A Real Time Modeling Of 3D Geographical Image

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***Abstract*—In this paper, the method of reconstructing the three dimensional geographical image of the selected area has been proposed. In order to acquire the digital data of the desired area, Google earth and its respective plug ins have been used. The methodology by which the attributes of the spatial models varies the physical, mechanical and chemical properties of the data has also been proposed. The real time results obtained in this work can also be used to predict the geo-hazardous susceptibility information at the national scale.**

Keywords*— *3D modeling, Geographical Information System, Google Earth, GUI.

I.INTRODUCTION

Traditional geological maps which illustrate the distribution and orientation of geological structures and materials on a two dimensional (2D) ground surface are no longer sufficient. They are inadequate for the storing, displaying, and analyzing geological information. It is also difficult and expensive to update traditional maps that cover large areas. Many kinds of raster and vector based models for describing, modeling, and visualizing 3D spatial data have been developed. At the mean time, with the fast development of sensor techniques and Computer methods, several types of airborne or close range laser scanners are available for acquisition of 3D surface data in real or very fast time. A few more type of digital Photogrammetric workstations are also available for semiautomatic interpretation of the complicated man made 3D surfaces [1], [3]. However due to image noises and limited resolution of current laser range data, so many existing techniques still need to be extended to fit real application.

Nowadays, this problem is tackled by another kind of data: the sub metric satellite images. The main advantages of satellite data compared to aerial images are high swath\width and ground coverage. However, [2] such data have a "relatively low" resolution and a "low" signal to noise ratio to deal with 3D reconstruction problems. Those drawbacks do not allow using standard methods developed for the aerial image case and lead us to propose a new method based on an important prior knowledge concerning urban structures. 3D geological information systems provide means to capture, model, manipulate, retrieve, analyze, and present geological situations.

This paper presents a real time automatic generation of 3D geographical image from 2D geographical image. The time complexity and space complexity required for this method is less.

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II.SIMULATION SETUP

The proposed methodology was tested on real time image obtained through the Google Earth. It is a globe, map and geographical information program that was originally called Earth Viewer. It maps the Earth by the superimposition of images obtained from satellite imagery, aerial photo. Google Earth displays satellite images of varying resolution of the Earth's surface, allowing users to see things like cities and houses looking perpendicularly down or at an oblique angle (see also bird's eye view). The degree of resolution available is based somewhat on the points of interest and popularity, but most land (except for some islands) is covered in at least 15 meters of resolution.

The Google Earth API (application programming interface) enables developers to embed Google Earth applications into web pages with JavaScript code. With the Google Earth API plug-in installed, these applications can run interactively in web browsers. The API can display place marks, lines, polygons, and overlays just as the standalone versions of Google Earth. The plug-in supports several of the Google Earth layers, including terrain, roads, borders, and buildings. It can switch to Google Sky Mode for views of planets, stars, and galaxies. Because it enables scripting, it offers great potential for the development of educational and other material

III. METHODOLOGY

The results of any Implementation is depends upon the type methodology. The success of the implementation [7] very much depends on strength and capability of the Software used. So it becomes an important issue to

choose the programming language. MATLAB is one of the best programming languages for signal and image processing applications. Hence MATLAB has been selected as a programming language for this implementation. The methodology used in this paper is as shown in Fig.1

A. *Interface Google earth with Matlab*

The special feature of Google earth, Google earth API allows us to interface Google earth with other software like matlab. The "actxserver" command is used to interface Google earth and matlab. This creates the local OLE automation server. Here, Google earth works as a COM server and matlab as a COM client. The Microsoft *Component Object Model* (*COM*) provides a framework for integrating reusable, binary software components into an application.

B. *Create Graphical user Interface for selecting desired area*

A graphical user interface is a type of user interface that allows users to interact with electronic devices with images rather than text commands. User can enter longitude and latitudes of desired area through GUI programmed in matlab or if latitude and longitudes are not known, then user can select one of the areas from drop down list which is also made in matlab GUI.

C. *Extraction of Image information from Google earth*

Google earth camera is set at the particular location according to the input information provided by user. Altitude value can be varied according to user's choice, by making appropriate changes in program. For obtaining image information, image boundary co ordinates are sent to Google earth server, then altitudes of each pixel of the image within the boundary is sent by Google earth.

