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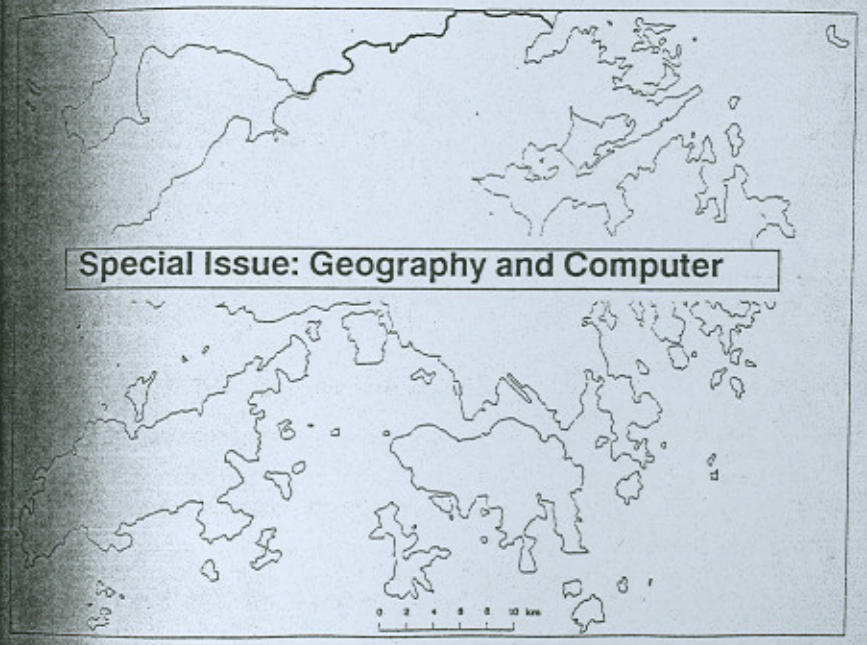

Special Issue: Geography and Computer

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WORDS FROM THE CHIEF EDITOR

The theme of this issue is computer application in geography. To Ka Yan has recently conducted a research on the attitude of geography teachers in using the computer as a teaching tool and Yeung Chi Ling has surveyed the use of the computer by geography students in the tertiary educational institutes. The findings of these two surveys are reported in this issue. Anthony Yeh introduces the development of geographical information system in Hong Kong; in particular, Dr. Yeh reports a number of recently developed GIS softwares, a number of which contains information of the 1981 and 1986 censuses. Most of these softwares can be used in a PC environment and are therefore of great potential value eo the geographer both in the secondary schools and tertiary educational institutes, in the private sector and in the government. Finally, the paper by Yeung Ka Ming illustrates how a number of widely available softwares, specifically, DBASE III, SPSSPC, and MICROSOFT CHART, can be linked and integrated to form a set of highly powerful data storage, analysis and retrieval tools. As Anthony Yeh's paper rightly pointed out, the computer, especially the development of geographical information system, is one of the hottest topics in geography. From the findings of To and C.L. Yeung, it is apparent that goegraphers in Hong Kong have only just begun to appreciate this, despite the holding of a number of seminars on the use of micro-computers in geography by the Association in the past few years. We sincerely hope that the papers in this issue can help arouse the interest of Hong Kong's geographers in acquainting themselves with this development and make full use of it in their teaching and research.

Mr. Yeung Ka Ming of the Hong Kong Baptist College has kindly agreed to be the guest editor of the current issue. With Mr. Yeung's help and his knowledge in computer graphics, we were able to use different fonts and try to produce the journal in a somewhat different format. We consider this a substantial improvement over the previous issues. Also the cost of production was cut by half as a result of this change. This last point cannot be overemphasized, given the current financial situation of the Association. Both the editorial board and, in my opinion, the entire Association, owe Mr. Yeung a great deal. Many thanks to Mr. Yeung.

Last, I would like to thank all members of the editorial board for their dedicated efforts. Without their support, the continual publication of this journal would not have been possible.

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NEWS

NEWS OF THE HONG KONG GEOGRAPHICAL ASSOCIATION

1. Annual General Meeting

The 1989 Annual General Meeting will be held at the Rayson Huang Lecture Theatre, the University of Hong Kong at 11:30 am on Saturday, March 11, 1989. The agenda of the AGM is attached on a separate sheet. Members are urged to submit agenda items, if such additions or alterations are felt necessary, one month prior to the holding of the meeting.

2. Extraordinary General Meeting

An extraordinary general meeting will follow right after the AGM to discuss membership fees. Again, agenda of the EGM is as attached.

3. Hong Kong Geography Day

Hong Kong Geography Day, 1989, will be held on Saturday, March 11, 1989, at the Rayson Huang Lecture Theatre, the University of Hong Kong. The Department of Geography and Geology, University of Hong Kong jointly sponsors this event. As before, this will be a one-day event, starting from 9:00 in the morning to 3:30 in the afternoon, and consisting of book and audio-visual aid material exhibitions and public lectures. The theme of this year's Hong Kong Geography Day is 'The development of Hong Kong Geography in the past twenty years' in commemorating the twentieth anniversary of the Hong Kong Geographical Association. Details of the programme will be sent to members of the Association and all secondary geography schools in due course.

4. Secondary School Activities

(a) Past Activities

(i) Field Camp. A field camp was held in Kadooriee Agricultural Research Centre on Jan 7-8, 1989. A total of 37 people took part in the activity. Prof C.J. Grant, Director of the Centre and Dr. M.R. Peart led the field works. Specifically, Dr. Peart brought the participants to Tai Tong, Yuen Long and demonstrated how drainage basin field surveys, which form part of the Advanced Level syllabus, can be carried out using non-expensive instruments that are widely available in the secondary schools. The next issue of this journal will provide details of the survey methods, together with some of the findings, of this exercise.

(ii) Field Trip to Guangzhou. Due to lack of response, the previously proposed field trip to Guangzhou during the Christmas holidays was cancelled.

(b) Future Activities

(i) A Field Day to the Island House will be held on Jan 28, 1989. Dr. R. Irving will lead the field trip. The theme of this field day is 'Environmental pollution and conservation'. For details, please refer to the previously circulated memorandum or call Mr Yeung Pui Ming at 0-6461322.

(ii) Guangzhou Field Trip. The Association in conjunction with the Guangzhou Geographical Association plans to organize a five-day field trip to Guangzhou during the Easter Holidays. An intense course on the Geography of China will be offered as part of the field trip package.

5. Geography of China and Tourism Exhibition

The exhibition will be held at Shatin City Hall on April 28-30, 1989.

6. Hong Kong Teachers' Centre

The Association previously appointed Mr. Edward Woo, vice chairman of the Association, to represent the Association in the provisional board of the proposed Hong Kong Teachers' Centre. A general meeting was held late last year. A further meeting will be held early this year to finalize its constitution. The Association is at present formally repesented in this Teachers' Centre.

NEWS OF COLLEGES AND UNIVERSITIES

1. Hong Kong University Department of Geography and Geology Opening Day. The Department of Geography and Geology, Hong Kong University, will hold an opening day on March 11, 1989 in conjunction with the Hong Kong Geography Day.

2. Hong Kong Baptist College's China Studies Degree Course. The China Studies Degree Course, of which the Department of Geography forms an integral part, was formally accredited by the Council for National Academic Awards of the United Kingdom. The Course will take in its first batch of students in the next academic year.

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Teacher's Attitude in the Use of Microcomputers in Geography Teaching

by
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Introduction

Geography teachers in Hong Kong have heard or read of the use of microcomputers in geography teaching, but perhaps very few has ever tried to use the microcomputer in classroom teaching. The role of teacher in computer assisted learning is however decisive. They stand in the forefront in the adoption of the new technology in the classroom. The mere existence of hardwares and softwares does not guarantee that teachers will use the computer. Central to the issue is how they perceive the use of computers in teaching and whether they are equipped with the necessary technical and pedagogical know-how.

Based on part of a survey of microcomputer use in geography teaching in Hong Kong (To, 1988), this paper describes how geography teachers in Hong Kong view the use of microcomputers in geography teaching and their experience and knowledge in microcomputer use.

Method of Study

A postal questionnarie survey was carried out in January, 1988 to investigate the possibilities of and obstacles in using microcomputer in the teaching of geography in Hong Kong.

The questionnaries were sent to secondary schools having geography as an individual subject in the curriculum. The subject was the geography teacher who is most committed to or interested in using microcomputers in geography teaching. Where there was no such person, the panel chairperson was requested to complete the questionnaire. 177 schools returned the completed questionnaire, with a response rate of 44.3%. Since 94.4% of the respondents came from aided or government schools, the analysis therefore reflects more the situation of the public-sector schools.

The respondents

61% of the respondents were female and 39% male. Of them, 63% were within the age group of 26 to 35 years. The average respondents were experienced both in the number of year of service and in position of responsibility. About 68% had more than 6 years' teaching experience, and over 80% were geography panel chairpersons. They are, therefore, in a position to influence school decision policy, and to promote or discourage attempts to integrate computer assisted learning into the curriculum. If they are convinced of the effectiveness of the computer in

geography teaching, it is they who would influence the commitment of their panel members and headmaster to computer use. On the other hand, their negligence and ignorance may hamper adoption.

Analysis of results

1) Teacher's knowledge and experience in computers

a) Courses taken before teaching career

47.7% of the respondents said that they have attended courses related to Computer Studies or used computers in the university or college of education. The percentage itself is not low but one has to be aware that the kind of experience they have may be restricted to using mainframe computer in university studies and is unrelatd to using microcomputers in teaching. Nevertheless, the experiences they have at least partially reduce the fear towards the computer.

b) In-service Training

49.6% of the respondents have attended courses/seminars / workshops concerning the use of microcomputers over the past four years. As some of them have forgotten the exact name of the courses they have attended, an accurate picture is difficult to portray. But from what have been mentioned in the questionnaire, these courses were mainly those organised by the Hong Kong Geographical Assosication (HKGA) and the Geography Section, Advisory Inspectorate of the Education Department (GSAI). Some, however, mentioned that they have attended tuition classes in private computer institutions.

c) Experience in the use of the microcomputer

61.4% of the total respondents have at least had some experience in using a microcomputer.

