THE CONVERSION OF TOPOGRAPHIC DATA IN GIS FORMAT

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Abstract*. Due to the fact that spatial data is stored in different formats, and in order to be able to work with them many times, we have to convert them from one format to another. This paper presents the transformation of dwg files into ESRI shapefile format. Any DWG file can be considered as a database of 2D or 3D drawings designed in the CAD work environment, such as AutoCAD. These types of programs contain vector images and metadata that describe the content existing within the file. DXF files are ACII versions of DWG files. ESRI shapefile extension is a spatial data structure, based on the generation of each spatial theme in a single vector format, be it point, line or polygon format. These data are easy to manage from the point of view of adding / deleting and formatting the supported columns. Using annotation is an option in ArcGIS software in order to store text to place on the maps. In other order, the annotation can be used in order to describe a particular feature or to add some other information to the GIS map. With the annotation, the text string with the position and the display properties are record together and can be editable individually. Annotations that are feature-linked are associated with a specific features in another feature class in the geodatabase. If it is checked, when it is creating the output annotation feature class, it will be automatically generated a relationship class. This particularly relationship class it define the relationship that exist between the annotation and the features and it enables to define and customize this relationship but it won't establish the connections and the links between features and annotation. By definitions of GIS and CAD, it can be said that a GIS software can be related to digital maps and a CAD software can be related to objects. In other words we can say that to represent a line (e.g. :road, rivers) a GIS software must be used but to design a bridge a CAD software must be used. The most important differences between a GIS and a CAD software are: a GIS software necessarily requires a spatial reference and a CAD can dispense with it; in a GIS software the scale can be change very simple, in a CAD software to change the scale can be problematic; GIS data's are stored in multiple files (shp, prj, dbf), while a CAD data can be stored in a single file; GIS applications are using a common terminology (e.g. a layer is the same in any GIS software (QGIS, ArcGIS, Envi), but in CAD some terms may conflict. In a GIS, analaysis predominates, a CAD places greater emphasis on detail and precision (e.g. the design of town elements); any GIS software is very efficient in order to managing databases but it is not a strenght of a CAD.*

Key words: Geographical Information System - GIS, DWG, Shapefile, Conversion

INTRODUCTION

This paper presents the transformation of dwg files into ESRI shapefile format. DXF formats grow an Autodesk company status and for the first time in December 1982. This format is used in particular with regard to these works in the field of computer-aided design, known as the generic CAD name (BEGOV ET AL., 2016). Formats a format of delay of the company status ESRI and introduced on the market with the launch of version 2.0 of the application ArcView GIS, in 1990.

The cadastral works are composed of (Filip et al., 2015):

a) establishing the boundaries of the administrative-territorial units and the lands and their delimitation by terminals (SMULEAC ET AL., 2014, DRAGOMIR ET AL., 2016);

b) establishing and marking on the ground the boundaries of the city (Popescu et al., 2016);

c) identification of immovable property based on the documents confirming the rights (Oncia et al., 2013);

d) the field measurements for drawing up or updating the cadastral plans (Manole et al., 2015);

e) formation of immovable property.

The cadastral documentation is a set of technical and legal entries that establish the real situation on the ground (IENCIU ET AL., 2013).

G.I.S (HERBEI ET AL., 2016) assumes the computerized modeling of the geographic projections of the Earth and is based on the use of different calculation techniques for collecting (NISTOR, 2011), storing, analyzing and displaying the geographic data of the land surface in the form of graphical and numerical reports (HERBEI AND NEMES, 2012).

The geographic information system (GIS) integrates several types of data (HERBEI, 2013, HERBEI, 2015), analyzes the spatial location and visually organizes the layers of information through maps and 3D scenes. With the help of GIS, users can analyze topographic, environmental, demographic and land use data (BADULESCU ET AL., 2016) to facilitate business decision-making and project management.

Figure.1 What is GIS?

MATERIAL AND METHOD

In this paper we have used ArcGIS software for the conversion of topographic data in the GIS format. ArcGIS is a geographic information system (GIS) for working with maps and geographic information (Herbei and Sala, 2014). It is used for creating and using maps, compiling geographic data, analyzing mapped information, sharing and discovering geographic information, using maps and geographic information in a range of applications, and managing geographic information in a database.

