

Interview with Professor Makoto Nagao

by
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When the International Association for Machine Translation was formed at the MT Summit in Washington last July, there was no doubt in anyone's mind who should be its head. Professor Makoto Nagao, of Kyoto University in Japan, has long been recognised as the leading authority, the "guru" as he is often described, of MT in the 1990s.



Makoto Nagao

GK: Can you tell me something about your career?

MN: I graduated in 1959 and took a Master's degree in electrical engineering in 1961. At that time, we had no computer science department and my first studies were in pattern recognition; so I studied character recognition by computer. Then I became interested in the computer's power to recognise characters and I spent a few years studying hand-writing character recognition and how it could be applied, for example, to a zip code reading machine for the Ministry of Telecommunications. I have since been into research and worked as assistant professor here at the University. I focused on computer science, on the capabilities of computers, on the kind of work they can do; human-like work for example.

GK: When did you first become aware of the body of work on machine translation in the rest of the world?

MN: I became interested in machine translation in 1962 and my first research topic was the generation of English sentences, to test the value of the grammatical rules and of the semantic information attached to each word and these were tested by the generation of English sentences, and the naturalness of the generated sentence was checked. I introduced the probabilistic application of grammar rules. Probability was supposed to be the relative frequency of the grammatical rule usage. The paper was published at the first COLING conference, which was held in New York City in 1965.

GK: So that was your first opportunity of meeting researchers from other countries?

MN: Yes, that was quite impressive for me because I was very, very young and I didn't know the details of the American researches and American researchers at that time. I met a lot of people. From around 1965 to 1975 it was a trial and error period for me. I wrote a lot of grammar rules of English and Japanese, and

abandoned them, wrote another set of grammar rules and abandoned it again, and so on. That was a repetition of a trial and error process. Of course, I was interested in the Japanese language and its relationship with English. We had no good character input system for Japanese at that time and we used katakana. But I could not be satisfied with it and, around 1975, I finally developed a special Chinese character input system. Since then, we have been able to handle Chinese characters directly in computers.

GK: Do you still use that system?

MN: No, that was used only for three years or so. Commercial systems for Japanese input made their apparition on the market. In 1978 I started seriously to develop a machine translation system. The first one I developed was a system for translating the titles of research papers from English into Japanese. We collected 20,000 such titles and analysed them. We found out that there were only 20 to 25 different types of construction. That was really astonishing for me and it was rather easy to convert English titles into Japanese. The Japanese government, which was very pleased with the results, decided to develop a translation system for other kinds of text. The idea was that if the title was translatable then we could do the abstract next. The abstract is actually quite difficult to translate. I started on what was a big project in Japan with the help of a lot of people from various companies.

GK: This was all done through Kyoto University?

MN: Yes, through our laboratory, and four years were spent on it. We constructed the two systems required by the government: Japanese to English and English to Japanese requirement and the demonstration was very acceptable. The Japan Information Centre of Science and Technology (JICST) took over the project to construct a practical system. JICST continued the government work for another five years and finished

the system in 1990. The system has been operational since then for Japanese into English translation.

GK: *You say it's in operation, can you say how many abstracts they are doing?*

MN: They schedule to translate 20 or 30 thousand abstracts per year and another 50,000 titles. After finishing this government project I got back into much more basic research, studying dialogues and conversational sentence analysis. I am also studying the analysis of very long sentences, sentences of more than 80 Japanese characters for example.

GK: *You are known in the West as the leading Japanese figure in machine translation. Have you developed a series of students who have gone on to run their own programmes?*

MN: Yes, I trained six or seven students every year in machine translation for about ten years, or more than ten years. That makes more than 70 or so students. Not all of those who joined private companies have been engaged in machine translation but the people who came to join us for the government project were very well trained and, after going back to the companies they became the central personnel in machine translation for their company. We trained more than 50 people from private companies in our project and they are all very happy. I guess there are such people in about 15 private companies. I believe that the training we gave to them had a lot of impact on the activity of private companies.

GK: *You must have seen a number of changes in the direction of machine translation over the years. At the Machine Translation Summit conference in Washington we heard a lot about probabilistic models and statistical analysis. Is this a new direction?*

MN: Yes, these are all quite new. Others are knowledge-based machine translation and example-based MT systems. I proposed something on these lines in 1983 and then I persuaded many people to do example-based translation in their systems but nobody bothered until recently. However, in the last three years many people have become aware of the importance of that kind of approach.

GK: *What role do you think the new International Association for Machine Translation, of which you are chairman, will have in keeping more aware of what's going on elsewhere?*

MN: Exchange of a lot of information on MT will be achieved. People will get to know about other people's activities, and particularly important, transla-

tors will realise in which direction translation is going. They will get all sorts of information about translation systems and the implications of the introduction of machine translation for their work. There will be a lot of opinions or complaints from the users of the translation systems which will be reflected to the manufacturers and improvement of the systems could be quite drastic.

GK: *You had the idea of the first Machine Translation summit conference, from which the conference series, and the Association for Machine Translation, have developed. Are you satisfied with the way these have gone?*

MN: Yes, I am very satisfied with the progress of the conferences. At the first summit we only had 200 people. Of course we limited the number of people because of the conference site but, for the second one in Munich, we had about 300 people, and about 400 in Washington. So there is a steady increase. We were particularly satisfied with the Washington conference because there was so much participation from the United States where there was little interest in MT in the past.

GK: *Do you think there is a contrast between Japan and the United States and Europe? In Japan you have a lot of government support either moral or financial, but this is not so in the United States?*

MN: Yes, we see a variety of differences in Japan and in the United States. One is that research funding is rather small in the United States compared to Japan but the big difference is that Japanese private companies are very enthusiastic about the development of machine translation and related technology, while in the US very few small venture companies are interested in it.

GK: *It has always struck me that in the West, the people involved all tend to be small companies but in Japan it's the industrial giant companies.*

MN: Yes, the big Japanese companies handle everything: semi-conductors, computers, home apparatus, MT systems and so on, in one company and that is one of the reasons for the toughness or strength of the Japanese companies.

GK: *You travel a lot and we see you everywhere in Belgrade or Munich or Washington or London, and you keep abreast of what's happening in machine translation and artificial intelligence in most countries.*

MN: Yes I keep track of many good activities in the United States and Europe. Many of them have origi-

nality and that is quite nice. I get a lot of good suggestions from these activities.

GK: It is very apparent that we hear little from the Russians now. At one time they were important in machine translation. Do you think that is because of the present troubles? Will the Association eventually extend back to Russia?

MN: Five years ago I went to Moscow and found out that they are in a very... well ... painful position, in the political situation and research condition. They don't have any good computers and so they have to depend always on paper and pencil. This situation limits the thinking ability of researchers. We can take further steps by implementing our thoughts on computer programmes, but they don't have comput-

ers so their thinking cannot make good progress. I think they have many good ideas but they don't have any tools to test and to develop them. I hope that the situation will change in the near future.

GK: Where do you think we will be in ten years time? Is voice recognition going to make an impact?

MN: Yes, I think so. When we talk with a limited vocabulary and when we speak in a clear way, then speech recognition is not a dream. In ten years I think that there will be a prototype system. The basic framework of machine translation may also change. At the beginning of the 21st century there will be a machine translation system which understands and conveys very sophisticated meanings and intentions of speakers.