Table 1. Teacher's experience in using the microcomputer

Purpose	At least with some experience* No. %	Never use it No. %
Writing computer programs	39 (22.0)	138 (78.0)
Word Processing	78 (44.1)	99 (56.0)
Calculation of marks	63 (35.6)	114 (64.4)
Handling geographical data	44 (24.9)	133 (75.1)
Teaching aid in the classroom	15 (8.5)	162 (91.5)
Handling personal files/accounting	68 (38.4)	109 (61.6)

N = 177
* including "always", "usually","sometime" & "rarely"

Table 1 summarises the pattern of microcomputer use of the respondents. The majority of the respondents claimed to have "always" or "usually" used the microcomputer for wordprocessing. Making notes or handouts for pupils appeared to be the main use. The second purpose was for handling personal files or accounting. The microcomputer was also often used as a "super-calculator" in the calculation of marks. Among the 15 teachers who claimed to ihave used microcomputers as teaching aids in the classroom, 6 teachers claimed to have "sometimes" used the microcomputer in teaching. Only one person has "always" used it as a teaching aid. He was in fact teaching computer studies as well as geography in the school.

2. Teacher's view on computer assisted learning in geography

a) Views on computer assisted learning

Ten statements related to teacher's attitude towards using computers in geography teaching were given in the questionnaire for teachers to choose. The first five statments evoke positive roles of computer assisted learning in geography, whilst the latter five cast doubt on the usefulness and pinpoint the limitations. Results of the responses are shown in Table 2.

In general, the respondents were quite supportive of the use of micro-computers. Very few people showed disagreements or strong disagreements on the first five statements (a to e). Overwhelmingly large proportion of teachers agreed or strongly agreed with the effectiveness of the microcomputer in storing and handling geographical data. (over 94 %). They also felt that computer assisted learning can help geography teachers by simplifying the real world in computer games and simulation. (77.9%) A comparatively lower percentage of teachers were of the opinion that microcomputers could enhance skill and knowledge and motivate learning. (63.9% and 65.6% respectively) At the same time, a considerable number of teachers remained undecided with regard to these two points (31.3% and 29.65). This may be due to that fact that the benefits of the computer in data analysis and simulation is easier to recognise, but elements like "enhancement of skill and knowledge" and "motivation" are more abstract and sometimes beyond measurement.

The other five statements (f to j) attempt to reflect the negative atttitude towards using microcomputers in geography teaching. There was a wider spread on the percentage of reponses to the different categories. On the whole, teachers were more hesitant about these statements as shown by the high percentage of response to the "undecided" category, which ranged from 22.7% to 60.9%. The statement which is disagreed about most is related to the limited educational value in using computer assisted learning in geography lessons. More than half of the responses (56.2%) agreed that "there is too much teacher time involved in learning about computer assisted learning". The statement which receives the highest "undecided" percentage among all statements is "The existing methods I use are better than using microcomputers". This is related to the fact that since the majority of the teachers have not tried using micros in teaching, they cannot make up their mind as to the effectiveness of this tool.

Table 2 Teacher's view on computer assisted learning in geography teaching

	Strongly Agree/ Undecided		Strongly Disagree/ Disagree
	(Percentage)		
a)Micros are useful in storing geographical information for retrieval.	94.1	5.3	0.6
b)Micros are useful in performing statistical analysis for geographical data.	4.9	1.7	0.6
c)Micros are useful in developing skill and knowledge through drill.	64.5	29.1	6.4
d)Computer assisted learning can help geography teachers by simplifying the real world in computer games and simulation.	87.4	20.3	2.3
e)Computer assisted learning is useful in helping to motivate pupils in geography class.	66.3	30.8	2.9
f)There is limited educational value in using computer assisted learning in geography teaching.	13.9	22.7	63.3
g)The present geography curriculum does not enable the use of micros.	42.5	32.9	24.6
h)The use of micros in teaching reduces teacher-student interaction.	20.5	32.7	46.7
i)The existing methods I use are better than using micros.	16.6	60.9	22.5
j)There is too much teacher time involved in learning about computer assisted learning.	56.2	27.8	16.0

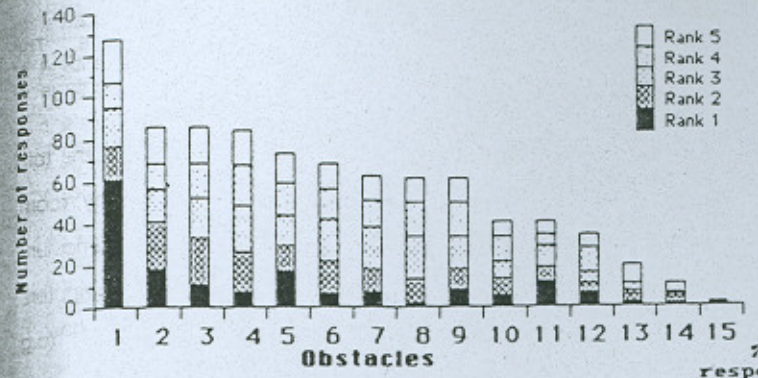
b) Obstacles in using microcomputers in geography teaching

Teachers were asked to choose five of the fourteen statements about the obstacles which hinder the use of the computer in geography teaching and to rank them according to the order of importance.

Fig.1 shows the ranks of the statement and the number of response to these statements.

Figure 1

OBSTACLES HINDERING THE USE OF MICROCOMPUTERS IN THE TEACHING OF GEOGRPAHY IN HONG KONG



	% of respondents
1. I do not have enough training/knowledge in using microcomputers in geography teaching.	71.8
2. There are no microcomputer facilities in the geography room.	48.0
3. There is a lack of software suitable for the geography curriculum.	48.0
4. Students do not have enough training in using microcomputers.	47.5
5. There is a lack of support from the Education Department.	41.3
6. There are not enough microcomputer facilities in the school.	38.4
7. Using microcomputers for geography consumes too much teaching time in the class.	35.6
8. There is a lack of information about available software.	35.0
9. Computer assisted learning software is expensive.	34.5
10. There is little suitable software available for use in the type of microcomputers found in my school.	23.2
11. School policy does not advocate the use of microcomputers in geography teaching.	23.2
12. My class does not have easy access to the microcomputer facilities in the school.	19.8
13. Using microcomputers creates a lot of problems in classroom ogranization and management.	11.3
14. I am suspicious of the educational value of using microcomputers.	6.2
15. Others.	1.1

Lack of training/knowledge in using the microcomputers in geography teaching is recognised as the most important obstacle. The significance of this factor is reflected both by the high percentage of response choosing it (71.8% of total) and by the high percentage of ranking it as the most important obstacle (34.5% of total).

The other obstacles, each chosen by more than 40% of the total respondents, are :

- There are no microcomputer facilities in the geography room. (48.0%)
- There is a lack of software suitable for the geography curriculum. (48.0%)
- Students do not have enough training in using microcomputers. (47.5%)
- There is a lack of support from the Education Department (e.g. guidance, training, information) (41.3%)

If only "Rank 1" obstacles are considered, the following sequence appears :

1. I do not have enough training/knowledge in using microcomputers in geography teaching. (61)
2. There are no microcomputer facilities in the geography room. (18)
3. There is a lack of support from the Education Department (e.g. guidance, training, information) (17)
4. School policy does not advocate the use of microcomputers in geography teaching. (12)
5. There is a lack of software suitable for the geography curriculum. (11)

(Number in ( ) refer to frequency)

Other obstacles added by the respondents include "extremely difficult to obtain software in H.K. for copyright reason" and "students are too weak in English".

Discussion

1) The respondents are not totally unaware of microcomputer. The majority of them have some experience in using the microcomputer. Possession of such skills as wordprocessing, data management provide the necessary basis of competence and cofidence for using the computer in the classroom.

Of those teachers having experience in using the microcomputers, 67.6% even have a microcomputer at home. Having ready access to a computer at home performs a valuable training function and makes them easier to be aware of the effectiveness and limitation of the microcomputer.

2) Geography teachers in Hong Kong seem to show positive attitudes towards computer assisted learning. They appear to understand the potential of this new technology. But it must be realised that these are only what they think the computer ought to be. They are also pragmatic and show concern over a) the time involved, b) the adaptability to existing curriculum and c) the need to change teaching method.

The findings closely resemble to those obtained by Freeman (1983) and Rogers (1987) in the U.K. and Stimpson (1986) in Hong Kong. The attitudes of the geography teachers can be described as "a marked mixture of interest and scepticism" (Stimpson, 1986 :202)

3) A lot of geography teachers have been, in one way or another, using the microcomputer as a tool to handle the routine duties of teaching, i.e. making notes, mark calculation, etc. On the other hand, a large proportion have never used the microcomputer as a teaching aid in the classroom.

4) The most important reason which hinders the use of computers in geography teaching envisaged by teachers is the lack of training or knowledge in using the computer in the classroom. This is similar to that perceived by teachers in a Post-graduate Certificate of Education workshop in Hong Kong two years ago. (Stimpson, 1986)

Throughout the years 1985 to 1987, HKGA and GSAI have organised at least three courses on the use of microcomputers in geography teaching. The Computer Education Centre, Education Department also kept on running computer awareness courses for humanities teachers. But their efforts could not satisfy the increasing demand for more training. In general, these courses are of short duration and are held infrequently. The coverage is often of an introductory nature. Due probably to lack of expertise, the pedagogical aspects of using computers, classroom management and the necessary teaching strategies are seldom treated in sufficient depth. Particularly lacking is the kind of subject-specific and follow-up training or support.

Despite the existing obstacles, teachers are aware of the potential of the microcomputer in teaching geography. If what they express are not just "rhetoric", the positive attitude towards computer use reflects the willingness of the geography teachers to accept the challenge of the microcomputers. The need to have teachers trained to know how to use the microcomputer in the right time, with the right amount and in the right way becomes particularly critical in the implementation of microcomputers in the classroom.