In this paper it was used ArcMap software which is the main component of ESRI Solution - ArcGIS suite - for geospatial processing and to view, edit, create and analyze geospatial data.

RESULTS AND DISCUSSIONS

To perform the conversion from DWG or DXF format specific to cadastral topo measurements in a shapefile format dedicated to GIS platforms, the following steps are performed:

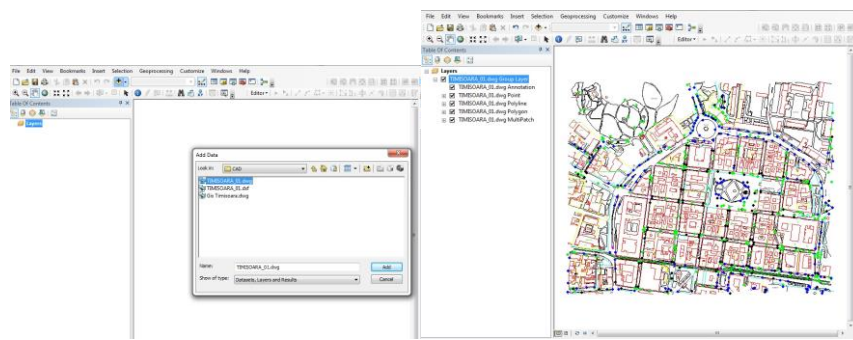- Adding the DWG file into ArcMap Software, and then expanding the .dwg Group Layer.

Figure.2 Add DWG data in GIS

Step 1. Right click on the polygon layer in the DWG group and then export it to a polygon feature class. In order to be able to export the polygons from the DWG file, they must be closed, otherwise they will be exported as polylines.
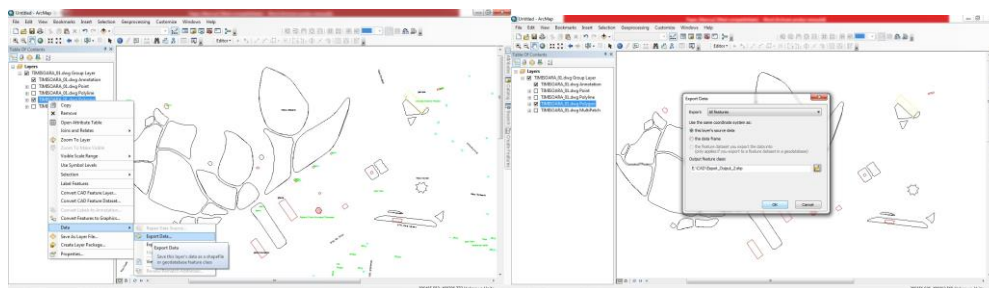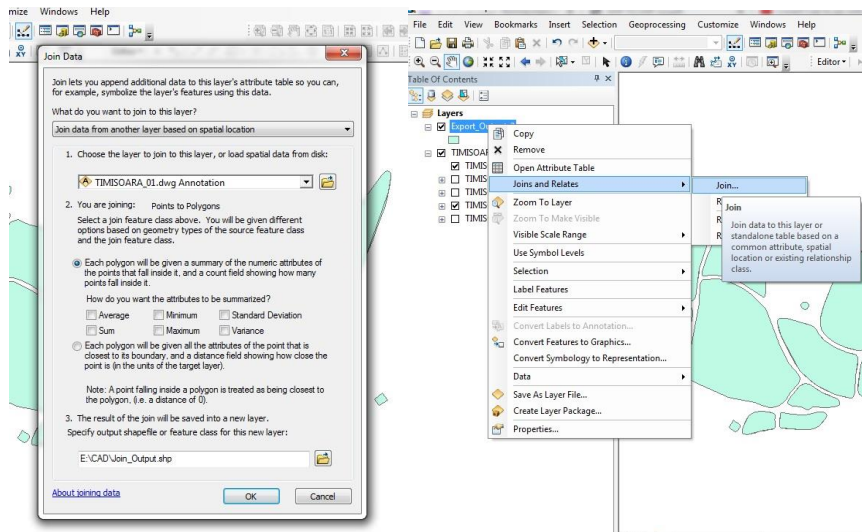

