3D VISUALIZATION

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This article explains how to view and manipulate images in 3D perspective to gain a better understanding of terrain features, relationships, and other aspects of your data. Viewing images in three-dimensional perspective is a valuable tool that helps increase understanding of features and relationships in images. Many types of earth science images can be integrated to create 3D scenes that show features and anomalies much more clearly than traditional two dimensional views. To create a 3D view, you simply add a Height layer to your 2D algorithm that contains an elevation image (such as a digital terrain model), then change the View Mode to 3D perspective or 3D flythrough. This article give you practice setting up algorithms for 3D viewing, and manipulating the images using the viewing and display controls in ER Mapper's 3D perspective viewer. In the end , you will know how to perform these tasks: -Prepare an algorithm for 3D viewing by adding a Height layer -Change the viewpoint, zoom level, and other 3D view parameters -Use the 3D Flythrough viewing mode -Stack multiple surfaces in a 3D view and set surface offset and transparency -Merge separate algorithms into surfaces in a single algorithm.

The 3D VISUALIZATION allow you to view raster and vector data in 3D. With the exception of map composition items, any type of data processed by an ER Mapper algorithm can be viewed.

To view data in 3D, your algorithm should contain

An Intensity layer or a height layer-

Data to be displayed over that height surface-

3D viewing is integrated into the main ER Mapper program. This allows you to change between 2D and 3D views in any image window. There are two ways that you can view different data over the same area: you can choose to open a number of windows and load a different algorithm (view) into each or you can choose to stack the views each above the next in the same window. In two dimensions you can view more than one surface by making the upper surfaces partially transparent. In three dimensions you can stack surfaces one above the other.

You can view your images in 3D on PCs, SGI Irix 5 and 6 and Sun Solaris workstations. ER Mapper's 3D engines tailor themselves to your hardware so that they run faster if your computer has built-in hardware accelerators

You can display raster and vector data in 3D. In fact, any type of data processed by an ER Mapper algorithm can be viewed

There are two views available:using the 3D Perspective view the image is in an orthographic projection You manipulate it from a fixed viewing point as though it is an object in space.in the 3D Flythrough view the image is in a perspective projection. It is as though you move through space with the view changing around you.

2-HEIGHT DATA

To create a 3D image you must add the data to be shown as height: each surface in your algorithm that you want to show as 3D must have a Height layer. Though elevation data is usually used in a Height layer you can use any kind of data that you want.your algorithm should contain:

A Height layer (or a mosaic of Height layers) in each of your surfaces, to represent height. This could be elevation, two way time, magnetics, gravity, vegetation vigour, bathymetry, or any other appropriate data. Data to be draped over the height surface.

For example, this could be Landsat data as Red Green Blue layers over a height layer of elevation data. The data draped over the Height layer can be raster and/or vector. For example, you could use an aerial photograph and a vector GIS (Geographic Information System) layer displaying roads.

3- DIGITAL ELEVATION MODEL

Digital Elevation Models (DEMs) are a digital representation of elevation, organized as a regular grid of numbers. A great many applications, such as laying pipes or assessing fire risks, have a direct use for DEMs. This study examines how DEMs are created ,ways to enhance DEMS and extract information from them, how to combine DEMs with other types of data, and how to do what-if processing with them

Digital Elevation Models are represented as a regular grid of numbers. The spacing between grid elements represents the interval between samples. For example, a 30 meter grid spacing means that there is one elevation sample every 30 meters. The numerical value in each grid element represents the elevation at that point. This is often a floating point number, to ensure that small variations in elevation can be recorded accurately.This chapter discusses the generation and quality of DEMs, the display and integration of DEMs with other types of data, and how to carry out what-if processing and classification of DEMs and related data.

DEMs may be created from a number of sources, including:

-Measuring selected elevation points over an area, and then gridding them into a regular grid using a gridding package. This technique has several disadvantages, including the effort required to collect the individual elevation points, and inaccuracies in the regular grid in areas where limited numbers of points have been gathered. Any area that has had gravity surveys will also have elevation heights collected at each point. Otherwise, the source for individual elevation points are likely to be from analytical plotters.

-Generating a DEM from a contour line source of elevation, for example, from a map or from an LIS system. Contour maps are generally created using analytical plotters, and thus have a large range of points gathered. Also, contour maps typically have valley floors and ridge lines defined, ensuring that these crucial aspects of a DEM are well preserved. When generating a DEM from a contour source, care must be taken to ensure that the resultant DEM does not have a "terraced" effect between contour lines.

4- 3D PERSPECTIVE VIEWING

This chapter explains how to view and manipulate images in 3D perspective to gain a better understanding of terrain features, relationships, and other aspects of your data. ER Mapper lets you quickly change between 2D and 3D views of your data, stack multiple surfaces in a single view, set transparency between surfaces, and many other features.Viewing images in three-dimensional perspective is a valuable tool that helps increase understanding of features and relationships in images. Many types of earth science images can be integrated to create 3D scenes that show features and anomalies much more clearly than traditional two dimensional views. To create a 3D view, you simply add a Height layer to your 2D algorithm that contains an elevation image (such as a digital terrain model), then change the View Mode to 3D perspective or 3D flythrough.ER Mapper's 3D viewing capabilities are extensive and easy to use, including:

-view any image in 3D, and quickly switch between 2D and 3D views

-use static 3D perspective or real-time "flythrough" modes

-stack multiple surfaces in a single view

-set transparency between surfaces to view underlying features

-incorporate vector data in 3D, such as roads or cultural data

-generate top quality, high resolution 3D hardcopy prints

Two-dimensional (planimetric) view

Three-dimensional perspective view

5- 3D PERSPECTIVE :HANDS-ON EXERCISES

These chapter give you practice setting up algorithms for 3D viewing, and manipulating the images using the viewing and display controls in ER Mapper's 3D perspective viewer.After completing these exercises, you will know how to perform these tasks in ER Mapper:

-Prepare an algorithm for 3D viewing by adding a Height layer

-Change the viewpoint, zoom level, and other 3D view parameters

-Use the 3D Flythrough viewing mode

-Stack multiple surfaces in a 3D view and set surface offset and transparency

-Merge separate algorithms into surfaces in a single algorithm

Objective: Learn to prepare an algorithm for 3D viewing by adding a Height layer that contains the desired elevation data. Also learn to use 3D perspective view mode, and control the viewpoint and display parameters of the 3D scene.

1-Open a Landsat TM RGB algorithm

2-Zoom in to the upper-right portion of the image

3-Add a Height layer and load the DTM image

4-Select 3D Perspective mode to view the image in 3D

5-Turn off the Lighting (artificial illumination) option

6-Tilt the image forward or backward

7-Rotate the image around its center point

8-Zoom the image in and out

9-Rotate the image side to side

10-Pan (scroll) the image within the window

11-Increase the vertical exaggeration of the image

12-Apply different rendering modes for the 3D image

13-Use the Lighting and Bounding Box options

14-Adjust the amount of Terrain Detail

15-Save the 3D algorithm

6-CONCLUSION

3D VISUALIZATION help me for:

-Evaluate line of sight problems

-True real-time 3-D stereo fly-through

-View data with true 3-D perspective

7-REFERENCE

1-photogrammetric week'95

2-manual of photogrammetry

3-PE&RS

4-Manual of ER Mapper 6.0