D. *To copy the Image & 3D Conversion*

The altitudes of each pixel in the image are projected by using surface command in matlab. The mat lab command 'surface' creates surface object. But before converting the image into 3D, it is converted into indexed image. The "rgb2ind" command is used, which converts the RGB image to an indexed image using minimum variance quantization. It returns two values; one of them contains at most n colors and n must be less than or equal to 65,536 and other one is indexed image itself. Here, we convert the RGB image into image with 256 colors. "Rgb2ind" converts RGB images to indexed images using one of these methods:

- Uniform quantization
- Minimum variance quantization
- Color map approximation

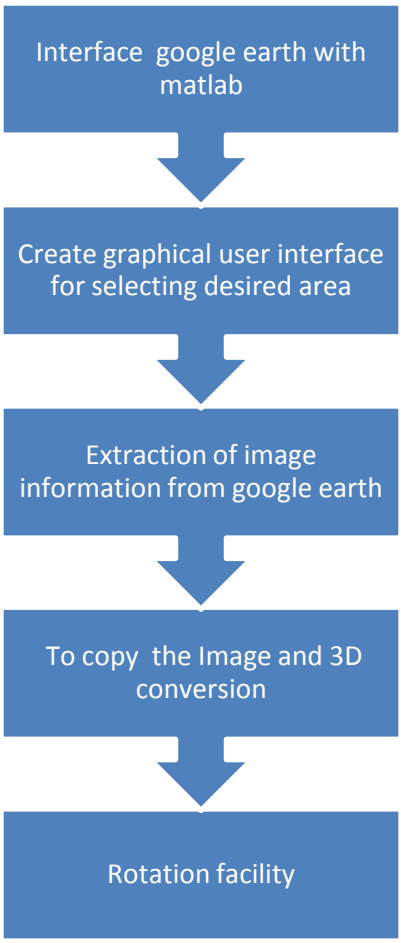

Fig.1 Methodology

E. *Rotation Facility:*

Matlab command **"**rotate3d**"** is used to rotate 3d the image as per the mouse clicks. Rotate3d enables mouse-base rotation on all axes within the current figure. When enabled, rotate3d provides continuous rotation of axes and the objects it contains through mouse movement.

IV. RESULTS AND DISCUSSION

With reference to the methodology discussed above, 3D geographical image results are shown in Figures 2, 3, 4 and 5 for "Kalsubai Mountain" of Maharashtra state. India.

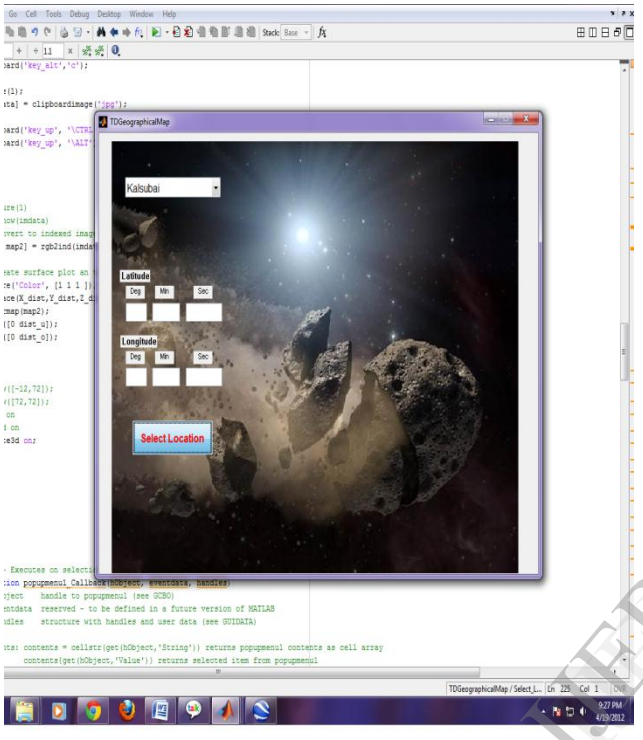

Fig.2 Graphical User Interface

After completion of coding in MATLAB, we confronted some errors. These errors were arising due to slow speed of internet connection. When the internet connection is slow then the parameters are not retrieved from the Google earth, so the image is not converted to 3D.