Reference

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Development of Digital Geographic Information and Geographic Information Systems in Hong Kong

by
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One of the main obstacles in using computers to analyze and map geographical data is the availability of geographic information in digital form. The entering of statistical data and digitizing of map boundaries are time consuming, labour intensive, and tedious. Very often, similar sets of geographical data and map boundaries are entered separately into computers by different researchers, research institutes, government agencies and private firms. It will save much resource and time if these data and map boundaries can be entered and stored in the computer once and made available in digital form for other users. With the rapid development of computer cartography and geographic information systems in North America and Europe, many digital geographical data, such as topographic maps, LANDSAT images, zoning plans, and statistical data, are now available to the public from government agencies and research institutes. There is also an increasing availability of digital geographic information in China (Yeh, He and Chen, 1987). In the past, digital geographical data are mainly available in magnetic tapes used by mainframe or mini computers. Recently, with the rapid development of microcomputer, most of these data are also available on microcomputer floppy disks. Some are even also in electronic spreadsheet format, facilitating users to analyze these data with microcomputers.

In Hong Kong, although population and statistical data have long been available on magnetic tapes ever since computers were used in processing census data by the Census and Statistics Department, the availability of map boundaries in digital form is limited. User had to digitize his own map boundaries and link the statistical data into his mapping package. Digitizing of maps, in the past, was mainly done by researchers in the universities, such as Lo (1986) while he was with the Department of Geography and Geology, University of Hong Kong. However, there are three recent developments in Hong Kong which will make digital geographic information, particulary map boundaries, more readily available to the public. First is the development of Hong Kong Map Data Sets by Hong Kong's SAS Institute Ltd. which allow SAS (Statistical Analysis System) users to do computer mapping using Tertiary Planning Units or District Board boundaries. Second is the SUPERMAP CD ROM (Compact Disk Read Only Memory) disc jointly produced by the Census and Statistics Department and the Space-Time Research Pty. Ltd. of Australia which stored the Hong Kong 1981 Population Census and 1986 By- Census data by Tertiary Planning Units and District Board Districts and produce maps on microcomputers. The final development, which is still at the preliminary stage, is the development of a Land Information System by the Survey and Mapping Office of the Buildings and Lands Department which will store all their maps and plans in the computer.

SAS Hong Kong Map Data Sets

SAS (Statistical Analysis System) is a statistical package which is available for both mainframe/mini computers and microcomputers. It is the main competitor of SPSS (Statistical Package for the Social Sciences) in the United States. The GMAP procedure of SAS can produce choropleth maps, three-dimensional surface maps, block maps, and prism maps. Map boundaries can be manipulated by using the GPROJECT procedure to change map projection methods, the GREDUCE procedure to reduce the number of points needed to draw a map, and the GREMOVE procedure to combine areal units into large areal units, producing a new map data set. SAS Institute Inc. in Hong Kong has created the Hong Kong Map Data Sets for the SAS Data Library which contains the map boundaries of Hong Kong Island, Kowloon, and the New Territories[1]. Six map data sets are available in the Hong Kong Map Data Library which can be classified into two groups. First, map data sets with Tertiary Planning Unit (TPU) boundaries for Hong Kong Island (HKMAPU), Kowloon (KWMAPPU), and the New Territories (NTMAPPU). Second, map data sets with District Board boundaries for Hong Kong Island (HKMAPDB), Kowloon (KWMAPDB), and the New Territories (NTMAPDB). Areal units of the TPU map data sets are identified by the TPU ID, whereas the District Board map data sets are by District Board ID. The Hong Kong Map Data Sets are available on mainframe/mini tape and IBM PC floppy disks. After loading the map data set into the computer, user can input his own data using the variable ID as identifier and use the SAS GMAP procedure to produce a choropleth map by the computer (Fig. 1). Subsets of the map data set can be extracted and used for mapping (Fig. 2). User can also digitize and create his own map data set and use SAS to do the mapping. A Hong Kong 1986 By-Census Social Atlas has been produced by the Census and Statistics Department using the SAS Hong Kong Map Data Sets (Census and Statistics Department, 1987).

SUPERMAP

CD ROM (Compact Disk Read Only Memory) and interactive video disk are devices similar to compact disks which are used to play music and video. However, instead of storing music and video, they are used to store data. In the case of interactive video disk, it can also store music, pictures, and video. Typically, a compact disk has a storage capacity of 550 megabytes (550,000 Kbytes), about the same capacity of 1,600 low density floppy disks. They are becoming increasingly popular as a medium for the storage, distribution, and control of large databases. They are also increasingly being used in storing geographical data.

One of the notable example in using compact disc in storing digital geographic information is the BBC Domesday Project (Goddard and Armstrong, 1986; Openshaw et al., 1986; and Rhind and Mounsey, 1986). The BBC Domesday project is an attempt to create an updated version of the Domesday Book produced by William the Conqueror 900 years ago

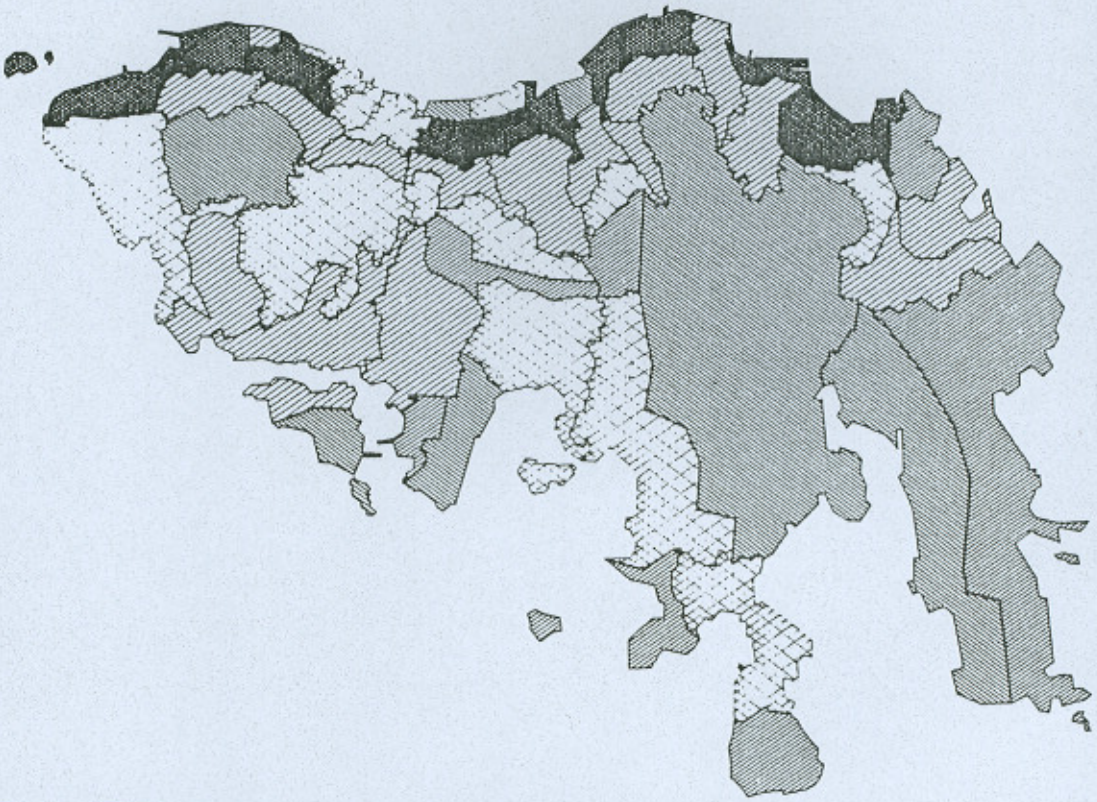


Figure 1 Example of choropleth map using the TPUs of Hong Kong (HKMAPPU) in the SAS Hong Kong Map Data Sets

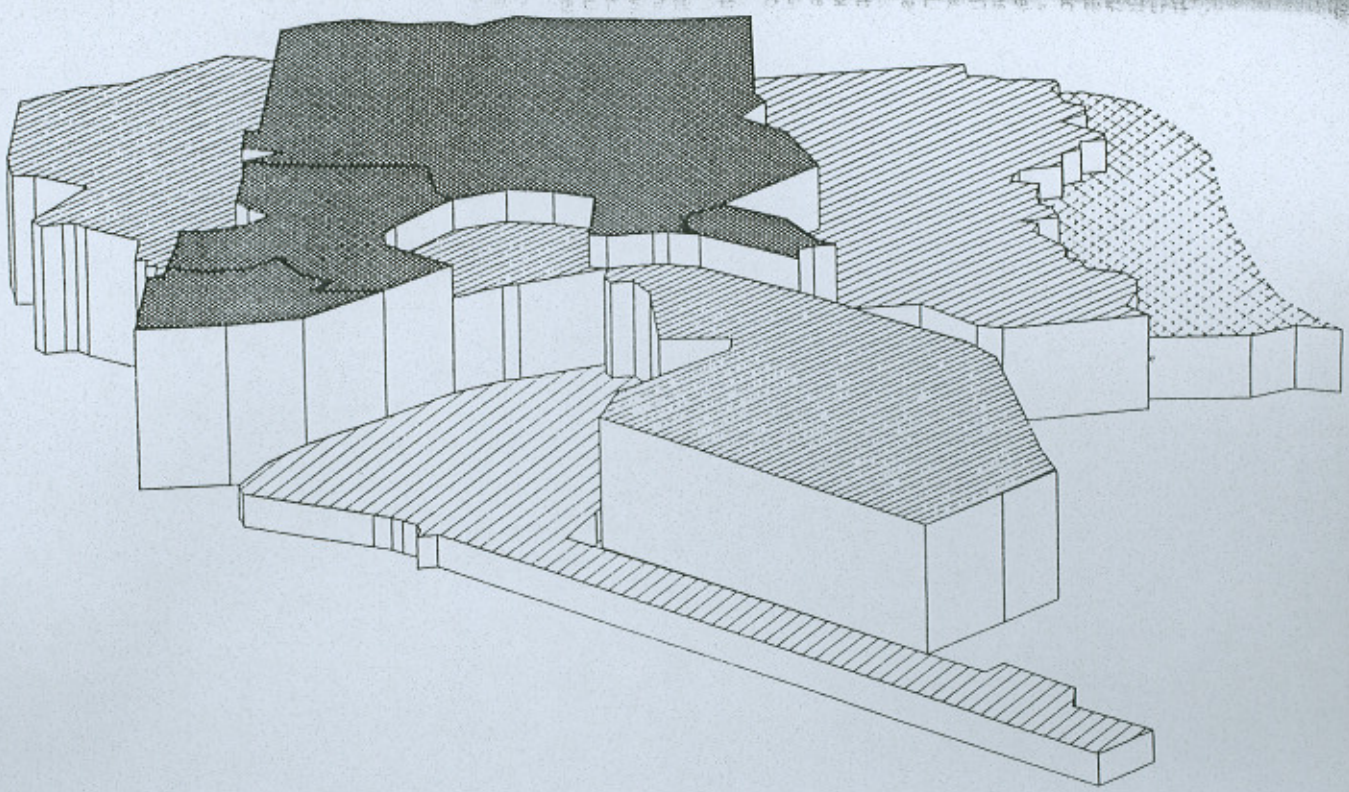
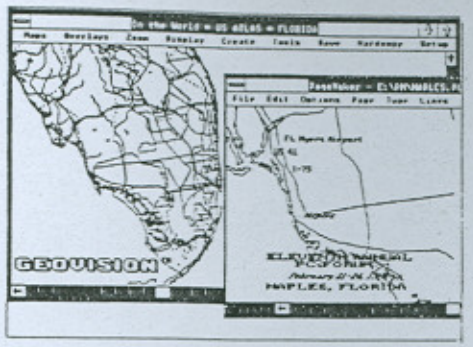


