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Object Oriented Approach of Tree Estimation Using Remote Sensing Imagery in Nanded City

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Abstract: I conducted a case study to measure tree from urban greenery using Google Earth images for urban greenery visualization assessment in Nanded City [MH] India. The final and identical trees was observed in the whole study area of Sneh nagar, Nanded. The total mature trees was detected is about 161. So this final tree count was noticed in the agriculture collage at Sneh nagar, Nanded during the investigation period at 2018 to 2019. The total detected plants are observed out of previously perceived from 713. So the final output is based on tree counting as per the GIS image analyzer by using this diameter. As per this average we are analyzed total no of objects as plants about 713 individually from 181 plants are the herbs (one to two in feet's). Next the Shrubs are 371 (three to four in feet's) and recognized as final third output of the tree are about 161 (six and above feet's) current research respectively.

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Introduction

The tree population and having scope for green belt development in the city areas. Since ancient India, We are worshiping the trees. On Earth Tree having very important and significant role in sustaining Environmental conditions which allow healthy life for all living things. Now in present day, increase in Population and Industrialization, Deforestation is also increasing. Thus increase in deforestation leads toward Holocaust such as global warming Catastrophes like Landslides, Floods. For this issue we need to Manage and control the forestry around us; in simple word we need to know, how much tree present in our area? Today, researcher did optimize research in GIS and Image processing technologies.

Trees are important topographical objects in different fields of application. Not only the ecological aspects are of interest to trees, but also various economic factors. Obviously, tree data play an important role in forest inventories and GIS forest applications. Several algorithms have been developed for the treetop detection and delineation algorithms observed by Girish Kumar and Padmaja (2012).

The half of the population of the world which has beaning staying in the urban areas. The India is not away from it because major urban area covers 50 % of the total urban population in the India. This total 50 % population sustain in 10 % of urban land area of India. As per the demand of human beings is rapidly increasing for all the natural resources so the trees one of the demanding resource in human life because it provides no of things such as Oxygen, Fruits, Seeds, Flowers, Sap etc. The major urban plants species whish are the major air sinkers to control air pollution in the urban environment. He exposed some of the foremost plants species in the Nanded city are *Azadirachta indica, Ficus religiosa, Ficus benghalensis, Delonix regia, Polyalthia longifolia* and *Dalbergia sissoo* and having aesthetic values too. They plays an important role to air pollution control in the Nanded city Yannawar V. B. (2016).

The trees usually have found resistant to air pollution and turn air safer or free from any damaging effect. Trees are also prevailing biotic elements of any region, whereby their presence these react against air pollutants. Finally it is also useful for green belt development for industries and society for sustainable urban development. Number of such beneficiary issues make me to select this title for further research. The world itself indicted that the mentoring means to monitor or to observer to take and care of that object. Similarly the Urban tree mentoring is also useful tool for urban green belt development, urban forest management and sustainable urban developmental approach. Urban environmental issues are rising day

by day and trees are the ultimately deceasing because of the urban developmental activities.

So therefore the mentoring of the urban trees are become more important part of my research. The mentoring urban trees have huge scope as per the demand of sustainable urban development and also for Green city development in recent days. So the Nanded is not away from it to make city sustainable. So I need to upgrade this topic and research in the my study area too. The current investigation deals with inspection of tree counting in urban areas. Previously the tree counting was not undertaken for the investigation purpose, especially this was done manually. Tree cutting has increases due to numbers of urban developmental activities which are cumulative day by day the research area. Though, the contemporary study has given attempt to tree counting and robust and user-friendly technique that will allow to counting number of trees.

2 Study Area

Nanded district is located in the central part of India, and eastern part of Maharashtra. Telangana State and Karnataka state borders attached to Nanded district. Telangana State situated at the eastern side and Karnataka situated on the southern side of Nanded district. Nanded region consumes a topographical area of 10,528 Sq. Km., which forms 3.41% of the whole topographical area of Maharashtra State. The district is located in the Deccan Plateau. The district of Nanded has among 18°.15' and 19°.55' North latitude and 77°.7' to 78°.15' east longitudes.