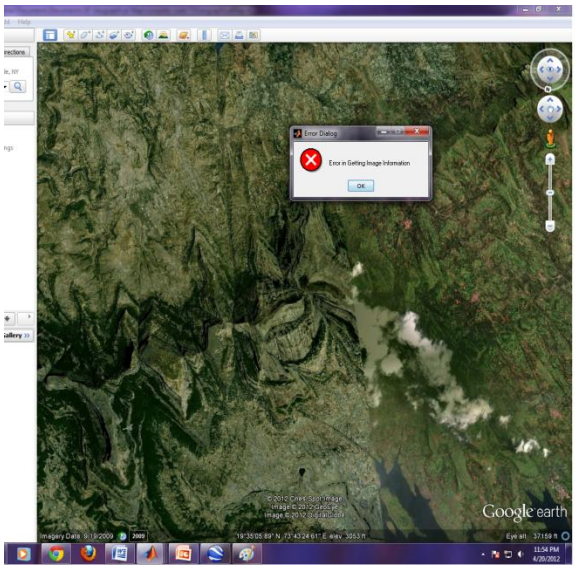

Fig.3 Error occurred due to slow speed of Internet

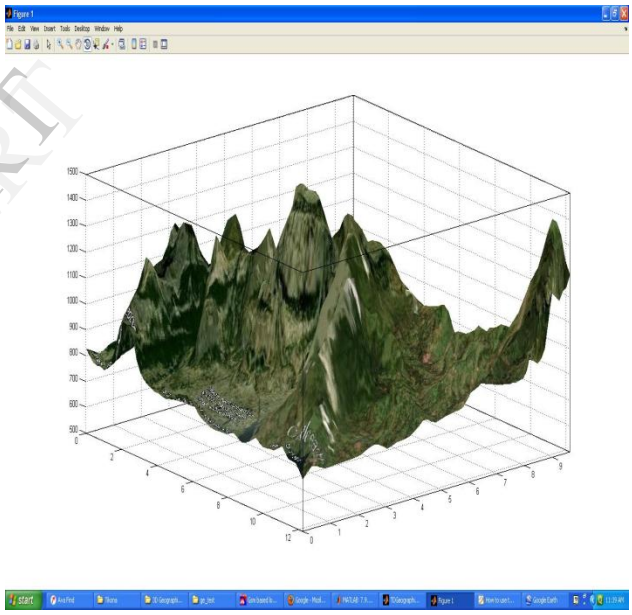

Fig.4 Fig. A real time 3D Image

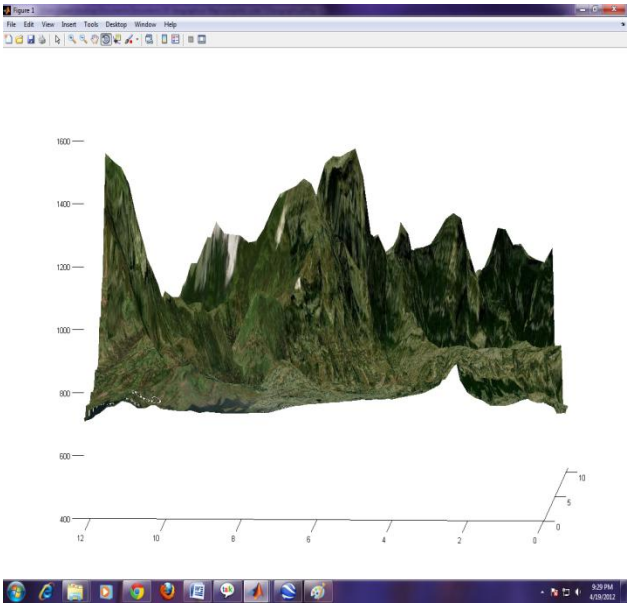

Fig. 5 A real time 3D Image with rotation.

V. CONCLUSION

In satellite image processing the steps [5], [6] such as image acquisition, image enhancement, image restoration, and the compression have been commonly used. Hence, in order to analyze the satellite images the complex methods are strongly needed. This work is an effort to reduce the number of steps in satellite images. A new method for conversion of 2D geographical image to 3D geographical image has been proposed. Since in the proposed method the top view which can be easily retrieved from the Google earth software has been used, the complex image processing steps required in image processing can be eliminated. Further, in comparison to conventional 3D conversion methods, the time and space complexity required in the proposed method is also low. Thus, the proposed method of modeling the real time 3D graphical images is the most suitable method in satellite image processing. However, since large capacity navigational softwares with additional features are not available in the literature, there is wide scope for the improvement in the method. The work presented in this paper can also be used not only for the different factors such as resolution but also for the applications such vegetation images and sectional images of the soil layers.

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