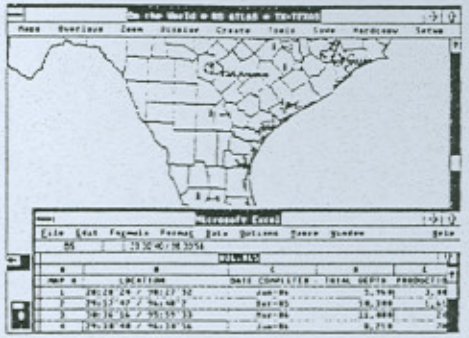
Figure 2 Example of choropleth map using the Kowloon City subset of the TPUs of Kowloon (KWMAPPU) in the SAS Hong Kong Map Data Sets

to document the wealth and resources of the United Kingdom after 20 years of the Norman government. Instead of using paper, the latest technology using laser dics and sophisticated programming was used to document the present resources and lifestyle of Britain. The BBC Domesday runs on a BBC Master Advanced Interactive Video (AIV) Microcomputer and a BBC AIV LaserVision player developed by Philips Electronics[2]. The amount of information is huge. The 12-inch double-sided LaserVision disc in LV-ROM format stores up to 324 megabytes of data as well as up to 54,000 analogue video pictures which is equivalent to 800 floppy disks (150,000 pages of text) and 50,000 pictures and 24,000 Ordinance Survey Maps. Data are stored on two video discs. The National Disc includes data from the latest population census, General Household Survey, Family Expenditure Survey, and the BBBC Daily Life in the 1980's. Information are organized into four main groups - economy, environment, society, and culture. The Community Disc is based on 24,000 Ordnance Survey maps arranged in six levels - the United Kingdom, Countries and Island Groups, 40 x 30 km Local Blocks, 4 x 3 Local Blocks, Street Map, and Floor Plans of Special Sites - with text and photographs available at each level. With keyboard or trackerball, the system can give immediate access to statistics, charts, maps, photographs, aerial views, descriptions, and moving video pictures of Britian. Measurement of distances and areas can also be made on the system. It provides a desk research tool for anyone who would like to find out where places are, what they look like, what their characteristics are, and what goes on there. It can be used by schools, colleges, and libraries for learning, and government offices, tourism and travel agencies, and land and estate agents for retrieval of information on places of their interest. Courier and distribution services can use it for route planning and finding of locations; film and television companies can use it to check the appearance and characteristics of an area without leaving the office, and newspaper reporter for assembling facts, events, and statistics. There are plans to utilize the interactive video technology used in producing the BBC Domesday to produce materials on other topics such as ecology, dictionary and countryside environment.

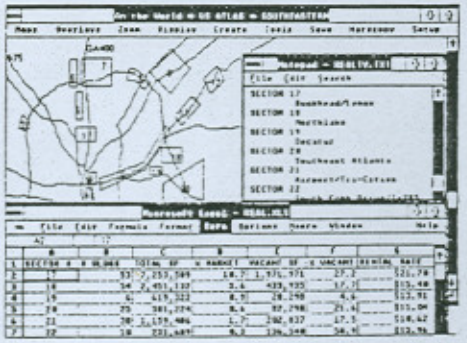
Another example is the GEOdisc U.S. Atlas from Geovision Inc., Norcross, Ga. which stores digitized maps of the United States at the scale of 1:2,000,000 on a CD ROM[3]. Same as most software using CD ROM, it is microcomputer based and runs on an IBM AT or a PS/2 microcomputer with an EGA (Enhanced Graphics Adapter) or a VGA (Video Graphics Adapter) graphics card, Microsoft Windows, 640 Kbytes of memory, a hard-disk, a CD ROM reader, and a mouse. Data stored on the compact disk includes major highways, waterways, political boundaries, railroads, Federal land areas, and hydrological districts. It also contains more than a million place and landmark names plus coordinates for inserting them on a map. These data have been compiled from reliable sources including USGS Digital Line Graph (DLG) and Digital Elevation Model (DEM) data, NOAA digital data, and Census Bureau Geographic Base File/Dual Independent Map Encoding (GBF/DIME) information. Accompanying the CD ROM atlas of the United States is the application software called "Windows/On the World" (WOW) which allows user to retrieve and edit the database information (Fig. 3). WOW is an application program written for the system software called Microsoft Windows which allows different software applications or



Use maps with desktop publishing .....



....with spreadsheets ....



...and with all Windows applications too!!

Figure 3 GEOdisc U.S. Atlas .

different portions of the same software package to be displayed simultaneously in separate windows on the screen. Apart from mapping, it has the abilities to generate map overlays, display distance, bearing and position information, and links to external databases. Because WOW is written in Windows, it can communicate with other programs. For example, textual and numeric data can be kept in an Excel spreadsheet and shared with WOW. One can select an area of the United States by a name or geographic region. Map can be zoomed in from a range of 2x to 64x, where 64x is approximately 40 miles. To create a customerized map, the program allows user to use a mouse to "cut" and "paste" elements from the database. User can merge its own databases with those stored in the CD ROM. For example, a mining company can show the location of its various drilling sites. Other applications include resoure management, transportation and industrial planning. Future development of the GEOdisc is to develop a database containing even more detailed information, down to the city block level.

The BBC Domesday and GEOdisc U.S. Atlas may not be very useful in Hong Kong because they only contain overseas geographic information. Recently, Hong Kong geographic information are ialso available in CD ROM form. A software package called SUPERMAP was released in July 1988[4]. It is a CD ROM produced by Space-Time Research Pty of Melbourne, Australia in conjunction with the Hong Kong Census and Statistics Department. Hardware required to use the SUPERMAP includes an IBM AT or XT microcomputer or its compatible with at least 512 Kbytes of memory and a hard disk, a CD ROM reader, and EGA graphics card and EGA monitor. Data available on the CD ROM includes the Hong Kong 1981 Population Census and 1986 Population By-Census data and U.S.A. 1980 Census data which is produced in conjunction with the U.S. Bureau of Census. For the Hong Kong data, 400 demographic and socio-economic variables are available for the 200 plus Tertiary Planning Units (TPU) and 19 District Board (DB) districts with the respective base maps. For the U.S.A. census data, 2,500 demographic and socio-economic variables for the counties of the U.S.A. are available with base maps.

SUPERMAP allows the retrieval, manipulation, and mapping of data by TPU or DB districts. It allows user to define region of interest and select item or combination of items. It also has the ability to design maps for displaying information and obtain a print-out in colour or monochrome, depending on the type of printer used (Fig. 4). Data retrieved from the system can be incorporate into reports or import into other computer packages such as spreadsheet where subsequent statistical analysis and graphing can be performed. It also has the ability to import data supplied by the user and link it to the selected regions and produce tables alongside the the census data stored on the compact disk. It is user friendly and can be used in a very short time with no formal training.