The present study, in and around the area of Nanded city has selected. The present investigation Sneh nagar Agriculture collage area has been selected and investigated. The present study was conducted in an agriculture collage area of Sneh nagar, Nanded, Maharashtra. Having latitude 19.15065 and longitude 77.30375 of the Sneh nagar, Nanded respectively. The agriculture collage area is selected for present research because there is huge amount of trees are present in the campus area of the city. Which ultimately easy and useful for tree counting purpose. After the Guru-ta-Gaddi celebrations, the development of the city continues e.g. construction activity and various developmental activities in the city Vyankatesh Yannawar (2013).

Figure 2.5: Study Area of Sneh Nagar Agriculture collage, Nanded city

4.0 Research Methodology

The basic The proposed work explains very well by subsequent flowchart. Which was ultimately purely described in simplest way which is the best part of my research topic. It has been described in my own wards in this research topic jejunely.

4.1 Google Earth

Every image created from Google Earth using satellite data provided by Google Earth is a copyrighted map. Any derivative from Google Earth is made from copyrighted data which, under United States Copyright Law, may not be used except under the licenses Google provides. Google allows non-commercial personal use of the images (e.g. on a personal website or blog) as long as copyrights and attributions are preserved. By contrast, images created with NASA's globe software World Wind use The

Blue Marble, Landsat or USGS layer, each of which is a terrain layer in the public domain.

The first concern is the time consistency of Google Earth images. In our study area, not all Google Earth images were captured in same period, with some Google Earth images captured during winter, and others in summer. Google is still continually updating the Google Earth imagery periodically, but users do not yet have access to the time information of Google Earth images through Google Earth Image API. In order to keep the time consistency, Google Earth images were checked manually in this study, and images taken in winter were excluded from further analysis

The modified Google Earth should be more suitable for representing the greenery that a pedestrian can see on ground. The spatial distribution of sample sites with higher Google Earth values does not match well with the spatial distribution of vegetation cover in the land cover map of the study area. This may be explained to some extent by the discrepancy between the profile view from the ground on a street and the overhead view from the sky. The profile view is affected by layout of buildings and vegetation, size of urban trees, vertical structure of trees, and distances between trees and viewers.

Figure 2.7: A Wide View of trees in Agriculture collage area Sneh Nagar, Nanded

4.2 GSA Image Analyzer

The GSA Image Analyzer is a tool specially designed for the creation and analysis of 2D image objects. The objects can be identified on the basis of their specific colouration and be distinguished in this way from their environment. For an analysis the subsequent automatic functions are provided such as number of identified objects, 2D object area computation, object area ratio to total area (density), determination of object length, counting of intersection points in a raster and visualization of colour distribution.

The additional calculation also has been done for the Additional functions as manual counting by marking areas, manual counting by image splitting, creation of images and image processing functions etc. There for we take advantage of remote sensing in proposed work to count the number of tree. But this image not neat and clear to identify the tree crown and hence we need image processing to depict touching crowns. After image processing our next step to count tree crown and display the result.

4 Result And Discussion

Indian's forests cover a wide range of categories and incorporate public and private ownership and commercial and non-commercial uses. Privately managed forests consist of privately owned forests and publicly owned but privately leased forests. They form a significant proportion of India's forests and in some

places contribute significant quantities of timber to the domestic and even the international market.

Appropriate and consistent data at the 'regional' level, detailing what, where, how much, and when wood would be available will greatly assist regional planning of the current resource for economic, environmental and social purposes, including investment into new ventures. Whatever the owners' long term objectives and immediate intentions are, the extent of the private forest resource needs to be determined at the national level if issues such as carbon balance and biodiversity are to be adequately addressed.

