TECHNOLOGY

Computer for Translating

A computer that will translate Chinese into English, in which the cataloguing system is an adaptation of one devised by Dr. Lin Yutang, is being developed—By Alexander Gode

➤ NOW THERE is an attempt being made to translate Chinese into English automatically by machine.

This system, demonstrated by International Business Machines Corp. at its Yorktown, N. Y., research center, has as its core a substitution device in which an input signal from the source-language text is replaced by an output signal for the target-language text.

To make the switchover the machine searches the stored information in the substitution device, which implies that this information is stored in some systematic fashion. With Chinese the stored information cannot be arranged alphabetically since Chinese is written in multi-stroked ideograms and not in letters of an alphabetic system.

The IBM procedure of cataloguing Chinese symbols is an adaptation of a system worked out by Dr. Lin Yutang. It is based on the observation that both the upper and the lower half of an ideogram contain of necessity one of a limited number of stroke configurations.

There may be hundreds of Chinese ideograms with a particular stroke configuration in the upper half but only a dozen or so with that upper configuration in combination with a particular other stroke configuration in the lower half. The ideograms in this dozen or so are simply numbered.

Thus every Chinese ideogram can be identified as X plus Y plus Z, meaning (X) characterized by a particular configuration in the upper half, (Y) characterized by a particular configuration in the lower half, and (Z) listed in a particular arbitrary place in a group sharing X and Y.

This setup enables a human operator to code every Chinese signal in a text in such a way that the machine can search its information store for the corresponding output signal.

In practice considerable additional structural and grammatical information needs to be digested by both the operator and the machine.

All machine-translation research attempts to trace and work up for mechanical simulation what is happening in the human translator's mind. Stimulated by machine-translation research, interested human translators have attempted to achieve conscious awareness of every step and sub-step they undertake in their work. Under normal conditions this process is "intuitive" and "automatic."

One crucial aspect of mechanical-translation research, neglected at IBM and elsewhere, is the fact that the human translator who attempts to break down in steps or units of procedure what he normally does in unconscious routine comes up with the conclusion that there is a specific point at which his work ceases to be reducible to signal-suggested steps. This point marks the limit of computer language work.

The theoretical question arises whether transpositions from one language into another, which contain nothing from the area beyond the point mentioned, can ever be called translations. The answer is: "Yes, if the source text contains no essentials beyond that point," and "No, if the source text does contain such essentials."

Individual scientists at IBM and elsewhere in this field are aware of the implications of the foregoing. They are strikingly more modest than the early enthusiasts.

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近來發現磁心的開關時間
可以縮短，故能用它來做
更高速的存儲器了.

Word-for-Word Translation:

Recently discover/discovery magnetic core (de) switching time possible shorten, therefore use/consume it come make even high speed (de) storage device (le).

Machine Translation:

Recently discover switching time of magnetic core possible shorten, therefore possible use it in order to make storage device of even higher speed.

Human Translation:

It has been discovered recently that the switching time of magnetic cores can be shortened. They, therefore, can be used to make storage devices of even higher speed.

CHINESE TRANSLATED—A Chinese sentence with translations, word-for-word, by the IBM machine and by a human translator is shown. The words "de" and "le" have no English equivalents.

TECHNOLOGY

Computer Talks Fast With Great Accuracy

➤ ELECTRONIC COMPUTERS now can exchange information very fast with complete accuracy. They do it in an artificial language with equipment built at the Massachusetts Institute of Technology.

Called SECO (which means SEquential deCOding), the system is the first one in which some important operating characteristics predicted by information theory have been achieved in practice. Digital messages have been sent and received over an ordinary telephone line hour after hour with perfect accuracy.

Prof. John M. Wozencraft explains the system's operation in the Technology Review, 65:8, 1963, by comparing SECO's procedures to those of radio hams talking during an electrical storm. When noise obliterates part of a speaker's words, a ham's listener usually knows what was said from the context of the message. If the noise becomes too bad, the men speak more slowly, more distinctly, and choose their words more carefully. Even if a prolonged clap of thunder makes it impossible for a listener to know what was said, he at least knows that he did not get the message and asks the speaker to repeat it.

The computers exchange information in binary digits rather than English words, but these are so encoded and decoded that the machines can use methods analogous to those of the radio hams to prevent misunderstandings.

"The key to the speed and efficiency with which SECO accurately identifies the transmitted message when it receives a noise-corrupted version," Prof. Wozencraft explains, "lies in the structure of the sequences that represent messages. Most of the time, SECO has no trouble in finding the correct message quickly and efficiently. When the noise becomes too bad, on the other hand, it becomes hopelessly confused and asks for a retransmission. Thus it avoids wrong decisions."

SECO's developers have used a telephone line for their experiments simply because of its convenience, and have received data over it accurately at more than three times the speed obtainable with conventional techniques.

"Of course, like a person," says Prof. Wozencraft, "SECO will ultimately err, but we anticipate that the probability with which it does so will be unmeasurably small."

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TECHNOLOGY

Stretching Paper Improves Stiffness

➤ STRETCHING PAPER while it is being made will improve its stiffness and reduce its tendency to swell in damp weather.

The stretching is done while the paper is being formed on a machine. Special curved rolls hump upward under the weak and wet web of pulp fibers, tending to stretch the paper as it is being dried.

Dr. Edward G. Locke, director, U.S. Forest Products Laboratory, Madison, Wis., said papers for color printing, map making and punchcards for high speed computers do a better job if they can resist changes in humidity that make paper stretch and shrink in use.

Even small changes in paper sheet dimensions can throw off color registry, distort distances on maps and construction plans, and possibly even confuse electronic brains if punchcard holes are misaligned.

The research was conducted in cooperation with the Boxboard Research and Development Association, and was directed by Warren A. Chilson, Donald J. Fahey and Vance Setterholm of the laboratory staff.

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