Hong Kong's Land Information System

The idea of a land information system (LIS) was proposed by the Town Planning Office of the then Public Works Department in the early 1970's. However, this idea had not been given much attention. This was partly because of the failure to perceive the utility of the system and partly because of the limitations of the hardware, software, and GIS technology

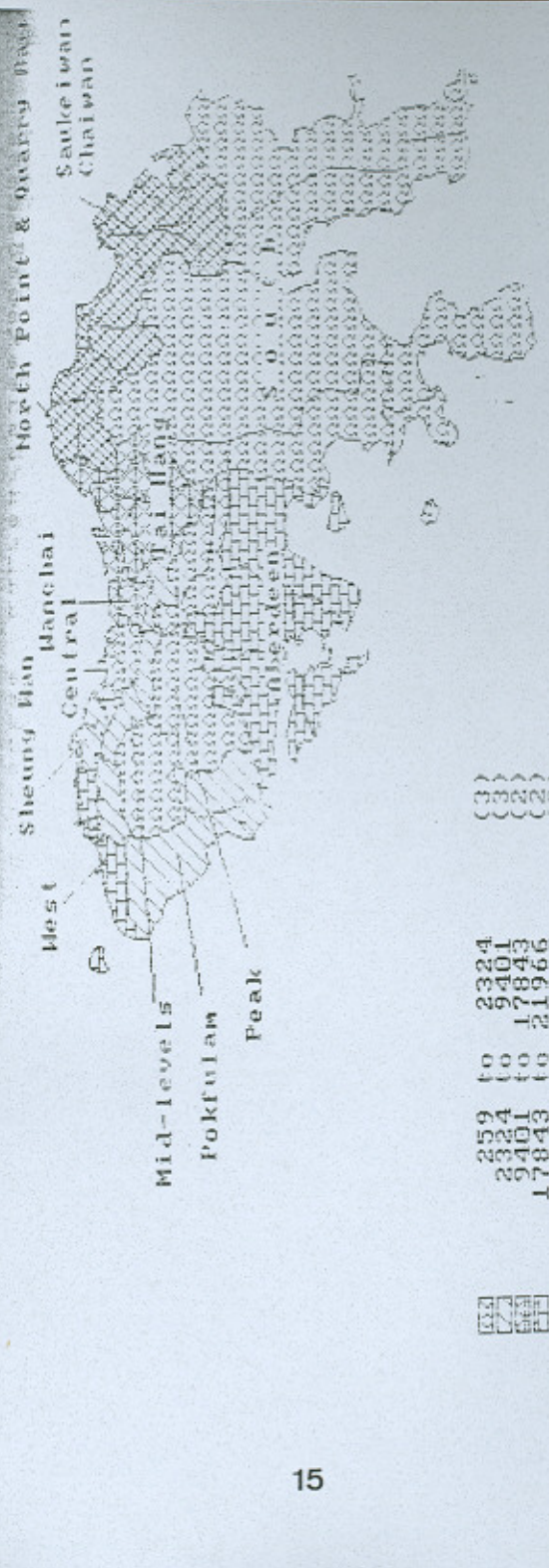


Figure 4 Example of printer output of SUPERMAP

available at that time. The idea was revived in the early 1980's when the Special Committee on Land Supply recommended to the Government the introduction of a computerized land inventory system which could provide the Government, and possibly the private sector, with up-to-date land information for decision making and planning. This was a response to the scarcity of land and high land price in Hong Kong. A system is needed to monitor the timing, location and quantity of the availability of developable land for the planning of rapid urban and economic development in Hong Kong. An ad hoc inter-departmental working group was set up by the then Director of Lands to look into and advise the basic requirements of a computerised land information system. In 1983, a team, headed by a Chief Land Surveyor, was set up in the Survey and Mapping Office of the Lands Department to carry out more in-depth study of the LIS. Although the originally proposed LIS was to serve all Government departments which handle and use land information, however, it was found that it was difficult for different departments to agree on a common approach. Hence, it would be simplier to start as a project of the Lands Department which handles and uses land information most. Once developed, the system could then be expanded to serve the needs of other departments. The establishment of the LIS was approved at the end of 1986 and financial approval was given in mid-1987. In September 1987, a Land Information Centre (LIC) was set up in the Survey and Mapping Office and a HK $20 million tender was called in January 1988.

Initially, the LIS will be built on three application areas. First is the Basic Mapping System (BMS) to produce maps and to maintain all planimetric details on the 1:1,000 survey sheets. Second is the Cadastral Information System (CIS) to keep record of land parcel boundaries and land status information for all private and government lots, to prepare cadastral plans, and to provide enquiry facilities. Third is the Town Planning Information System (TPIS) to update and produce town plans, to keep site records, to maintain land use and land supply information, to maintain facilities inventories, to allow interactive retrieval of graphic and textual data, and to perform data analysis and reporting. The Basic Mapping System will be maintained by the Land Information Centre and the Cadastral Information System will be implemented in the 10 districts lands/surveys offices, each of which will build its own system on the up-to-date basic mapping database provide by the Land Information Centre. Updated base maps, will be used by the Town Planning Office for the preparation of various town plans and i other forms of information retrieval and display.

The Land Information Centre will be equipped with a mainframe/mini-computer, hard disks, colour graphic work- stations, digitizing work-stations, computer terminals, printers, plotters, magnetic tape units for system backup, and tape cartridge units for transferring files to and from the district offices. Each of the 10 district offices will be provided with a set of equipments which will enable it to run its own system independently, while allowing for a communication link with the Land Information Centre for data transfer.

One of the basic features of the Land Information System is the "layering" of geographical data. Map features are classified into groups and stored in separate layers in the computer (Fig. 5). For example,

roads can be stored as one layer, contour lines as another layer, and lot boundaries as the third layer. This can allow the flexibility of data and map retrieval and combination. All map features can be related to attributes or textual data. For example, attributes of a lot may include lot number, owner, street name, etc.. To standardize data, a common address reference system will be used which incudes :

a) House Number and Street Name
b) Street Intersection
c) Building Name
d) Lot Number
e) Co-ordinates
f) Tertiary Planning Unit Number
g) District Name

These identifiers can be used to access graphical or textual data.

The system will most likely be set up in early 1989. Digitizing of the survey sheets and land parcel records will proceed district by district, starting with Kowloon, follow by Hong Kong Island, and then the New Territories. It is hoped that digitized maps for Kowloon will be available by the end of 1989 and the whole territory by the end of 1992. Information for the Town Planning Information System will be available immediately after the Basic Mapping System and Cadastral Information System of a district are completed.

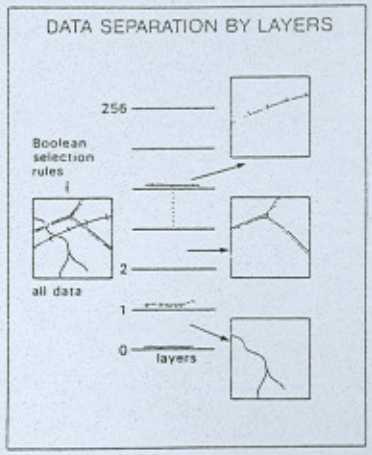


Figure 5 'Layer' Structure of Geographic Information System. Each layer is used to contain a separate theme. Different maps can be created by viewing layers singly, or in combinations (Source: Burrough, 1986, p. 32).

GIS in Hong Kong

SAS Hong Kong Map Data Sets and SUPERMAP are not GIS, although they perform some of the functions of GIS. Unlike the Hong Kong Land Information System of the Buildings and Lands Department which is a geographic information system, they are specialized geographic databases which allow users to retrieve and map census data. They lack the standard functions of GIS such as map manipulation, map overlay, spatial search, and spatial modelling (Burrough, 1986). However, they can satisfy some of the data retrieval, analysis and mapping needs of users, particularly for the analysis and mapping of census data.

With the availability of digital geographical data in SAS Hong Kong Map Sets, SUPERMAP and the Hong Kong Land Information System, it is inevitable that people and students in Hong Kong will have more contacts with geographical data in digital form and GIS than before. Particularly, the Land Information System of the Buildings and Lands Department will revolutionalize the concept of maps in Hong Kong. Instead of buying a map in its tradition form on a piece of paper, one may purchase a digital map on a floppy disk.

The use of these digital geographical data is often limited by the availability of computer hardware. However, this limitation is rapidly diminishing with the advancement of microcomputers. The SAS Hong Kong Map Sets and SUPERMAP can be run on microcomputer systems which are already standard equipment in offices, schools, and research institutes. Previously, GIS is only limited to mainframe/mini computers which are not easily accessible to users. It is now more easily accessible through the development of a number of microcomputer-based geographic information systems (Marble and Amundson, 1988). For example, pc ARC/INFO which runs on an IBM AT with 30 megabytes of hard disk has most of the functions of mainframe geographic information system. It is foreseeable that the digital geographic information in the Hong Kong Land Information System can be loaded into and processed by microcomputers, making it more easily accessible by users, particularly those in research institutes and private firms.

The Hong Kong Land Information System of the Buildings and Lands Department will be mainly used in the areas of mapping, land administration, and urban planning. However, once created, it is foreseeable that the system will be increasingly used by various government departments which need geographical information in their works, such as the Census and Statistics Department, Housing Departments, Environmental Protection Department, Urban and Regional Service Departments, and Territorial Development Department. It will also be used by private sectors which needs geographical information such as telephone and gas companies, surveying and engineering firms, and planning consultants.

For the time being, digital geographical data and geographic information system may be of little use to ordinary people. They will be used mainly by those who need to retrieve and analyze geographical data. With the advancement of microcomputer technology, there may be

one day that GIS will be available and used by ordinary people. For example, instead of taking a map to the field , one may take a pocketsize microcomputer with a digital topographical map which can show relief and cross- sections, and compute bearings and distances. By connecting his microcomputer through telephone lines to a central GIS system, one may ask for the shortest route and mode of transport from a place to another and the location of buildings and places of interests. The above may sound like fantasy but these types of GIS are under active research and will be available for use in not too distant future.

GIS is one of the fastest growing areas of study in geography in North America. Many universities and colleges are setting up GIS laboratories and offering new GIS courses. Students with GIS knowledge can find a job easily. This development in North America can be reflected in the Jobs in Geography (JIG) of the Association of American Geographers. In last year, over 80% of the jobs advertised are GIS related, either in universities or government agencies. GIS courses are increasingly becoming standard courses in the geography curriculum of North American universities and colleges.

China is also rapidly developing GIS (Yeh, He and Chen, 1987). In recognition of its importance in geogaphy, the Institute of Geography of the Chinese Academy of Science in Beijing has set up a Laboratory for Resources and Environmental Information System (LREIS) in 1987. GIS courses are offered and researches carried out in most research institutes and universities. Although the present practical applications of GIS in China is limited compared with North America, it is anticipated that this will increase with more people trained in GIS and government officials more aware of the usefulness of GIS. Geographical data will increasingly be stored in GIS and available in digital form in China in the future.

To keep pace with the development of geography curriculum in North America and China and to equip our students with the increasing use of GIS in Hong Kong, it is essential that university geography students should know how maps and geographical data are stored in computers, how to manipulate and retrieve them, and how to generate maps on computer. Such knowledge should be as essential as cartographic or numerical skills in any modern geography curriculum. In-depth computer cartography and GIS courses should also be offered to students who would like to specialize in this worldwide growing field of geography.

