OPENING ADDRESS

PRESENT AND FUTURE OF MACHINE TRANSLATION SYSTEMS
— AN INTRODUCTION TO THE MT SUMMIT —

Makoto Nagao
Department of Electrical Engineering
Kyoto University, Kyoto, Japan

Machine Translation Systems in Japan: There are more than ten companies in Japan which have announced commercial products of machine translation systems, and about the same number of other companies which are developing the similar systems and will announce commercial products soon. More and more companies have come into information processing field, and are interested in natural language processing technology. This is because the human interface is a major importance in the future information society.

There is a long history of researches in natural language processing and machine translation at many Japanese universities and research institutes, and the technology transfer has been continued to the private sector. However, formidable efforts are necessary at the industry to fill in the gap between small academic models and huge practical systems. The companies which sold machine translation systems are now being criticized by their customers for the bad quality of the translation, and are being agonized by the difficulty of significant improvement. Machine Translation users have had big misunderstanding that any expressions will be translatable in good quality. This is an illusion, which has partly come from exaggerated advertisements of the companies of machine translation systems. The companies are paying off their indebtedness now. But the customers also have their faults. Customers' documents are often written in very awful Japanese, and even a human translator can not understand and translate them. Customers must write authentic sentences. If the input sentences are carefully written to avoid ambiguity and misunderstanding to the readers, they are generally translatable by machine in a reasonable quality.

Governmental Support: The Japanese government is supporting machine translation and its related research activities through various channels. The Ministry of Education, Science and Culture is supporting the basic researches mainly through the fund called Grant-in-Aid for Researches. Theoretical linguistic researches as well as computational linguistics are gradually increasing by the research grant of this kind. The Ministry of International Trade and Industries supports varieties of activities such as the Fifth Generation Computer Systems (ICOT), and Electronic Dictionary Researches (EDR, IPA). The Ministry of Post and Telecommunications supports Automatic Translation Telephony Research (ATR), Agency of Science and Technology supports a machine translation interface for database retrieval systems at Japan Information Center for Science and Technology. The Ministry of Foreign Affairs in cooperation with the Ministry of International Trade and Industries has started a machine translation project between Japanese and Asian/South Asian languages (ODA Project). All these research activities are conducted by the cooperation between the academic circle and the related industries in Japan and the corresponding countries. In the future the cooperation circle must be enlarged to many more foreign institutes and industries, because language translation essentially involves the countries where the source and target

languages are spoken. I hope that a good effective cooperation mechanism be found but among the participating countries in this conference.

Aims of the Conference: Machine translation system is imperfect at present and the near future. But it has a possibility of improvement, and even at the present quality there are economically feasible usages if we are not very much ambitious. We have to find out future prosperous markets for machine translation system. This is the main reason why we have gathered here in Japan where the research and development activities in machine translation are highest.

The major topics which we want to discuss and find out some solutions in this conference are the followings.

(1) Recognition of the state-of-the-art of machine translation technology in the world.
(2) Recognition of the state-of-the-art of the market for machine translation in the world.
(3) Recognition of the problems in present machine translation systems, and the way of solving them and of improving the translation quality.
(4) Finding out future profitable market areas by the advancement of machine translation technology.
(5) Necessity of the governmental financial support for the development of higher level machine translation technology.
(6) Finding out suitable mechanisms of international cooperation for the develop-ment of machine translation system.

Exploitation of Good Application Areas and Markets: We are to be rather careful about in what kind of application areas present-day machine translation systems can and should be introduced. Possible application areas are,
(1) machine translation of daily news for the purpose of quick survey of what's happening in the world in the past few hours. This is quite useful for the financial/economic information,
(2) machine translation of technical materials, user's manuals for export/import merchandises,
(3) quick scanning of abstracts from an information retrieval system,
(4) draft translation of memos of conferences and meetings,
(5) draft translation of stylized business letters, and so on.

Machine translation can be fairly successful between the languages of the same or adjacent families, such as the language pair of Japanese and Korean. There exists already a very successful system between these two languages. The same may be true for English and German, French and Italian, and so on. In these cases we can rely primarily on syntax, and some effective usages of semantics are sufficient for the analysis and translation.

Machine translation between the languages of different families is quite difficult on the contrary. Compositionality principle does not hold, and deep level syntactic and semantic interpretation is required. The present-day machine translation systems between these languages are quite unsatisfactory for real practical usage. However, if we are careful about input sentences, the system will be usable. For example, we are not interested in novels, poems and so on. We are only interested in text categories such as scientific and engineering documents. We introduce a certain amount of pre-editing of input sentences, and post-editing of machine-translated sentences. If these are allowed, and if the total cost including input of text, pre-editing, machine translation, post-editing and print-out, is cheaper than the total cost solely done by human translator,

machine translation system can survive. Introduction of a machine translation system is effective when the documents to be translated are voluminous, and the period allowed for translation is short. Terminology can be controlled throughout the whole documents. This is another advantage for machine translation. There exist already a few translation companies in Japan which utilize machine translation system from these standpoints. I think there exist various applications and markets for the present-day incomplete machine translation systems. We must exploit promising applications and markets for machine translation.

    <u>Research Themes</u>: Future directions and the improvements of machine translation systems will be,

(1) grammatical rules to look at wider area of a sentential structure,

(2) clarification of intersentential syntax and semantics. Researches of anaphora reference, ellipsis inference in analysis and synthesis,

(3) more detailed study of contrastive linguistics between languages, especially in reference to their specific cultural backgrounds.

    People easily speak about "language understanding" researches, but nobody has detailed out what language understanding means, and what kind of sub-problems are to be pursued in the framework of language understanding. We have to go step by step, and must solve the problems at each stage. The problems listed above are such sub-problems we have to attack at this moment. We want to clarify many more such topics which we can and must attack in the near future by international cooperation.