DIGITAL MAPPING, AUTOMATIC STRUCTURING AND CLASSIFICATION, FOR URBAN AREAS USING A GRAPHICS WORKSTATION

By

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And

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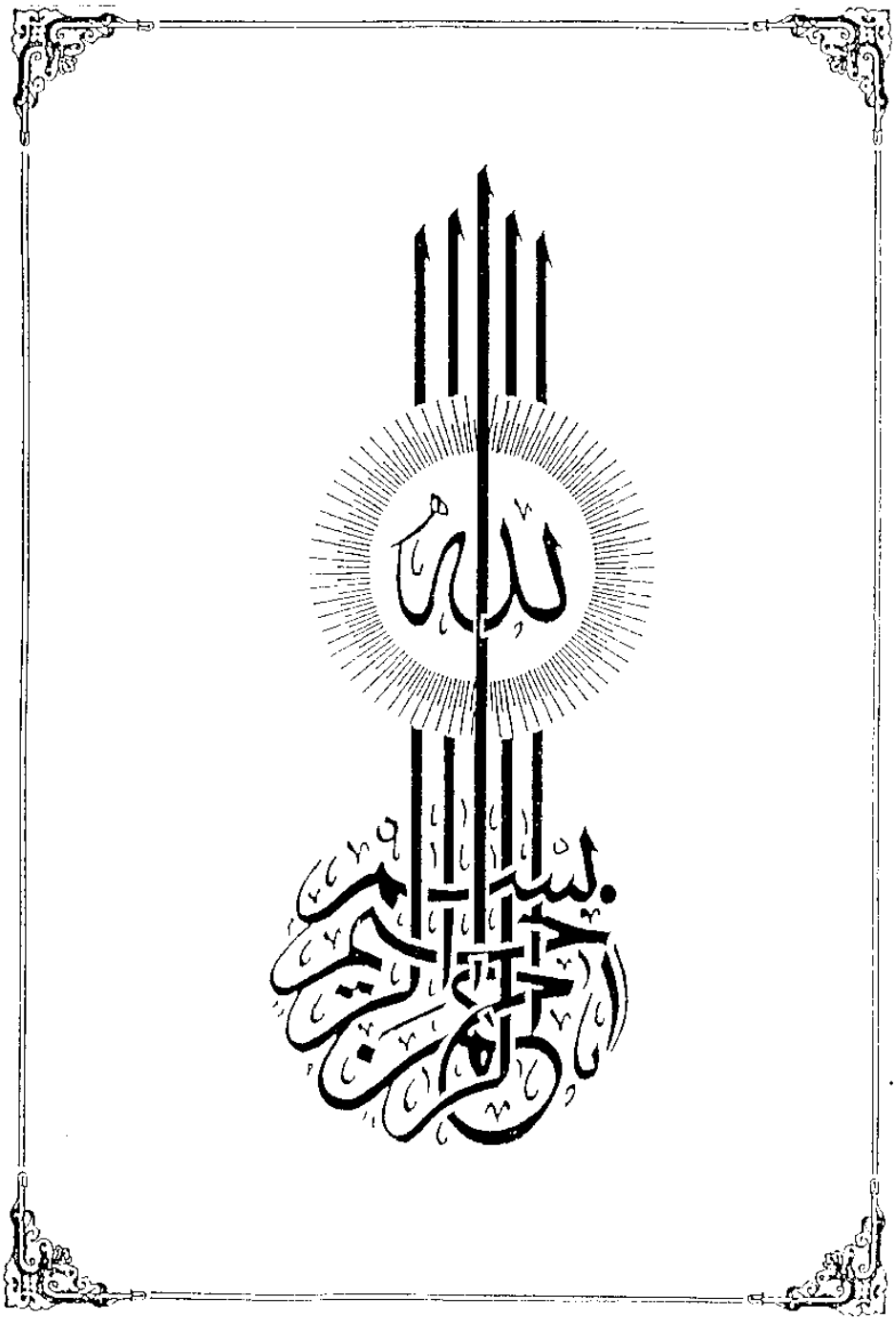

STATEMENT

This dissertation is submitted to Ain Shams University for the degree of DOCTOR OF PHELOSOPHY in Civil Engineering.

Ths work included in this thesis was carried out by the auther in the department of Civil Engineering (Public Works Division), Ain Shams University, from 1986 to 1991.

No part of this thesis has been submitted for a degree or a qulification at any other University or Institution.

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ABSTRACT

Efficient techniques for structuring and classifying map data in digital form have been developed, aiming at the reduction of the processing time, the simplification of the structuring process in vector format and the decrease of the storage capacity needed for the database. These techniques are tested on digital data captured from existing maps of scale 1: 1250, for an area called "Bloomsbury" lying in central London.

Structuring of links, nodes and polygons is performed within a developed technique, mostly automatic, that makes use of the power of the cartographic editing package LITES2 through some macro programs developed specifically for this purpose. Other commercial packages are also used in this process, namely ILINK and IPOLYGON. Modelling of the structured data is designed and applied using the Entity Relationship Model.

The relational DataBase Management System DBMS is designed to receive the calculated attributes from the data model in order to classify the map entities in terms of land_use. This classification process is made using commands written in the Structured Query Language SQL within the ORACLE Realtional DataBase Management System (RDBMS) and applied to attributes stored in the database.

The identification process is based upon the topological principles of adjacency and connectivity and the presence of original link coding. Further attributes are extracted from the structured data

and passed to the database in order to identify block and parcel edges within the proposed DBMS.

Graphic results are obtained by developing a technique to link the non graphic database with the graphic attributes stored in the cartographic package.

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CHAPTER 1

INTRODUCTION

1.1 Digital Mapping

1.1.1 General

Digital mapping can be defined as the digital representation of the spatial and / or planimetric distribution of map characteristics. It contains spatial information such as the location of different map entities, and non spatial information such as feature codes attached to the spatial information to be identified in the digital form, [Lichtner, 1988].

The conversion of the map data from graphic into digital form requires a vast amount of data which obviously requires computer systems and some sort of databases, [Nagy et al, 1979].

The use of computers in cartography and digital mapping has a number of benefits which include the, [Feuchtwanger et al, 1988]:

1. To facilitate map making and updating when data are already in digital form.
2. To make maps for specific user needs.
3. To minimize the use of the printed map as a data stored and thereby to minimize the effects of classification and generalization on the quality of the data.
4. To create maps that are difficult to be made by hand, e.g 3D maps or stereoscopic maps.
5. To introduce automation, enabling a review of the whole map making process.
6. To facilitate data analyses.