The use of digital geographic information and GIS in secondary schools is not as apparent as in universities. However, this will change with the increasing availability of CD ROM reader as a standard computer equipment in secondary schools. There is a growing number of Computer Assisted Learning (CAL) packages being developed on compact discs. Dictionaries and encyclopedia, will soon be available in compact discs form. One day, instead of learning from books, one may be learning from compact dics which will make learning more effective and enjoyable. Students will be using compact discs to learn map reading, spatial analysis, geographical concepts, and the geography of different countries.

Footnotes

[1] For information of the SAS Hong Kong Map Data Sets, please contact SAS Institute Ltd., 3601 Shun Tak Centre, 200 Connaught Road, Central, Hong Kong, Tel: 5-403160.

[2] The complete BBC Doomsday system including BBC Master AIV Microcomputer, BBC AIV LaserVision Player, and colour monitor costs around HK$50,000. For more information, please contact Acorn Computers (Far East) Ltd. (local distributor of BBC microcomputers), Rm. 2801, Tung Wai Commercial Building, 109-ì111 Gloucester Road, Wanchai, Hong Kong, Tel.: 5-8332066.

[3] The software package costs US $495. For more information, please contact Geovision Inc., Suite One, 270 Scientific Dr., Norcross, GA 30092, U.S.A.

[4] The software package is available at HK$7,800 from the Publication Sale Counter of the Census and Statistics Department, 19/F, Wanchai Tower I, 12 Harbour Road, Wan Chai. For details, please contact Mr. P.K. Lau at 5-8234736.

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Computer and Software Usage Among Undergraduate Geography Students in Hong Kong

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Introduction

In spite of the fact that computer is not well received by every individual, computer is considered as an indispensable tool in geographical studies. This stems partly from the nature of our subject matter - the shear complexity of our human and physical environment, and partly from the vast quantity of spatial information which is becoming increasingly available with the advent of technology such as remote sensing and the improvement in communication. In geographical studies, computer may be used in data processing, statistics, computer graphics and mapping and, more recently, computerized Geographic Information System (GIS) becomes fashionable (Rhind, 1987).

Increasing computerized geographical research would necessitate a group of 'computer-aware' and 'computer-literate' undergraduate to substantiate and carry forward earlier efforts. In fact, the availability of computer for undergraduate uses is steadily increasing in the tertiary institutions with easily accessible machines. The lower price of computer in the clone computer market in Hong Kong makes the possession of a personal computer by an undergraduate or their families affordable. Software of different levels of sophistication and accomplishing different tasks are also available. However, how such facilities and opportunities are exploited by geography undergraduate is scarcely looked into. It is in this view of assessing the nature of computer usage that a survey was conducted on undergraduate geography students in Hong Kong. Based on preliminary analysis of the questionnaire sent to the Geography Departments of the University of Hong Kong, the Chinese University of Hong Kong and the Hong Kong Baptist College, it is found that slightly over 60% of the respondents considered themselves as computer-users (Figure 1). In this paper, their usage of computer and preference over software packages will be reported and discussed.

Results and Discussion

1. Computer Usage

It was found that computers are used most frequently as a word-processor. Over 80% of the respondents chose word-processing as their most frequently used application (Figure 2a). This is probably associated with the fact that geography as a social science (arts) subject requires a lot of written works. Also, as computer users in the geography

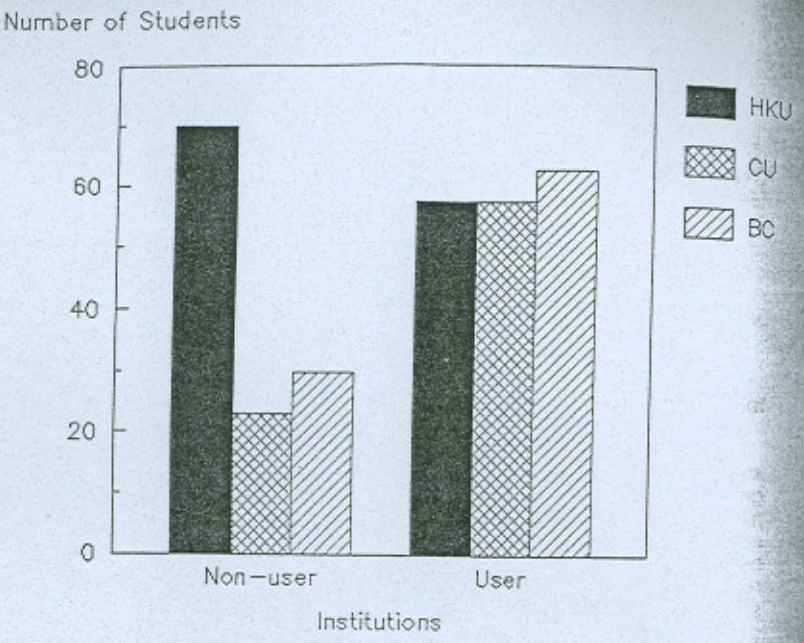

Figure 1 Respondents of the Study

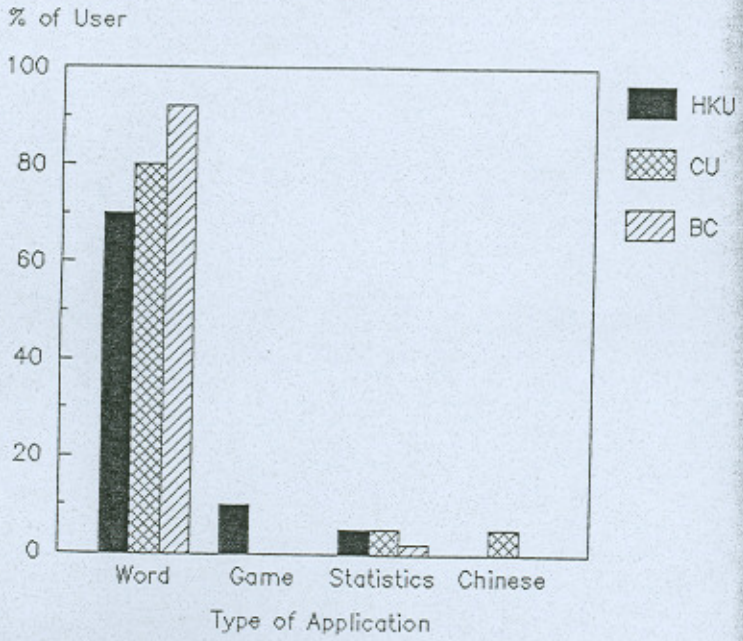

Figure 2a Students' First Favourite Application

departments contains a higher proportion of beginners (Figure 3) who start using computer only after they enter the tertiary institution, word-processing is most pliant and serves their immediate needs.

Rather unexpectedly to know is that computer games rank second in the first preference list as well as in the second preference list. The high general esteem of computer games reflects a general under-use of the micro-computers among the geography undergraduates. In many cases, many of the 'users' purchase a new computer simply because of the needs to occupy a fancy toy.

Under-use of the computer is even more obvious while looking at the second favourite application (Figure 2b). The use of computer for statistics ranks first (37.5%) as the second favourite application, but the employment of computer for database management is of very low level (10.6%) and computer graphics is as yet unknown to geography undergraduates. This is just ironical when computer is considered by geographers as an indispensable tool for handling vast quantity of spatial information (Walsh, 1985).

The use of Chinese systems portrays a very interesting picture as its use is almost confined exclusively to students of the Chinese University (Figure 2b), probably due to a tradition- induced interest of the institution.

2. Software Selection

It is not strange to see that software packages for word- processing are among the most popular (Figure 4a). Among them, WordStar ranks first (60.6%) and PC Write ranks second (24.2%) (Fig. 4b). Only two respondents use packages other than the above mentioned. Differences between institutions are large as all the PC Write users are from the Chinese University. It is not surprising as PC Write is the word-processor provided for students in the mainframe computer of the Chinese University. In a like manner, the Baptist College uses WordStar in their Computer Literacy Course. Therefore, almost all users of the Baptist College use WordStar. The mainframe in HKU provides no word-processor for students. However, a substantial number of personal computer attached to convenient output devices are available for users of the Hong Kong University. Therefore, it may be inferred that WordStar users in HKU are mostly self- learners of PCs.

Response is more diverse with the second most favorite software (Figure 4c). MicroStat - a statistic package which is taught in the Baptist College as part of the course Quantitative Method II - tops the list and shares its importance with WordStar. SPSS (Statistical Package for Social Scientist) ranks third with most user contributed by the Chinese University. Overall, the range of packages used is small. Many popular software packages such as dBase III and Lotus 123 attract little user. Besides, respondents expressed their unawareness concerning software packages; some have put down SPXX (SPSS), BBase (dBase III), Locust (Lotus) or the like in the questionnaires.