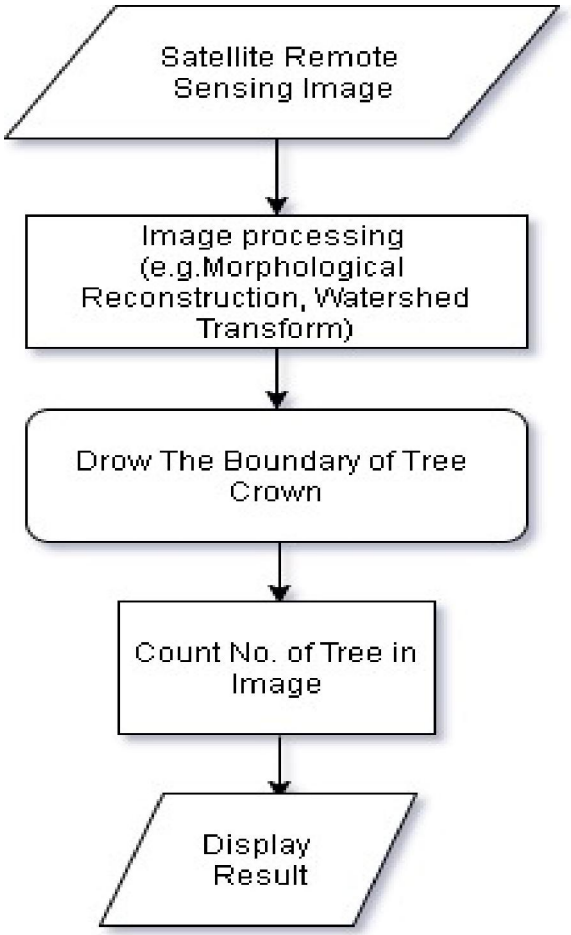

Figure 4.2 Showing the definite flow chart that was utilized in current research action

Remote sensing is technic to locating and categorizes the targets on earth without making physical contact and is a theory for synergy and scrutiny of the geometrical structure of the objects. In proposed study, we collaborate and exploit it for assessment tree. On earth, trees having a vital and significant role in sustaining Ecological conditions. Thus, proposed study focusing on finding efficient algorithm of tree assessment using Remote Sensing imagery. To implement proposed study approach used to depicting touching crowns on remote sensing data with image processing functions.

I deliberate the diverse techniques of tree counting by using the satellite images and GIS techniques. According to objective to study find the simple way of tree counting in so that everyone can estimate the tree around the field. So I need to go through all image processing software's. Apart from it I need to find the easiest and user friendly technique for image processing for tree counting.

I studied the dissimilar approaches of tree counting by using the satellite images and GIS practices. According to objective to study the different tree counting method's used in the past. So I go thoroughly all the past literature review in the field of remote sensing and GIS giving special focus on the image processing with special reference to tree counting technique's and software's used. By giving special reference to finding the easiest and user friendly technique for image processing for tree counting.

4.8 Google Earth

However, the overhead views provided by remotely sensed imagery do not cover these factors. Correlation analysis shows that the Google Earth has a strong correlation with the canopy cover-age close to sample sites, but the correlation is much weaker with canopy coverage beyond the buffer distance of 20 m. Some areas in the southwest of the study area have a low fraction of greenery in the land cover map, however, there do exist several sites with high green view represented by Google Earth.

By checking the Google Earth images of these sites, we found that most of these sites located along alleys with big trees. In the overhead view, these trees along those alleys are not large patches of green covers, however, in the profile view, these sites look greener. On the contrary, some sites with a larger patch of greenery in the land cover map have Google Earth values lower than ten. The major reason should be related to the pedestrians' viewing scope on streets, which cannot cover the green spaces that are far from the streets or blocked by buildings.

Therefore, a larger vegetation cover observed from the high space may not mean a higher observed on a street. This indicates that it is not sufficient to measure urban greenery only based on greenery information in a vegetation cover map, which was usually derived from remotely sensed satellite imagery or air photos. The Google Earth may be used as additional information/data to help urban planners and others to more accurately evaluate or quantify urban greenery by considering the citizen visualized greenery at street-level. Our Google Earth based

method is a feasible tool for assessing visible street greenery in cities.

It is expected that Google Earth images for more cities in more countries will be available in the near future. The Google Earth images can also be used in location-based services to calculate the amount of visible street greenery. It allows urban planners to identify areas within a city that can be considered greener than others. It may provide a monitoring tool for a differentiated analysis of gain or loss in urban street greenery. It may be used in the planning stage of an urban greening program to help urban planners select the locations, sizes, and types of greenery for maximum affect. It may also be used to check the visual impact of some urban forest management practices and document the visibility of urban greenery in cities.

The proposed methodology for measuring Google Earth images is easy to be understood and used by urban planners. Thus, it seems to be a promising tool for future urban planning and urban environmental management, rather than a simple gadget for users. While we demonstrate here the feasibility of Google Earth for assessing urban green spaces and we show that Google Earth can deliver useful urban greenery information that was not previously understood, we believe there are several issues that need to be resolved.

