The State of Machine Translation in 1996

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In a paper entitled *The State of Machine Translation in 1951* [1], Yehoshua Bar-Hillel made it clear that in the absence of methods for resolving "semantical ambiguities", fully automatic general-purpose MT could only be achieved at the cost of inaccuracy for the "foreseeable future". Forty-five years later, we are forced to admit that his pessimism has proven entirely justified.

Progress in MT research has been painfully slow, and the ultimate goal has kept on receding with each step forward. Traditional *rule-based* approaches (whether of the linguistics-based or the knowledge-based variety) have resulted in systems that tend to collapse under the weight of their own complexity well before they rise above the clouds of semantical ambiguity. Recent results in *corpus-based* approaches (whether of the statistical [2] or the example-based variety) indicate that it may soon become possible to develop systems that match the performance of the best rule-based systems with substantially less human labour; but these results do not appear to bring us much closer to high-accuracy MT.

Bar-Hillel's pessimism about the prospect for an overall solution to the MT problem was counter-balanced by his confidence that given adequate application strategies, suboptimal solutions could soon be made available. He went so far as to suggest three such strategies.

The first was to use MT systems to produce rough translations for the purpose of "scanning the huge printed output [of actual or potential enemies]". As a tool for information assimilation, MT has indeed proven useful: intelligence services have been using systems like SYSTRAN since the early sixties. Moreover, this kind of application is now becoming a mass-market business under the guise of "browsing tools" for the Internet. For example, Web Translator, a multilingual Netscape-integrated MT system is now available from Globalink for less than $50. No doubt, countless new users will be dazzled both by the machine's proficiency at producing "stammering streams of verbal wreckage" ([4], p.2) and by their own surprising ability to decipher it, at least in part.

The second of Bar-Hillel's proposed strategies was to target "restricted language" situations. In 1977, the successful implementation of the METEO system [3], which translates Canadian public weather forecasts, confirmed that MT can indeed work extremely well when applied to simple *natural sublanguages*. Unfortunately, there are so few situations of this kind on the translation market that METEO remains an isolated victory. The closely related strategy of imposing artificial constraints on the source language writing process is currently the focus of some large-scale efforts (such as the KANT system which CMU is developing for Caterpillar) but its practicability has yet to be demonstrated in a convincing manner.

Thirdly, in situations where high-quality translation of unrestricted text is needed, Bar-Hillel believed that a human/MT partnership could be made profitable. The human operator would be asked either to pre-empt machine failures by suitably annotating the source text (pre-editing), or to correct them after the fact (post-editing). With the advent of more powerful hardware, a third variation on this theme has become possible: man/machine interaction throughout the MT process.

But it is now obvious that Bar-Hillel was being overly optimistic about the possibility of devising an adequate and effective division of labour between humans and MT systems. True enough, claims have repeatedly been made that post-editing the output of systems such as SYSTRAN, WEIDNER, LOGOS and METAL can result in substantial gains. However, most rigorously controlled experiments have concluded just the opposite (for a good example, see [5]). These pessimistic conclusions are more in line with the indisputable fact that after all these years, the market penetration of MT in professional translation services remains marginal at best.

Bar-Hillel's application strategies cover the complete range of compromises that can be made with respect to the three attributes of an ideal MT system (quality, generality, full automation). Consequently, barring an unexpected research breakthrough, the use of MT will in the near-term be mostly limited to browsing tools and highly restricted sublanguages.

In most situations where high quality translation is needed, the proper place of humans and machines will remain as described by Martin Kay fifteen years ago [4]. That is, the core of the translation task is best left to the human translator, with the machine providing support for the more peripheral aspects of the work. Fortunately, corpus-based approaches have succeded in giving a new impetus to the development of translation support tools. Novel tools such as translation memories that allow translators to recycle pre-existing translations are already available on the market (Translation Manager 2, Eurolang Optimizer, etc), and research on many others (such as terminology acquisition aids and translation checkers) promises exciting new results.

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