INTELLIGENT TERMINALS FOR EXCAVATION RECORDING

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Abstract

Intelligent computer terminals which can record data on cassette tapes may represent an economic alternative to both card-punching equipment and on-line terminals.

Introduction

Several papers at this and past conferences have discussed how we may be helped to understand sites by the use of computer information retrieval techniques. Much has been published about the use of particular information retrieval systems, and about the coding of the archaeological information into a form suitable for machine analysis, but little has been said about the mechanical process of getting the data into the machine.

The traditional method seems to be the use of coding sheets and punched (Hollerith) cards. In fact, of the systems described at the past three years of Birmingham conferences only one uses anything else. This exception is the use of an on-line computer terminal, situated near the excavation site, by Wilcock and Buckland (see Wilcock, 1973; Buckland, 1973). Before I describe a possible third alternative I must first discuss some of the disadvantages of card and on-line terminal systems.

Coding sheet, punched card systems

I think there are four main disadvantages in such systems:

1) Cost
2) Error-rate
3) Inflexibility
4) Lack of feed-back to the excavator.

These must, of course, be justified in more detail.

1) Cost: This may seem rather surprising, but it can be very important. At present, to have 1,000 cards punched and verified costs from £30 to £35. If we take the Danebury project as an example (Shackley and Wilcock, 1974) it is stated in their paper that "At least 20 cards were used to record general features about each pit", and further, "An additional 16 cards were then used for each layer within the pit". Using the lower limit of the costs quoted above this represents a punching cost of 60 p. per pit + 48 p. per layer within the pit. At the time of the 1974 paper 500 pits had been excavated. If there were an average of just three layers in each pit, this needs an investment of £1,020. The total excavation of the site may yield ten times as many pits.

One of the largest excavation recording projects so far attempted in Europe, at the site of Bergumermeer (Newell and Vroomans, 1972), has

generated more than 120,000 punched cards. To have these punched commercially would have cost £3,600.

It must be realised that this is part of the real cost of an excavation recording system, although it may not be obvious in the present situation where most investigators do their own punching, or have access to 'free' university facilities.

2) Errors: There are two sources of error in punched-card systems; the first in the completion of the coding sheet, and the second in the transfer of the data from the coding sheets onto cards.

The first tends to be exacerbated by the use of numerical coding, which is often needed to reduce the volume of the data to be punched. The redundancy involved in coding by keywords would reduce this kind of error, at the cost of increased punching.

The second source of error may be mis-punching, which can be reduced greatly by punch-verifying. But coding-sheets will also be misread, and this source of error can only be controlled by more careful, and time-consuming work in the field.

3) Inflexibility: This arises mainly from the fact that coding-sheets must be printed in advance of the excavation, and are difficult to modify should the needs of the excavator change. The fixed length of punched cards makes variable-length data fields difficult to handle. Numerical coding of the data means that there must be a code-book, which may also be a difficult document to change.

4) Lack of feed-back: To have a lot of cards punched takes time, especially if the punching is not being done by a commercial organization. Thus there is little chance of giving the excavator daily, or even weekly summaries of the progress of the excavation. Errors in the recording or coding scheme will not show up until after the end of the excavation, when it will be too late to correct them.

On-line terminal systems

At first glance, the use of on-line terminals seems very attractive. There are no expensive cards, data entry programs can be written to format and check the data, these programs can be modified to allow for new data or entry formats and the user has access to all the information that has been recorded. This is the sort of system described by Wilcock (1973).

As any user of a dial-up time sharing service will know, there are reliability problems. This can occur with the host computer, with the line and with the terminal itself. These are not generally so severe as to make work impossible. The installation of the terminal can be subject to delays, mostly due to the slowness in installing the line and the modem to connect the terminal to the line. If there is already a telephone line available, an acoustic coupler may be used, but these tend to have unacceptably high error rates.