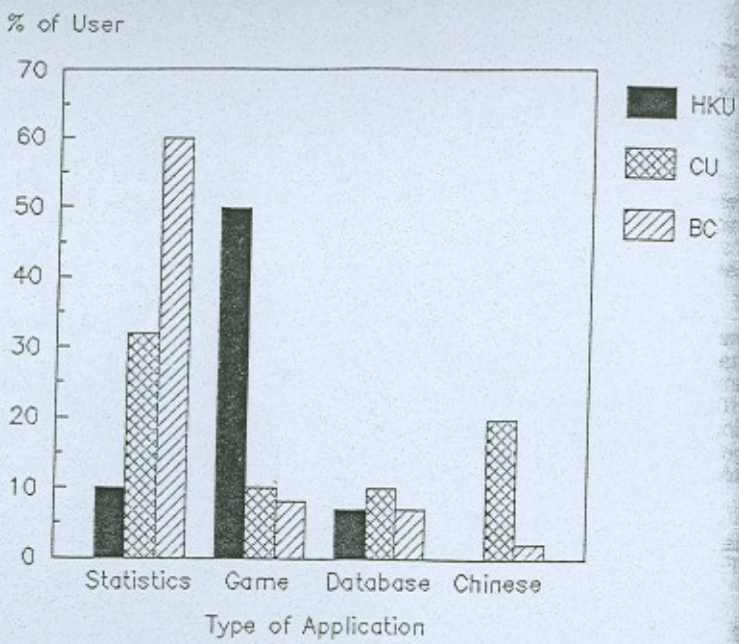

Figure 2b Students' Second Favourite Application

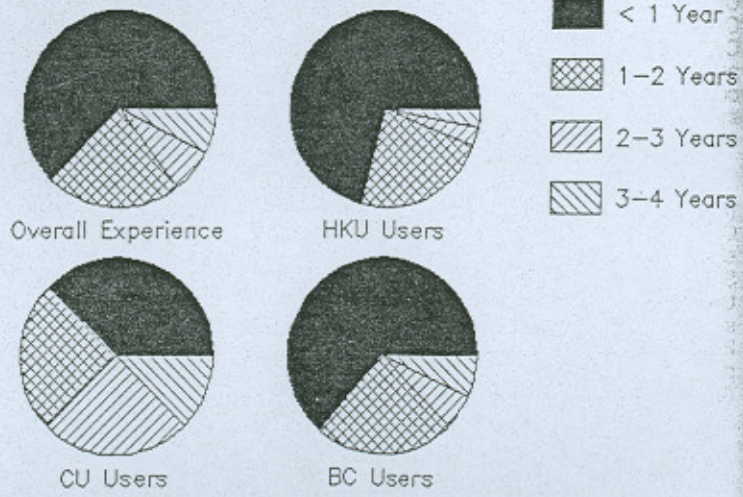

Figure 3 Experience of Users

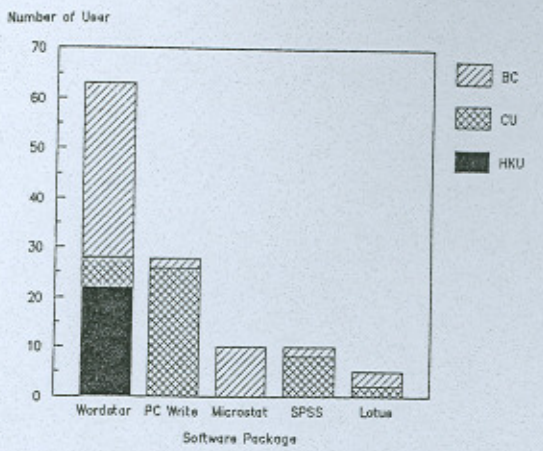

Figure 4a Overall Usage of Software Packages

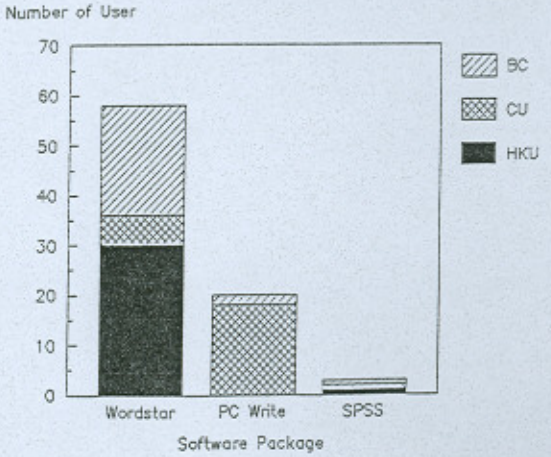

Figure 4b Students' First Favourite Software Packages

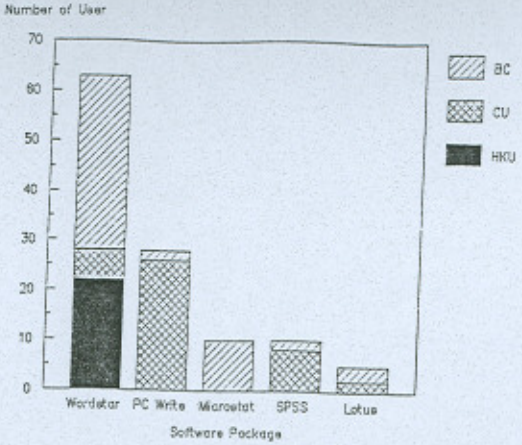

Figure 4c Students' Second Favourite Software Packages

Conclusion

Very few of the respondents indicate any usage other than the ones reported above. The findings show that the computer is used primarily as a sophisticate 'typewriter', secondary as a toy and infrequently as a reminiscent calculator . Word-processing certainly enhanced students efficiency in coping with the coursework. Yet, if the potential of the present computer facilities (including those provided and privately owned) are to be fully utilized, more encouragement, or possibly training are required to extend the students' horizon beyond word- processing and apply computer for geographical problem solving. From the provisional findings, it is explicit that a 'Use after Knowing' inclination is common to all users which indicates guidance and introductory sessions are essential.

One may complain our geography undergraduates that were trained from the Arts Stream; most of them with almost no backgrounds in the computer. However, a slight adjustment of emphasis may at least show the students what computers can accomplish. In other words, undergraduates should be aware of and be able to appreciate the 'New Revolution' (Rhind, 1987) brought to geography by the computer. After all, there are 38% of the respondents who are totally computer-illiterate.

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The Integrated Use of Database, Statistical and Graphics Packages for Non-Programmers in Geographical Research

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Introduction

In recent years, substantial drop in the market price of microcomputer and the introduction of many so-called user-friendly softwares have put forth another revolution after the quantitative methods in the study of Geography. The term 'GIS' which stands for Geographical Information System has been widely used. A great number of studies have been taken to exploit the potential of its application in Geographical Research (Lo, 1986). In addition, the use of micro-computer as an instructional tool has also received much attention (Walsh, 1988; Haines-Young, 1983). This paper describes the integrated use of database, statistical and graphics packages in a soil survey.

System Requirement

(i) Hardware[1]

The minimum requirements for the integrated use of the 3 packages described in this paper are:

1. one 8086 compatible computer with at least 512K memory
2. one 10 mb Hard disk and one 360K disk drive
3. graphics display card and monitor
4. output devices such as a 9 pin printer

(ii) Software

The following packages are used in this paper:

1. dBase3 + (manufactured be Aston and Tate)[2]
2. SPSS/PC + (manufactured be SPSS inc)
3. SPSS/PC + graphics/table (manufactured by SPSS inc)
4. Microsoft chart V 3.0 (manufactured by Microsoft corporation)

Similar packages such as Lotus 123, Symphony, Multiplan, RBase 5000, Chart Master and Graftalk may also be used.

Job Description

A soil study is used for demonstration purposes, the objectives of the study were to study changes in soil's physical and chemical properties as results of recreational trampling. Several sites of different degrees of trampling were surveyed. In each sampled quadrat, the following soil properties and plant attributes were studied:

(i) Physical Properties

1. bulk density (g/cm ^{3})
2. infiltration rate (cm/hr)
3. penetration resistance (kpa)
4. texture
5. soil moisture content (%)

(ii) Chemical Properties

1. soil Nitrogen (%)
2. soil Phosphorus (%)
3. soil Potassium (%)
4. pH
5. cation exchange capacity (me/100g)
6. conductivity (mmhos)

(iii) Plant Attributes

1. vegetation cover (%)
2. species abundance
3. species diversity

System Development

This demonstration involves database development, statistical analysis and graphic presentation (Figure 1).

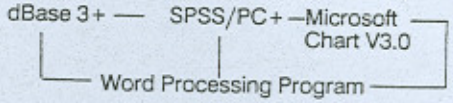

Figure 1 Software Packages used in this paper

(i) Database Development[3]

Figure 2 illustrates the major steps in the development of a database system in dBase 3+.

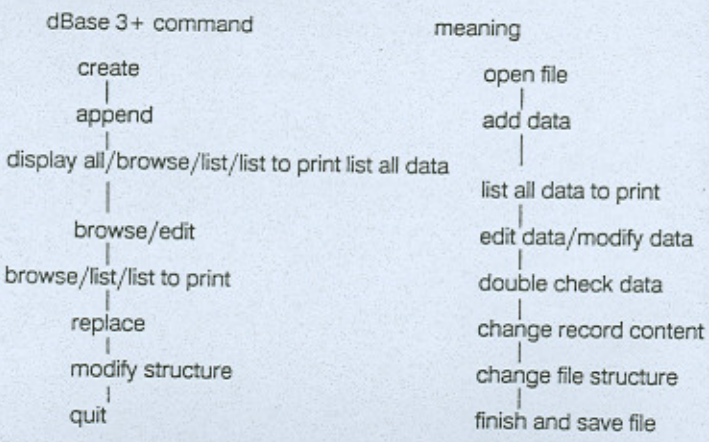

Fig. 2 Steps in the Development of Database

To start building a database, a file has to be created and its structure defined. This includes the names of fields in a record (In a database file, all the data for a particular entry is called a record, each item of information within a record is called a field), the number of character in a field and the type of information allowed in each field. In this example, a file named Soil was created and a total of 15 fields were defined.

Field Name	Type	Width	Dec
1.Quadrat*	Number	2	0
2.Moisture	Number	6	2
3.Bulk	Number	6	2
4.Infil	Number	5	2
5.Resist	Number	4	0
6.Texture	Number	1	0
7.SoilN	Number	4	2
8.SoilP	Number	4	2
9.SoilK	Number	4	2
10.pH	Number	4	2
11.CEC	Number	5	2
12.Conduct	Number	4	2
13.Vcover	Number	6	2
14.Abund	Number	3	0
15.Diver	Number	2	0

*Refer to page 31 for explanation of field names

Name of field is limited to 10 characters in dBase 3+. In the designation of field width, the decimal point is counted as 1 unit. For example, 25.14 will use up 5 units of field width. In addition to numberic information that can be calculated (numeric fields are used this time for easy communication with external software packages), other types of information that can be entered include character (letters, numbers and punctuation symbols as well as numbers that would not be calculated such as prime number); date; logical and memo fields[4].

