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MACHINE TRANSLATION: A 'BRAVE NEW WORLD' OF LINGUISTICS

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"A language is a set of sentences, each finite in length
and constructed out of a finite set of elements."
-Noam Chomsky (1957)

"Machine Translation refers to the use of machines (usually computers) to translate texts from one natural language to another."(Sin-wai 137) Computational Linguistics is concerned with the application of linguistics to problems which are basically concerned with computing; that is where the aim is to produce a computer programme which will perform one required task more efficiently, more quickly or more economically than it could be performed by human beings. Much more work has been done in this aspect of computational linguistics, for the obvious reasons that government and other grant giving organizations are more interested in occupation of this type and although the aim has no, therefore been pure linguistic research, there has been significant fall out to linguistics. The most widely exposed work of this kind has been mechanical translation, and more effort has been put into this than any other branch of Computational Linguistics.

Machine Translation functions include- word translation, mouse-trailing instant word translation, dictionary look up, editable dictionary, phrasal translation, sentence translation, page translation, text translation, text to speech translation, transliteration, highlight and translate, grammar checker, address translation, hyperlink translation, web page localization, e-mail translation etc

Historically, interest in mechanical translation seems to have been first motivated by a famous memorandum circulated by Warren Weaver in 1949, in which he suggested that automatic computers might be used at least to aid in the solution of world-wide translation problems. Early work on the problems was characterized by a very adolescent approach to the difficulties involved . It was assumed that the computer could be made to perform the same operations as were presumed to take place when the translation was performed by a human translator. Each word in the input language text would be looked up a bilingual dictionary, which could easily be stored on magnetic tape, an equivalent would be chosen amongst the translation provided by the dictionary. And at the end of say, a sentence, the equivalent selected would be rearranged according to the requirements of word order in the output language. It was fast realized, however, that the task of selecting the appropriate equivalent from the bilingual dictionary and of rearranging these in an appropriate order, raised problems of tremendous difficulty.

At this point, two different views of the objectives of machine translation research became perceptible. One school of thought, mainly associated with Bar-Hillel, directed themselves towards what is sometimes called 'Fully automated, high quality translation'(FAHQT), believing that this long-term goal could be attained by a large investment of efforts in basic research. "Bar- Hillel considered that real world knowledge was necessary for translation and this was impossible for a machine to replicate. He felt that the goal of a fully mechanized translation on a par with that produced by a professional translator was unrealistic. In his opinion, it would be more realistic to attempt to produce machines that worked in conjunctions with humans" (Hatim 116)The second school might be said to have taken an engineer's view of the difficulty that is they felt that efforts should be concentrated on plummeting the total cost of the translation process, by an appropriate combination of human and mechanical efforts. "What is language for? The most general answer we can come up with for this is,- Language is used to get other people do what we want them to."(Yazdani:71)

With this in mind, Reifler suggested in 1950, a translation process in which the original text would be scanned by a pre-editor, who required only knowledge of the input language and who would put in appropriate diacritical marks into the input text so as to help the mechanical selection of output language equivalents. After mechanical processing, the computer output would be processed by a post-editor, having knowledge only of the output language, who would 'clean-up the resultant translation'. An adaptation of this editor was eliminated, the machine output listing all the dictionary equivalents for each input word, with the original word order, the whole burden of rearrangement and selection now falling on the post-editor. "There is also a need to re-define 'language' because we observe that information technology sees natural language as in natural language processing, in opposition to the language used in and for instructing computers….This opposition between natural and artificially constructed languages offers many interesting research perspectives for ergonomic linguistics, a new field of study associated with language planning and with efficiency of communication."(Sager 09)

Both of these schemes are clearly feasible and, if applied to technical material, would have the desired results of freeing highly qualified translators for more important or more difficult texts. However, the main reason why no such scheme has been implemented on a commercial scale is that, economically, it would not make a sense. Even a person with only a fairly good knowledge of language can ,when dealing with a subject with which he is familiar, translate accurately at very good speed. Using Oettinger's scheme, the text is processed at least three times: the initial key-punching, the post-editing and the final typing. Each of these operations will take roughly as long as the translation process performed by the human translator, and at least one of the persons involved must be intelligent and knowledgeable about the subject matter of the text, and ,therefore, highly paid. Further, not an inconsiderable amount of computer time will be required.

