supervised classification. Unsupervised classification is the identification of natural groups, or structures, within multispectral data. Supervised classification is theprocess of using training samples, samples of known identity to classify pixels of unknown identity.

2. A Study of Deforestation
Dynamic monitoring of forestry resources land utilization is needed. GIS is powerful tool which has potential to organize complex spatial environment with tabular relationships. GIS allows us to view, understand, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.The forestry land change includes the forest land type and theamount forest land area occupied, and GIS, the remote sensing image data, carries out the resources change situation to the mountain top and land parcel, and uses the formidable spatial analysis function, promptly to makes response to the forest resources space and time. Remote sensing and GIS techniques and technologies have become so closely interrelated, it is now possible to seamlessly utilize both within the same computing environment.

The magnanimous data of RS is processed by the GIS software, which provides the fast accurate and useful data to the user. By the contrast of the historical database and the renewal database information, we may discover the change situation of the forest resources very quickly[23].

De Silva et al [5] was done experiments to characterize objects when considering the different spatial resolution and different deforestation patterns in the Amazon using RS and Data mining techniques. Proper forest monitoring and management can only be achieved by using remote sensing techniques and creating spatial representations such as maps to know the exact locations and extent of deforestation.

Pavankumar et al[19] applied Remote sensing and GIS techniques geospatial images and analysisis carried out post classification change detection. Supervised classification of images of different epochs was carried out and then areas of resultant classes compared for change detection monitor the deforestation.

K.R. Manjula et al[10] expressed the widespread use of spatial database and spatial data mining technique to understand inter–relational nature of spatial data and the role of different driving factors for deforestation and the relationship among these factors.

Lambin[12] and Mas et al.[15] mention that deforestationmodels aremotivated by the following potential benefits:

1. To provide a better understanding of how driving factors govern deforestation
2. To generate future scenarios of deforestation rates
3. To predict the location of forest clearing and,
4. To support the design of policy responses to deforestation.

Houghton et al[9] expressed the policies that influences the rate of conversion of forest to other land use, or encourage afforestation and reforestation of deforested lands have the potential to have a large impact on concentrations of atmospheric CO_2.

Coppin et al[3], Lu et al[14], Maas[16] and Singh [21] made a reviews on the most commonly used techniques like the change vector analysis, transformation, classification (post-classification comparison, unsupervised change detection, expectation maximization algorithm) and hybrid methods for the change detection and monitoring of forest destruction through the analysis of remotely sensed data for different epochs.

Brown et al[1], pal[18] andOtukei et al[17] made a study on flexibility of decision trees for handling data in the form of continuous and categorical variable and ancillary or missing data supports their use in environmental management applications and especially for landcover classifications from remotely sensed data.

Sukaesih et al[8] applied the different classifications algorithms on forest fires data to develop classification models for hotspots occurrence in Riau Province. By using the classification models they provide characteristics of areas where active fires occurred. They studied physical data including land cover, road, river, city centers, industrial timber plantation, logging concession.

Kalli et al[11], Daniela et al[4], Seng et al[20] utilized the data mining tasks including association rules mining, classification and prediction, as well as cluster analysis inanalyzing spatial data related to forest fires.

3. Classification On Deforestation
In this paper we'll use a classification of deforestation objects, classification is done according to a type of spatial patterns, task performed automatically by the system for spatial data mining.

Mainly there are 5 reasons for Deforestation. They are

1. Agriculture
2. Urbanisation
3. Transport
4. Mining
5. Forest Fires

1. Deforestation based on Agriculture:
Expansion in agriculture is one of the most important causes of deforestation. This is the one issue that is not easily resolved. As demands on agricultural products rise more and

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more, land is brought under cultivation for which forests are cleared.However, this expansion is usually marked with more ecological destruction than rationality. Another cause is,shifting cultivation is often blamed for destruction of forests. In fact it is poor fertility of soil which has given rise to such a pattern of farming. A small patch of tropical forest is cleared, vegetation slashed, destroyed and burned. Crops are grown as long as the soil is productive, after which the cultivation is abandoned and cultivators move on to fresh patch of land.

2. Deforestation Based on Urbanisation:
According to the growing population in urban areas, forests have to make a way as urban areas expand in to surround forested areas.Buildings and cultivation is developed in the newly expanded land. In this regard community infrastructure is a key factor.The decision support is based on a choice between alternatives arising under a given set of criterion for a given objective. A criterion is some basis for a decision that can be measured and evaluated. GIS and remote sensing techniques are very useful in identifying the growth of urbanization.

3. Deforestation based on Transport:
Road Building has been the one most determinant factor in deforestation. The construction of roads, either as an economic tool or as necessity for the implementation of other infrastructure projects, is one of the main deforestation drivers. Roads provide access to the forest frontiers which are used by the most vulnerable people in search for subsistence land. Transport networks are built through forests, for which the forests are cleared for developing the transport between the cities. Remote Sensing and GIS provides the continuous monitoring of the forest. Paved roads can generateeconomic and social benefits but also deforestation, if not accompanied by successful planning. The deforestation facilitated by the road could also dramatically increase the annual carbon emissions.

4. Deforestation based On Mining:
Forests are rich in Minerals and metals like coal, gold, silver and fuel. Forests are cleared for extracting the natural resources. Roads and Railways make easier for people to enter in to the forest for extracting the resources. Mining also results in deforestation. Digging of forests for coal, gold and for other minerals also converts the forests into deforests.

5. Deforestation based On Forest Fire:
An average of 400 to 500 hectares of burn globally each year from forest fires. Burning of forest is used to clearthe forest of manypurposes like industries, agriculture etc. These fires may go out of control and spread to other areas of forest that are meant to cleared and it is difficult to regrow for the original forest. Forest fires can cause great damage to the environment, living things, human health and property. Fires can be monitored and analyzed in timely by using satellite sensor imagery in combination of spatial analysis provided by GIS.

4. Conclusion
This new approach is to study relevant knowledge in deforestation process, to search the areas of deforestation, through the use of Remote sensing and GIS. This technique is useful to understand, monitor easily from which we can prevent deforestation in specific regions. Our main objective is to provide an overview in classifying the deforestation to provide the relationship between socioeconomic activities and the environmental degradation.

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