The first geographic information system

第一个地理信息系统

中国大学MOOC

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- 主要研究方向地理信息系统平台及其应用，主持国家自然科学基金，国家重点研发（子课题）等课题多项，获省部级科技进步二等奖2项，三等奖1项，部门理论成果一等奖1项，高校GIS论坛“优秀教学成果”奖1项。
- 出版和翻译著作6部，近5年，以第一作者或通讯作者发表论文16篇，发明专利2项，软件著作权3项。

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The hardware of the first geographic information system

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第一个地理信息系统的硬件设备

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

第1个地理信息系统是什么样的?

图片来自参考文献【1】

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第一个地理信息系统的硬件设备

The hardware of the first geographic information system

地理信息系统相关文献

1. Roger Tomlinson，An Introduction to the Use of Electronic Computers in the Storage, Compilation and Assessment of Natural and Economic Data for the Evaluation of Marginal Lands[J]，1962.
2. Roger Tomlinson，Department of Agriculture, Government of Canada，Feasibility Report of Computer Mapping System，Agricultural Rehabilitation and Development Administration,[J]，August 1963.
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5. Roger Tomlinson，The application of electronic computing methods and techniques to the storage, compilation, and assessment of mapped data[D]，July 1974.
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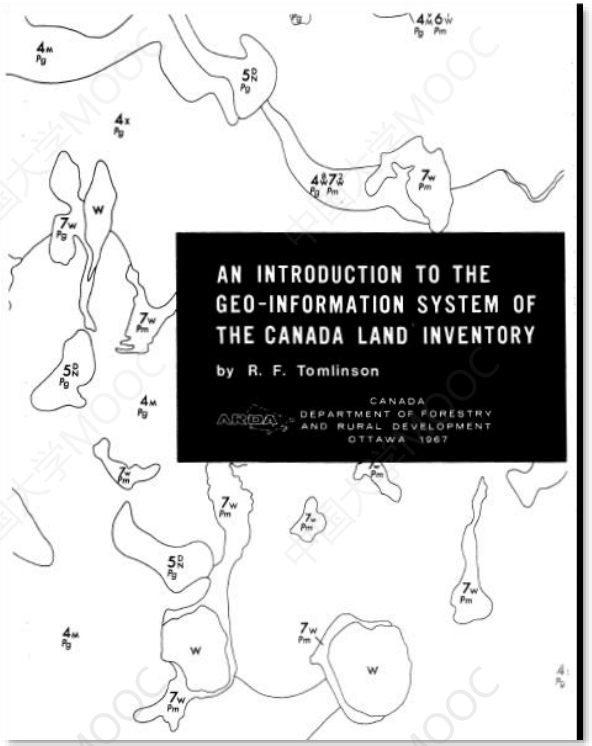
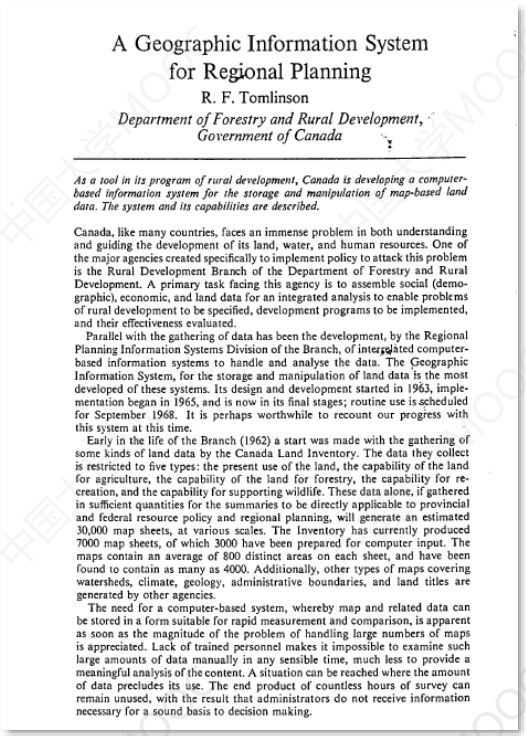
第一个地理信息系统的硬件设备

The hardware of the first geographic information system

地理信息系统相关文献





A Geographic Information System for Regional Planning

R. F. Tomlinson

Department of Forestry and Rural Development, Government of Canada

As a tool in its program of rural development, Canada is developing a computer-based information system for the storage and manipulation of map-based land data. The system and its capabilities are described.