So, far, then no large-scale, commercial application of computers to translation exists .It should be obvious, however, that there are various factors which may change the economics of the process. Optical-character readers, which read direct from the printed page into the computer, are becoming available. In some applications a machine-readable version of the input text is available as a by-product of some other process. Factors such as these, to get with the diminishing costs of computer power and the increasing sophistication of translation programs which are therefore less demanding on the post-editor, mean that we may well see machine-aided translation in use on large scale by translation agencies within the next ten years. The quality of machine translation output has improved considerably over past. "First, advances in technology

mean that it is possible to build larger databases of lexicons, grammar rules and even extra linguistic knowledge. Second, an improved understanding of linguistics means that relevant rules can be encoded more easily and controlled languages can be developed to reduce ambiguity."(Bowker 03)

The increasing sophistication of the translation programmes to which we have referred is due to the realization that it is possible to automate the process of syntactic analysis. The initial impetus for work of this kind came from the grammatical models of Chomsky, although it must been praised that these models were in no way developed with computational applications in mind. Since, one of Chomsky's prerequisites for grammatical theory is that it should provide an automatic mean for generating all the sentences of a language, his models are naturally suitable for use on a computer, in that a computer can be programmed to generate sentences according to the rules of grammar. This of course is far from true of traditional grammars which require the intervention of the user's intelligence or linguistic intuition. From this it is at least plausible supposition that there should be an algorithm (i.e.an automatic procedure) for deciding how a sentence has been generated by a grammar. In fact, it can be shown on theoretical grounds that this is always possible for a context-free phrase-structure grammar (One in which the context does not impose selection restrictions on individual items).

Programs have been written which successfully perform this sort of analysis, but this still leaves considerable problems to be solved (Producing adequate grammar for a language is a next time-consuming task ,and when such a grammar has been produced ,the parsing program will normally produce several different parsing s for a given sentence ,reflecting the syntactic ambiguity inherent in the sentence, For example the sentence 'Traffic jams are caused by slow lorries' and 'buses carrying heavy loads' has at least four possible parsing. A human reader resolves these ambiguities by context ,by his knowledge of what likely, and by his knowledge of the real world .We do not know how to make a computer simulate this process, indeed we cannot yet really conceive how this sort of encyclopedic knowledge could be held in a computer .At this point a solution of our problems seems to depend on developments in other disciplines concerned with the way in which the human brain organizes this information.

In spite of the problems caused by multiple parsing, however, syntactic analysis can help a great deal in mechanical translation; many things that would be ambiguous in a straight word-for word translation can be resolved by the analysis ,and problems of word order in the output language can be solved if we know how to map phrase markers in the input language on the phrase markers in the output language on to phrase markers in the output language. If we accepts the hypothesis that all languages exhibit basically the same deep structures, then we have theoretical grounds for supposing that mechanical translation should be possible by using this kind of analysis in other words, given a grammar of the input language and an algorithm for determining the deep structure of sentences in the language, we should be able to use this deep structure, to get herewith the transformations in a grammar of the output language, in order to generate the translated sentences, However against these theoretical grounds for optimums we must set the enormous practical problems of producing the grammars required our present by verify inadequate knowledge of what constitutes deep structure and the problem of genuine lexical ambiguity in view of this, one can not foresee fully automatic high-quality translation as a possibility for many years to come. "Leibniz believed that all natural languages arose from a single course. His view on natural language is that all human languages trace their roots to a single Adamic language, i. e. the language ascribed to Adam in Genesis when he named the animals that God had created." (Kurhade 10)

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