After the completion of data entry, data can be verify through the display, list or browse command. File structure modification and further replacement are sometimes necessary.

There are many ways to input data or monitor the database system. All data can be appended directly to the database. Yet, data modification would be much easier with the use of built-in commands. In the present case, both moisture content and bulk density were required. These two sets of data are related and they are derived from wet and dry core weights. To minimise the calculation effort, wet core weights may be entered to the field' moisture' and dried core weight entered to the field 'bulk'. After the completion of data entry, the following commands may be entered.

. repl all moisture with moisture-bulk
(this command will replace field moisture with moisture available in core)

. repl all moisture with (moisture)*100/(moisture+bulk)
(this command will give the moisture content in percent)

. repl all bulk with bulk/100
(this command will give the bulk density of the sample)

In a like manner, commands can be used if there are more than one sample taken. Commands similar to replace all xresist with (resist1 + resist2 + resist3)/3 will be very useful.

An cutput report form can be created by the create report and report form commands for final verification . A command similar to the one below will produce a document file named soil.rpt.
. report form soil noeject to soil.rpt

This report can be read by most wordprocessing programs therefore can be inserted in almost any text files.

By this point, the data is ready for a transfer to a new environment-statistical environment. To do this, the following command may be entered:

. use soil
(use the database file soil)
. copy to soil.doc delimited with blank
(this command will create an unformatted file named soil.doc readable by the statistical package)

ii. Statistical Environment

The strength of database packages lies in organising collection of information but they are with limited statistical functions, more complicated statistical works are best be accomplished by the statistical packages.

In the last section, an unformatted file soil.doc has been created. To read this file from the SPSS environment, the following command has to be entered:

: data list free file = 'Soil.Doc' /
(this first line declares reading of a free formatted file named Soil.Doc)
Quadrat Moisture Bulk Infil Resist
Texture SoilN SoilP SoilK pH
CEC Conduct Vcover Abund Diver.

(all of the above are variable names corresponding to the dBase 3+ file)

All these variables may be given their full variable names and value labels by entering

Vari label Quadrat 'Degree of Recreational Trampling'
Moisture 'Moisture Content (%)'
Bulk 'Bulk Density (g/cm^3)'
Infil 'Infiltration Rate (cm/hr)'
Resist 'Penetration Resistance (kpa)'
Texture 'Soil Texture'
SoilN 'Soil Nitrogen (%)'
SoilP 'Soil Phosphorus (%)'
SoilK 'Soil Potassium (%)'
pH 'pH'
CEC 'Cation Exchange Capacity (me/100g)'
Conduct 'Conductivity (mmhos)'
Vcover 'Vegetation Cover (%)'
Abund 'Species Abundance'
Diver 'Species Diversity'

Value label quadrat 1 'nil'
2 'minor'
3 'obvious'
4 'serious'
/texture 1 'sand'
2 'loamy sand'
3 'sandy loam'
4 'silt loam'
5 'clay loam'.

A temporary system file will be created by the SPSS/Pc+ package. To save the file to a SPSS/PC+ system file, the following command will do:

: Save file = 'soil.sys'.

Statistical tests from sample descriptive statistics to more sophisticate multivariate analysis are provided by the SPSS/PC+ package.

1. Descriptive Statistics

: process if (quadrat = 1).
(select cases of quadrat 1 only)
: desc vari = bulk to diver.
(run descriptive statistics such as mean and standard deviation for variables bulk density to species diversity of the quadrat 1)

2. Comparing population means

: mean table = bulk soiln by quadrat.
(find the means of variables bulk density and soil nitrogen of different quadrats)

3. Correlation analysis

: corr vari= moisture to resist.
(run the correlation coefficient of variables moisture to penetration resistance)

4. Cross tabulation and Chi-square test

Recoding is first required for Chi-square analysis.
: recode vcover (low thru 10=1) (20 thru 30=2) (30 thru 50=3) (50 thru 70=4) (70 thru Hi=5).
(the above command recode the variable vegetation cover, for example quadrat less than 10% vegetated is coded 1; and over 70% is coded 5)

Value labels may be included as follow:

: value label vcover 1 '<10%' 2 '20-30%' 3 '30-50%' 4 '50-70%' 5 'over 70%'.
(the above command defines the value labels)

: cros tabl = vcover by quadrat/stat = 1.
(cross tabulation is run between percent of vegetation cover and the degree of recreational trampling, the Chi-square value is requested by the stat command.)

5. t-test

: t-test groups = quadrat (1,4)/vari= bulk soiln.
(use t-test to compare quadrats 1 and 4 variables bulk density and soil nitrogen)

In addition to the SPSS.LIS which can be read by most of the word processing program, the built in TABLE command of the SPSS/PC+ package allows production of high quality tables. The following are examples:

i.Single Variable Table
.table table=texture
./stat=count cpct
(the above two commands request for a table showing frequency and percentage of every texture class)
./ttitle='The Relative Importance of Different Texture Classes'
(this command defines the title label)
./tfootnote='Source:Fieldwork, 1988'.
(this command defines the footnote)
.print table device=other/output='table1.doc'.
(a text file named table1.doc containing the output file will be created)

ii.Multi Variables Table
.table observation=soiln soilp soilk
./table=quadrat by soiln+soilp+soilk
(this command requests a table showing average soil nutrient status of different quadrats)
./ttitle='Soil Nutrient Status of Different Quadrats'
./tfootnote='Source: Fieldwork, 1988'.
.print tables device=other/output='table2.doc'

iii. Graphics Environment

With the addition of SPSS/PC+ graphics and the Microsoft chart packages, direct production of presentation graphs such as bar chart, pie chart and line graph directly from the SPSS environment is possible. The following are examples:

a. Line Graph (Figure 3)

: Graph Line =mean(abund) by quadrat.
(this command produces a line graph which shows changes in species abundance with increasing recreational trampling)

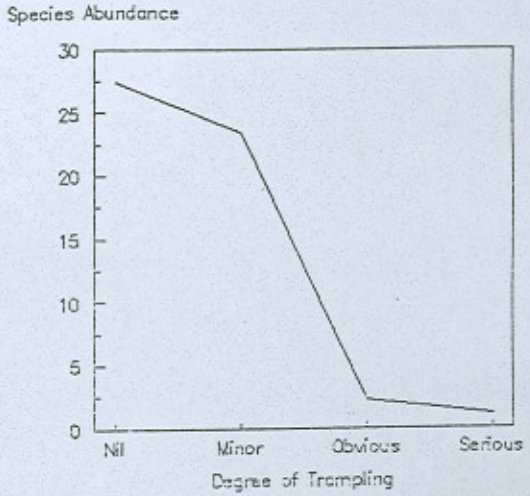

Figure 3 The Relationship between Species Abundance and the Degree of Human Trampling

b. Bar Chart (Figure 4)

: Graph Bar = mean(SoilN) by Quadrat.
(this command produces a bar chart to show mean soil nitrogen of different quadrats)

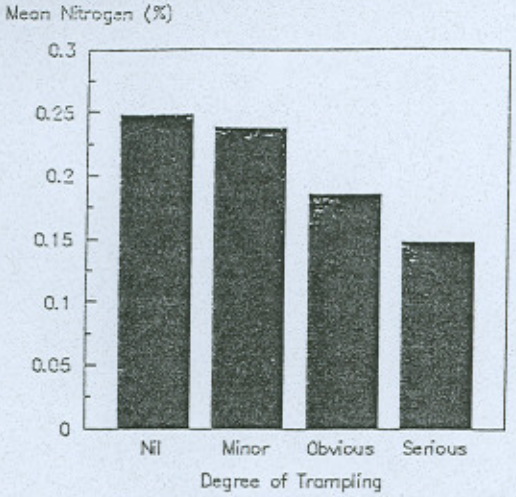

Figure 4 The Relationship between Soil Nitrogen(%) and Trampling

c. Pie Chart (Figure 5)

: Graph Pie = count by texture.
(this command produces a pie chart which shows the relative importance of different texture groups)

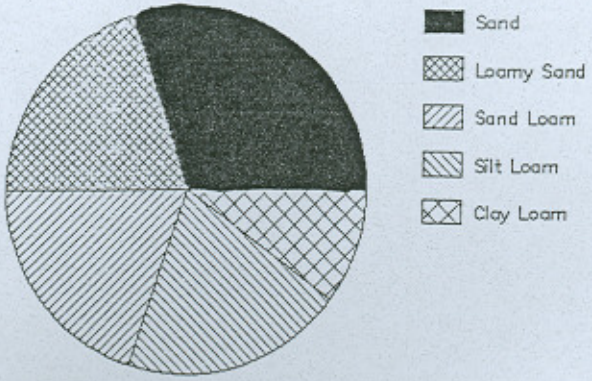

Figure 5 Relative Importance of Different Texture Classes

Footnotes

[1] The market price of the basic hardware at time of writing is around US$ 800.

[2] DBase IV is now available at a list price of US$ 795. A good introduction of dBase IV is available from Simpson A. (1989) Understanding dBase IV, Sybex, USA (List price US$ 24.95).

[3] The new dBase IV offers many new features, the following highlights some of the more impressive new features:
a. The dbase III Plus Assistant menu is replaced by a Control Centre. This centre provides access to all design screens and data and displays the names of files in a catalog.
b. A single dBase IV database can contain up to 255 fields, with a maximum combined length of 255 characters. Up to 99 files can be opened at the same time, 10 of which can be dBase files.
c. DBase IV also includes the new data type, Float, for storing floating point decimal numbers.
d. Functions for date handling, memo fields, indexing, browse, edit, reports , labels and froms have been improved.
e. The SCAN....ENDSCAN loop is provided by dBase IV as an alternative to DO WHILE .NOT. EOF().
f. Dbase IV offers arrays like many other programming languages.

[4] See for example Byers R.A. (1982) Everyman's Database Primer Ashton-Tate, USA for a very good introduction on database.

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NOTES TO CONTRIBUTOR

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