Canada, like many countries, faces an immense problem in both understanding and guiding the development of its land, water, and human resources. One of the major agencies created specifically to implement policy to attack this problem is the Rural Development Branch of the Department of Forestry and Rural Development. A primary task facing this agency is to assemble social (demographic), economic, and land data for an integrated analysis to enable problems of rural development to be specified, development programs to be implemented, and their effectiveness evaluated.

Parallel with the gathering of data has been the development, by the Regional Planning Information Systems Division of the Branch, of interrelated computer-based information systems to handle and analyse the data. The Geographic Information System, for the storage and manipulation of land data is the most developed of these systems. Its design and development started in 1963, implementation began in 1965, and is now in its final stages; routine use is scheduled for September 1968. It is perhaps worthwhile to recount our progress with this system at this time.

Early in the life of the Branch (1962) a start was made with the gathering of some kinds of land data by the Canada Land Inventory. The data they collect is restricted to five types: the present use of the land, the capability of the land for agriculture, the capability of the land for forestry, the capability for recreation, and the capability for supporting wildlife. These data alone, if gathered in sufficient quantities for the summaries to be directly applicable to provincial and federal resource policy and regional planning, will generate an estimated 30,000 map sheets, at various scales. The Inventory has currently produced 7000 map sheets, of which 3000 have been prepared for computer input. The maps contain an average of 800 distinct areas on each sheet, and have been found to contain as many as 4000. Additionally, other types of maps covering watersheds, climate, geology, administrative boundaries, and land titles are generated by other agencies.

The need for a computer-based system, whereby map and related data can be stored in a form suitable for rapid measurement and comparison, is apparent as soon as the magnitude of the problem of handling large numbers of maps is appreciated. Lack of trained personnel makes it impossible to examine such large amounts of data manually in any sensible time, much less to provide a meaningful analysis of the content. A situation can be reached where the amount of data precludes its use. The end product of countless hours of survey can remain unused, with the result that administrators do not receive information necessary for a sound basis to decision making.

GEOGRAPHIC INFORMATION SYSTEMS, SPATIAL DATA ANALYSIS, AND DECISION MAKING IN GOVERNMENT

R. F. Tomlinson

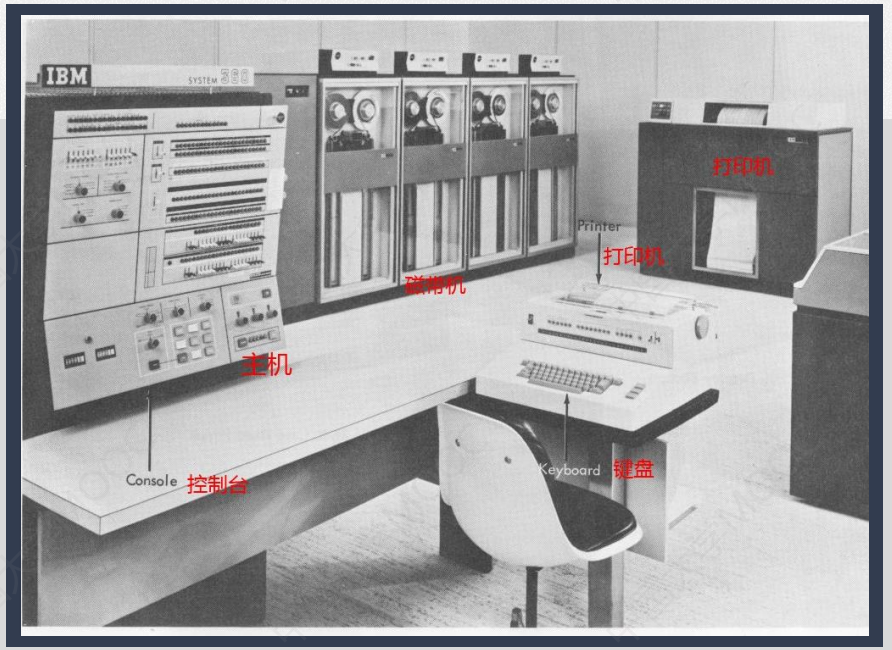
July, 1974

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS所采用的计算机是当时最为流行的IBM 360系列计算机。