In addition, Google Earth imagery only provides a static environment of urban spaces, that is to say, the urban environment at the exact moment each photo was taken. Considering the facts that street greenery varies throughout the year and the urban environmentist a dynamic surrounding, therefore, the calculated GSA values will potentially be dependent on the time of year Google Earth images were taken and be affected by changes in weather, or other things moving around such as cars and people. Recently Google added time stamp to the Google Earth, but time information is still not accessible using Google Earth image API. In the future, the time consistency problem could be solved once the time information of Google Earth images is accessible.

Figure 5.2 Showing Google image of the study area calculated by total number of trees in campus area of the agriculture collage of Nanded city

A second issue is that Google Earth imagery only covers a limited number of viewing points, which cannot capture the greenery from all places in a city. The greenery captured by Google Earth is limited to the greenery that can be seen from streets. This is because Google Earth images were gathered through custom-made cameras, which were usually mounted on top of cars. A third issue is the difficulty of accurately extracting green vegetation from Google Earth images.

Accurately extracting green vegetation from street view images is a challenging issue due to many factors, such as existence of shadows and spectral confusion between vegetation and other manmade green features. Street view images are stored in three dimensions using RGB color space, and do not have

near infrared bands, which are main indicators for vegetation.

Limited spectral information makes extracting green vegetation from street view images more difficult. Although the proposed vegetation extraction method can compensate the unavailability of near infrared bands to some extent, it tends to misclassify the manmade green features (green brands, windows, shadows, etc.), which share similar spectral signatures with green vegetation in RGB bands. Future studies need to incorporate geometric information i.e., manmade, non-vegetation features into the vegetation classification algorithms, because these features are generally more regular and homogeneous than green vegetation.

Lastly, current Google Earth Image API has no capability of delivering multi-temporal Google Earth images for one location. Google Earth images cannot be used for cityscape changing detection until Google Earth Image API has the capability of requesting multi-temporal images. Recently, Google upgraded its Google Earth services so that users can travel back in time to see how specific locations have changed. This gives the light to future multi-temporal studies of cityscape. In addition, other issues that may affect the analysis, such as the arrangement of green and buildings, patterns of green distribution, topographic factors, and environmental psychological factors, are not addressed in the study.

4.9 GSA Image Analyzer

The GSA Image Analyzer is a tool specially used for the calculation for the Additional functions as manual counting by marking areas, manual counting by image splitting, creation of images and image processing functions easily and rapidly so that's why we used this software for Google image analysis only in my contemporary research and investigation purpose only.

As per the basic advantage of this software is easy and fast for Tree counting purpose so that's why we chosen to use it. The objects are classified as per the shape, size and height of the plants. As per their size plants are classified into three categories as Herbs, Shrubs and Trees. Herbs have the height about one to two feet's such plants are called herbs. Shrubs have the height about three to four feet are termed as Herbs. Trees are those plants species having the height about six feet and above are called as trees.

So the final output is based on tree counting as per the GIS image analyzer by using this diameter. As per this standard we are analyzed total no of objects about 713 individually from 181 plants are the herbs (one to two in feet's). Secondly the Shrubs are 371 (three to four in feet's) and identified as final third output of the tree are about 161 (six and above feet's) current research respectively.

This has been shown below in table with the details as per there size and diameter etc. Object surface larger than 0.0000 Meter and smaller than 7.0004 Meter:709 Object surface larger than 7.0004 Meter and smaller than 14.0009 Meter:4 and Object surface larger than 0.0000 Meter and smaller than 0.6087 Meter:181.

Many organizations have large quantities of spatial data collected in various application areas, including remote sensing, geographical information systems (GIS), astronomy, computer cartography, environmental assessment and planning, etc. These data collections are growing rapidly and can therefore be considered as spatial data streams.

Table 4.2 Maximum object size as the result of standard procedure of tree count

Sr. No.	Specifications of the Objects / Trees	Size in Meter
1	Cut through area of objects	0.7
2	Area median of objects:	0.28
3	Area size of smallest object	0.14
4	Area size of biggest object	12.8108
5	Total area of all objects:	488.0002

Table 4.4 Maximum final object size as result of standard process of tree count

Sr. No.	Specifications of the Objects / Trees	Size in Meter
1	Cut through area of objects	0.0457
2	Area median of objects:	0.0426
3	Area size of smallest object	0.0152
4	Area size of biggest object	0.1126
5	Total area of all objects	8.1631

It shows that Google Earth images are qualified for assessing trees and the GSA image analyzer may be a more objective measurement for tree counting purpose only. The modified tree counting is easier for ordinary people to understand because it measures the general visible urban greenery on the ground. Thus,

the GSA may help urban planners and others to further understand the sensory functions of urban green spaces. GSA data can be regarded as additional information to reciprocally enrich the urban green information provided by remotely sensed imagery.