But, at least at present, on-line terminals are completely excluded from sites by the cost of the G.P.O. telephone line. For any path over 56 Km. a dialled line costs on average £10 an hour. A 40-hour excavation week thus costs £400, a ten week excavation £4,000, without considering any equipment or computing costs.

Intelligent terminals

I would like to suggest that we could gain most of the advantages of the on-line terminal system, without the enormous line charges, by the use of 'intelligent terminals'. These are, in fact, very small, self contained computers (Fig. 1), with at least the following elements:

Data-entry keyboard

Display

Hard-copy printer

Small c.p.u. and memory

Simple mass data storage device (cassette tape or floppy disc)

All these elements are fitted into a single, desk-top cabinet, about the size and weight of a large electric typewriter.

These terminals have been designed expressly for the purpose of data entry, normally for commercial applications, banking and warehousing. They have hardware features that make it easy to write interactive data entry programs, and to check the data as it is entered. The data can then be formatted and written onto the cassette tape. One tape holds about 250,000 characters of data, or the equivalent of over 3,000 punched cards. If finds are being recorded, a subset of the recorded data may be printed out to form the finds labels. Thus, data has only to be entered into the system once, and is checked as it is entered.

At the end of the day, the data on the tape may be studied, and summaries of the records printed out. The tape may then be sent to a large computer where the complete records of the excavation are kept on magnetic tape or disc.

This type of machine is quite expensive, at present ranging from about £2,000–£6,000, depending on the features offered. A machine costing £2,000 is able to do little more than produce a form for data entry, perform some simple checks on the range and type of the data, and format the data for the tape. The more expensive machines are able to perform much more extensive checking, such as the searching of keyword lists, and to provide better summaries of the data. In some of the cheaper machines there is no separate display unit, the printer is used for this purpose.

These machines are then obviously not for small archaeological groups doing small excavations, but such people have, in any case, very little need for excavation analysis by computer. Larger archaeological groups, and Government departments could obviously afford them. Some machines may be hired, the hire charges ranging from £100–£200 a month, and this is only the cost of one finds assistant. Intelligent terminals may represent the most cost efficient solution to the recording problem to those large archaeological groups which are firmly committed to the use of computer information retrieval systems to help them understand their sites.

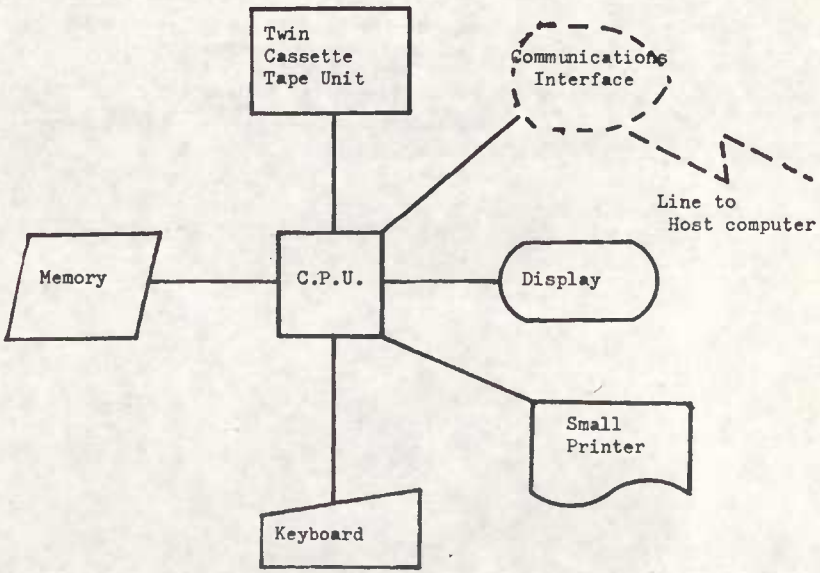

Figure I Elements of an intelligent terminal. The dotted part- access on-line to a larger computer - is not essential.

References:

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