Figure.3 Export Data

Figure 4. The Join and Release command

Another way to convert data from dwg or dxf to shapefile is through the commands: Feture to Line, Feature to Point and Feature to Polygon.
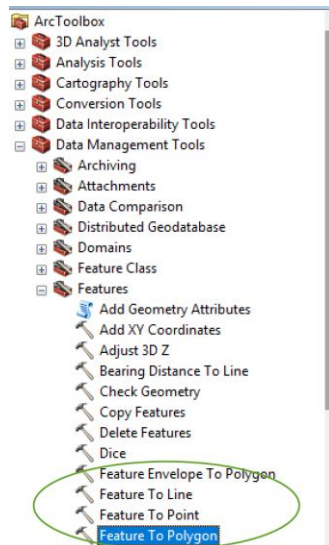

Figure. 5 Convert CAD data to GIS format data

Using these commands, the descriptive information (attributes) that exist in the CAD file after importing into GIS and which are on the Annotation layer can be placed directly in the spatial database that will be created for point, line or polygon
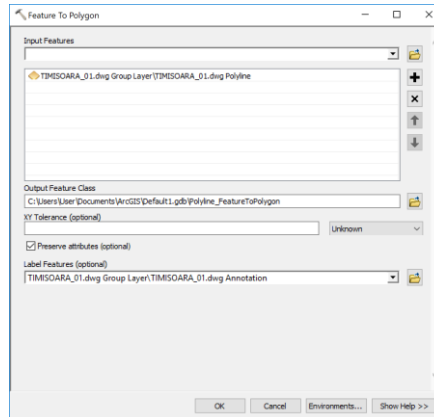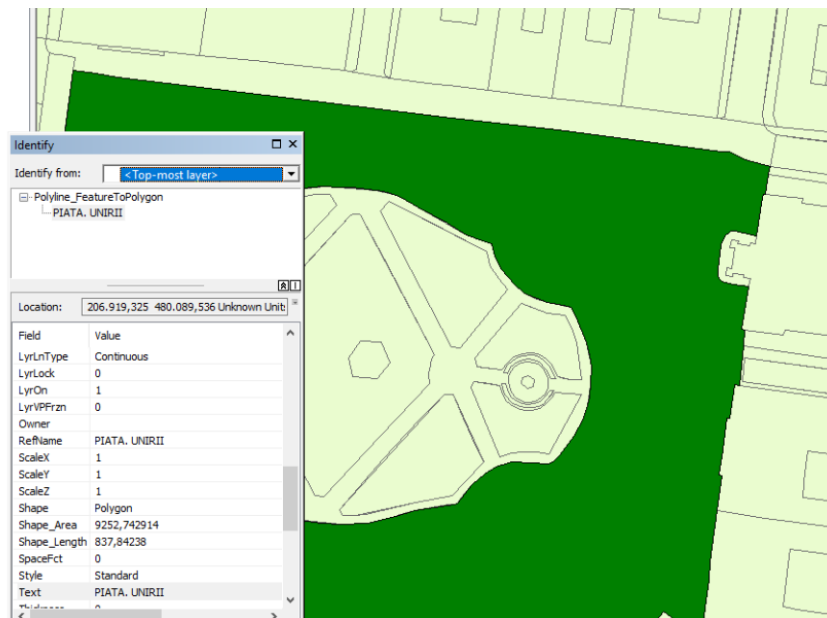
Figure. 6 The conversion Feature to Polygon

Figure. 7 The result of applying the Feature to Polygon command

It is noted in the image above that all the information existing in the DWG file has been placed in the Attribute Table specific to the shapefile file in ArcGIS.

CONCLUSIONS

The most important differences between a GIS or a CAD software are analyzed as follows: A GIS details in the field have a geometry (point, line, polygon) and thematic information stored in a database, while a CAD have no thematic information. In GIS the details can be represented in both vector and raster format, in CAD details can only be represented in vector system. A GIS allows for complex spatial analysis and queries, while a CAD has very

few analysis tools. In a GIS project the geographical data must be transformed or processed in a format compatible with the respective GIS system. Geographic information is available at various scales. Before being integrated into the system, the data must be brought to the same scale. This can only be a temporary transformation for the purpose of display or a permanent one used in a particular analysis. GIS technologies offer numerous tools for processing spatial data but also eliminating unnecessary ones.

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