当时的计算机和我们现在所理解的计算机有很大的不同，它不是一个独立的设备，而是由主机、存储、输入和输出等若干个设备组合而成的。



360系列计算机

图片来自参考文献【4】

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的主机采用了IBM360系列的Model 50计算机。

IBM 360 Model 50主机

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的存储设备

1.磁盘机

和今天的硬盘（hard disk）类似，只不过比今天的硬盘大得多，存储容量却小得多，整个磁盘组的容量才7.25MB。

图片来自参考文献【6】

IBM System 360计算机系统中的磁盘机（型号：2311）

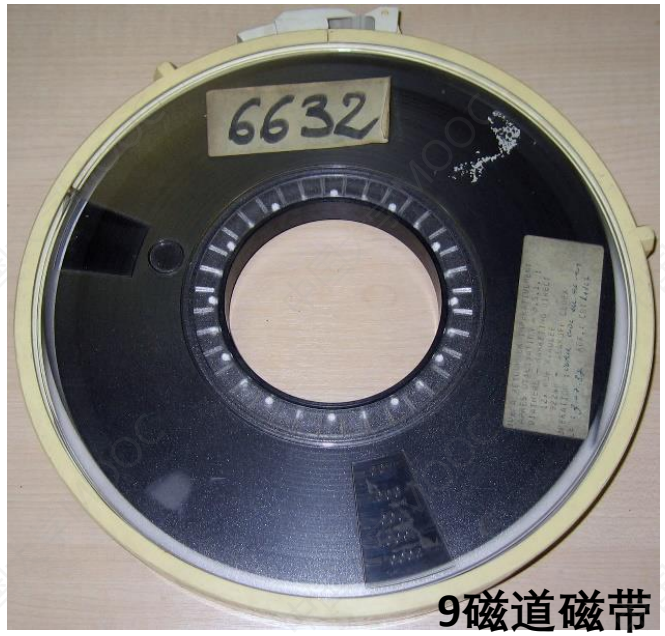
第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的存储设备

2.磁带机

图片来自参考文献【7】



图片来自参考文献【8】

每英寸可以存储6250Byte

最长有2400英尺长（731.5米）

直径大约在20厘米左右

最大存储容量约在170MB

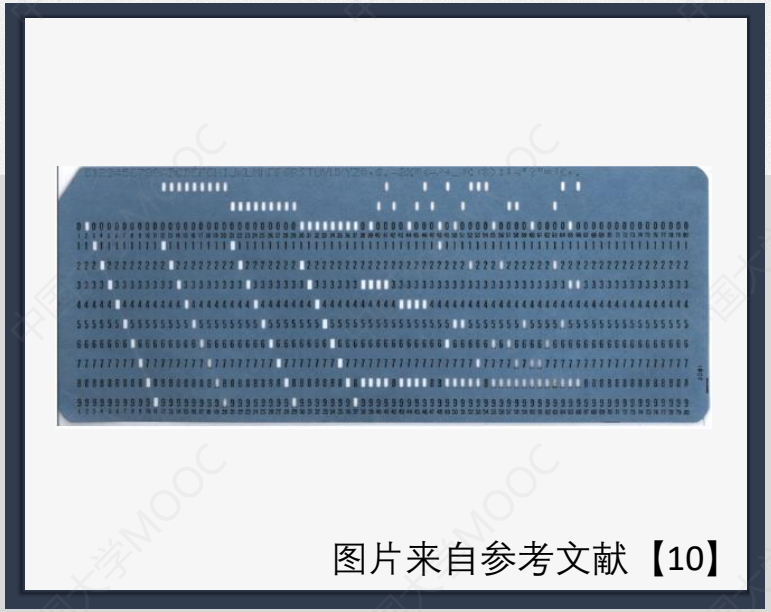
第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的标准输入设备-读卡机

图片来自参考文献【9】

- IBM System 360计算机系统中的2540系列的读卡机



图片来自参考文献【10】

- 80列、矩形孔的标准的IBM打孔卡片

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的特殊输入设备-滚筒扫描仪（drum scanner）

图片来自参考文献【11】

CGIS中所用的滚筒扫描仪

IBM公司专门为了满足加拿大土地调查（Canada Land Inventory）项目需求而定制的。该扫描仪最大可以扫描48*48（英寸）（换算过来是1.22*1.22米）的地图，扫描这样一幅地图需要大约15分钟的时间。

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的特殊输入设备-制图数字化仪（X-Y Digitizer）