Experimental results show that the tree count method is significantly faster than existing classification methods, making it the preferred method. So personally I suggest from my research recommendation is the Google Earth images are best and user-friendly and easily available for utilization. For image analysis purpose go for the GSA image analyzer which could give you the best and accurate result and within the precise time period too.

Crowns et al., Observed in 2004 that tree crowns are physically made but require a lot of work and include too many costs, which provides a less accurate count. Recently, remote sensing techniques help to extract information from high resolution satellite images. Different algorithms cannot classify the number of tree crowns into complicated scene images because there are different types of entities such as buildings, street lamps, etc.

Komura et al. (2003) observed the technique of circular unification to notice the crown of the tree showing the components of the crown as circles. Subsequently, a small area of trees was cleared and other crowns were unified for tree identification.

Mamoru Kubo et al., (2007), noted the image of the map rectification method. Here the data measured in the field are collected through the land control points (GCP). With these data created, the map projected on the crown of the ground consists of the position and shape of the individual trees and the segmentation of the image is performed on the satellite image. When comparing these two images, the crowns of the trees are identified.

Pinz was identified in the tree crown (1991) using changes in brightness in concentric circles from the top of the tree in the field. Likewise, Gougeon shaded a valley following the approach to delineate Gougeon's treetops (1995). Pouliot and King sampled transects around the apex of the tree and modeled the transept data with a four-order polynomial to determine the boundary between Pouliot and his companions in 2008, respectively.

Prediction accuracy is usually used as a basis of comparison for different classification methods. However, for data mining on streams, speed is a significant issue. In this study, we used Google Earth images to assess street greenery in an urban area. The Google Earth images, which were taken by Google on the ground and have view angles similar to those of pedestrians, were used for assessing abundance of street greenery. Since Google Earth images allow a horizontal and vertical representation, and cover the 360◦horizontal surroundings and 180◦ vertical pro-file, we modified the Google Earth proposed by Yang et al. (2009) to make it more rational.

Ryotaro Komura (2004) was studied by the Circular Expression and River Basin algorithm to delineate the treetops. Crown components are analyzed through the circle area and form a radio distribution image (RDI). Outline the crown area by applying the river basin to the RDI.

The method is fast and can be used for greenspace assessment for any place where Google Earth is available. Recently, Google announced that it had captured 20 petabytes of data for street view on June 6, 2012. The data comprise photos taken along 5 million miles of roads and cover 39 countries and about 3000 cities (Farber, 2012).

Tomas Brandt erg and Fredrik Walter (1988) proposed a multi-scale analysis algorithm to delineate the individual treetops on high spatial resolution satellite images. Here the outline of the canopy of the tree identified as Zero Crosses with convex curvature of the gray level. A modified center of curvature was indicated for each pixel of the border segment. Then, using these central points a primary sketch is formed using an extended ellipse with the circle of medium curvature.

Yannawar et al. (2013) studied the physical growth of the city of Nanded through the use of remote sensing and GIS techniques. He discovered that the main change has taken the place of agricultural land in urbanized land and road networks. This growth is later discussed with levels of expansion, with an emphasis on the unplanned nature of development.

Conclusion

The main objective is on modest and easy way of tree counting in India. We are not took consideration only of modest and easy way but also cost effective and high accuracy of tree counting. In this work we are using satellite image and with the help of image processing counting the number of trees. Tree Counting is done in proposed system by image processing technique to depict touching crowns on remote sensing image and then count the number of tree. Such a protocol could also be applied to government managed forest, especially to reserves, where less is known about the nature of the total resource.

We examined the use of Google Earth images for monitoring and measuring the amount of street greenery that people can see on the ground at different street sites in an urban area. This will require substantial funding but would provide information currently not available for sustainable urban development and regional planning. To manage

monitor forestry and Tree around us, we need to count the number of Tree present in our area. This work having prime motive is mainly focusing on tree counting using Remote Sensing imaginary, and doing studying of efficient and effective Technic of tree counting.

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