APLICATIONS OF PRODUCTS OBTAINED FROM DIGITAL TERRAIN MODELS

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ABSTRACT

Th e representation of relief is a fundamental component of the cartographic process. A wide range of techniques representing the topographic variations of the earth´s surface on a two dimensional surface have been developed and these vary both in their symbolic content and in their degree of realism.
In even that the Digital Terrain Models have been used since finals sixty's decade, recently it has been increased their multiple applications and uses in different technical areas and engineering, especially in Geographic Information Systems where they are need to data georeferencing.
With this work we want to contribute in a technical, efficient and economical manner to the diverse processes that involve the usefulness of the DTM and especially to present the possibility of capturing data with a photogrametric method alternative to the conventional method.
The quality of the data source, the accuracy, the resolution and the ability to define small details, the hardware, methods and procedures to capture and processing data are the most important parameters when considering the generation of the Digital Terrain Models.
The comparison of the products elaborated by digitizing and capturing contour lines by photogrammetric methods with those generated from Digital Terrain Models allow to establish the quality, uselfulness and productivity obtained in each one of the processes.
The procedure used to derive DTMs is based on a grid of points (SCOP software) that let get the product in an easy and efficient way.

1. INTRODUCTION

Recently, the use of a Digital Terrain Models and a computer graphics techniques has become a more common method not only for generating computer visualisations of the terrain but also for assessing the impact of manmade objects on the landscape.Thus in many cases the Terrain Model providing the geometric description of the earth´s surface will be supplemented by descriptions of significant landscape features.Vegetation and cultural information as well as design objects will often be combined with the terrain model to create a scene with a higher degree of realism. Models of this form can be referred to as landscape models.

A big organization that manages a lot of information requires to use efficient systems that enable to transform these data in useful information for decision making in several technical areas.

The Digital Terrain Models (DTM) derived from points, lines and areas, which describe the topography of the earth's surface, are currently essential components in the cartographic processes.

The Digital Terrain Models can be manipulated as input data in order to show results and to allow the analysis in the Geographic Information Systems.

The main objective of this work is to show several applications of the Digital Terrain Models and establish the best relation Benefits/Time, comparing the capture of contour lines by conventional methods with the data generated by DTM method.

2. ANTECEDENT

Several methods of capture and processing were utilized to be able to compare the different results.It was possible to establish which is the efficient process for analysis

and feasibility studies in cartographic, photogrammetric and engineering disciplines.

The area of study was into the urban area of the City of Manizales (Colombia).

Equipment:

- Sheets at 1:2.000 scale, issued 1989.

- Aerial photographs, 1:8.000 scale, issued 1993.

Software:

-Infocam/ Oracle

Hardware:

- Workstation 4000-VLC
- Workstation Vax 4000-90
- Analytical plotter DSR15
- Digitizer Calcomp 9500
- Drum Plotter Calcomp Classic 4036

3. PROCEDURE

- Select and analyze the capturing source, for example: photos, cartographic information and reports.

- Capture of contour lines by manual digitizing using the Collector module of Infocam.

- Capture of contour lines by conventional photogrametric processes using the Collector module of Infocam.

- Capture of contour lines from a grid of points and breaklines using the Kern and Dtmcoll module of Infocam.

- Subsequently, using the Image and Scop modules of Infocam, the data were edited and processed.

- Obtention and output of products: plotter, printer, report and display in screen.

- Verification of quality and accuracy of products.

- Adjustment and final corrections.

- Output of the final products.

4. RESULTS AND CONCLUSIONS

It is very important for the final product the quality and the accuracy both of the data source and the capture methods.

The capture of data for photogrammetric methods offers the best results than the other methods.

The generation of the DTMs allows to show the main details and relief forms that are not visible with other kind of methods.

Grid models have the advantage of a regular structure of the data, wich simplifies the use of the DTM.

High fidelity and easy to use DTMs have the potential to replace the existing graphical contour maps and to describe all relevant topographical height information in digital form.

Finally, the diverse products obtained by DTM are very important in the analysis. They may be used in different studies as:

- Construction of highways.
- Filling and cutting operations.
- Environmental assessment.
- Soil studies and land suitability.
- Infrastructure for telecomunications.
- Geographic studies.
- Design of utilities.

In the same way, the DTMs are more easy to update than other kind of elevation data.

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