图片来自参考文献【11】

CGIS中所用的数字化仪

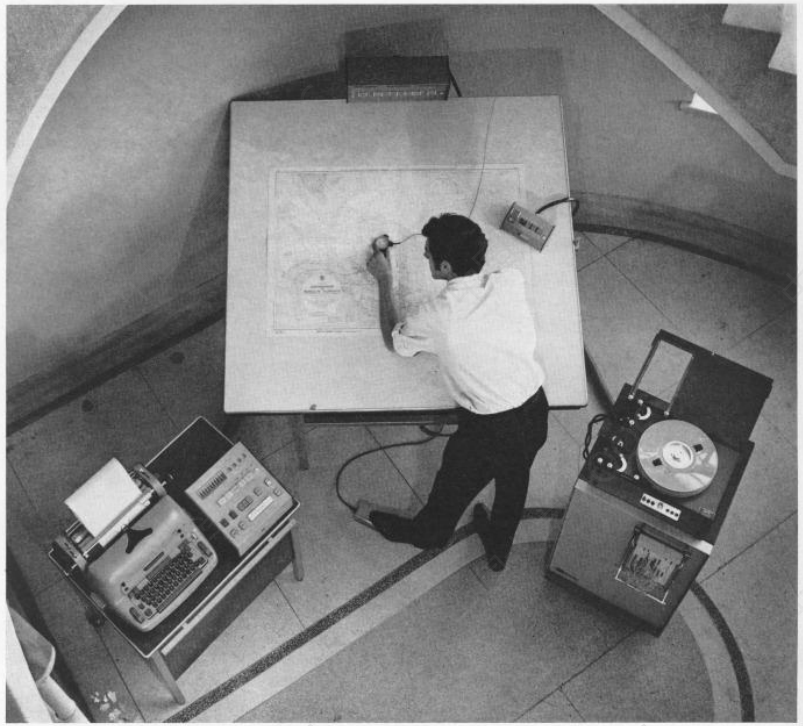
由Dobbie McInnes（多比·麦金尼斯）公司生产的“D-Mac”的制图数字化仪（X-Y Digitizer），数字化仪可以将纸质地图上的点数字化成坐标存储到计算机里。

英国设计杂志关于D-Mac数字化仪的报道

Geared for export: three case histories

James Dreaper explores the way three British companies went about designing products which have become outstanding exports. They illustrate the three main categories of export design thinking: products which sell well abroad because they are superbly well designed; products which have been designed for specific overseas markets; and products which have had the needs of foreign markets built into their basic concept.

1 D-mac's Cartographic Digitiser



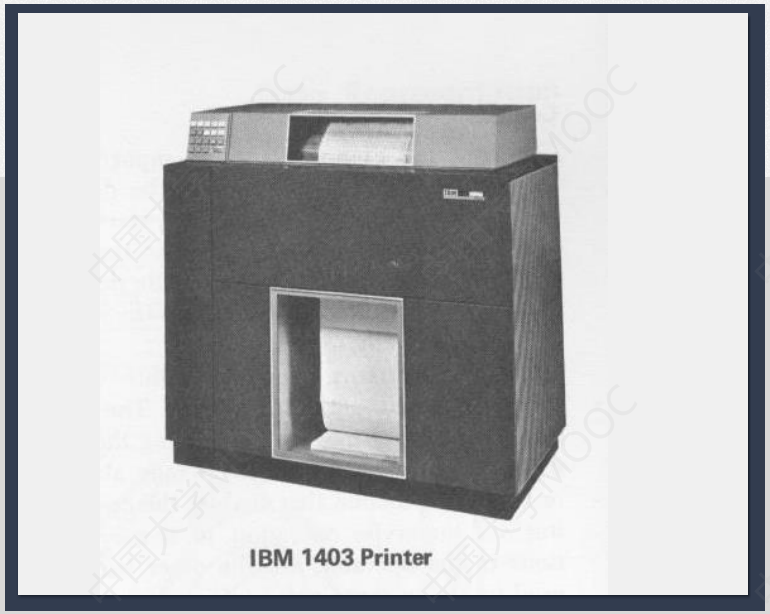
The three units that make up the Cartographic Digitiser Type CF *are a control pedestal, a reading table and an electronics console; together, they fit into an area 10 feet by 6. The system provides a rapid method of converting data contained in maps, photographs or films into a form suitable for computer processing. The "pencil" develops an electrical field which is tracked by a sensing mechanism.*

图片来自参考文献【12】

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的标准输出设备-打印机



IBM System 360计算机系统中的1403系列的打印机

图片来自参考文献【9】

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的特殊输出设备-滚筒式绘图仪（a drum plotter）

IBM滚筒式绘图仪
（型号：1627）

图片来自参考文献【13】

第一个地理信息系统的硬件设备

The hardware of the first geographic information system

CGIS的特殊输出设备-平板式绘图仪（a flatbed plotter）

图片来自参考文献【12】

IBM平板式绘图仪
(型号：1627)

格伯科研仪器公司（The Gerber Scientific Instrument Company）于1964年型号为Model75 的平板式绘图仪，在Roger Tomlinson的可行性报告中，格伯科研仪器公司生产的平板式绘图仪也是可选项之一。

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