Programming the Right Remark on Mars

Computational Linguists Face Challenge of the 90ies

Computational Linguistics, among the fastest-growing fields of research in the 80ies, is looking ahead: NASA's planned manned mission to Mars is opening prospects of a spectacular breakthrough in language generation.

(UPI/Washington Post) What goes into a spontaneous utterance like Neil Armstrong's famous "This is a small step for me, but a big step for humanity"? Or Yuri Gagarin's "I didn't see God"? This question is racking computational linguists across the US right now. The problem will be engaging this hybrid brand of scholars - half linguists, half computer scientists - for years to come. Researchers in labs and on campuses from San Diego to Cape Cod have stumbled on a new application of their craft and a golden opportunity to boost funding and deepen knowledge.

During the 80ies, the old dream of constructing a machine able to do automatic translation reawakened after slumbering through the 70ies. The advent of much faster and more powerful hardware enabled language engineers to do much subtler programming. Simultaneously, sophisticated formal models emerged in theoretical linguistics, raising hopes of implementing linguistic competence on computers for a range of purposes, from cars driven by spoken commands to natural-language front-ended expert systems engaging in conversation. Research results catapulted government and corporate funding, as any self-esteeming software company or state authority jumped the bandwagon hoping to gain competition advantage or prestige from patenting perplexing systems.

However, impatient sponsors expecting quick results were frequently disappointed. Prof. Higgins of MIT explains the reasons: «It turned out that hopes for immediate progress in turning out commercial products were staked too high. Teaching machines to understand language is a vast undertaking, demanding decades even if all experts across the world were cooperating in one big project. If efforts are scattered, things slow down. Add secrecy, and you're in a bad fix.» As a result, funding lagged in the late half of the 80ies.

Adding to the misery, topics of basic research less apt for producing quick-and-handy results suffered neglect. Unless you could promise impressive programs, you were likely to run out of resources fast. One such field of study is known as language generation, meaning computers utter sentences on their own. «This area is especially tricky», says Prof. Higgins, «because language synthesis, as opposed to analysis, depends crucially on a formal theory of pragmatics, concerning the point of saying what's said. The number of parameters you have to consider climbs sharply." For a computer system to speak or even write statements freely, it must simulate man's capacity of using language for some purpose. It must master the art of deliberation, that most human of all activities. In the absence of realistic applications, funding in this area will remain on a low key. Says Prof. Higgins, «prospects stay down.»

Until recently. In the wake of President Bush's announcement of the NASA's decision to equip a manned mission to Mars before the turn of the millennium, a brilliant idea has stricken several of America's outstanding computational linguists independently: Why man the mission? In an era of perfect robotry for all motoric purposes, it is the spoken message from space that represents the main reason for manning any space mission, and on Mars, the symbolic impact would be tremendous. But what if that human touch could be manufactured? «If we can make a robot perform exactly the same tasks as an astronaut, including the talk on the spur of that magic touchdown moment, there is no point in taking on the extra load of making the spaceship habitable», Prof. Higgins explains, articulating the consensus of the NLP community.

They have a point. In advocating this astronomic proposal, the computational linguists are exploiting a weak point in the NASA's plans: Expense estimates are already rising beyond all hitherto imagined limits. The cause: Ensuring living and working conditions in those extreme circumstances requires investments on an unprecedented scale. By replacing the flesh-and-blood astronauts by a robot equally competent even in linguistic respects, the project would come significantly cheaper, they argue, even counting costs for language generation basic research. Says Prof. Higgins, «this is the sole realistic approach.» Already, NASA officials are showing signs of interest.

And can it be done? In order to truly mimic astronaut behavior, the computer will have to learn to weigh all aspects of the situation and to feel what it is like to be treading on another planet. Is there hope of programming an astrobot in such an intricate fashion as to speak spontaneously, inspired by the unpredictable experience of landing on Mars? It is now up to the various project managers, corporate and government, to answer this question convincingly in the affirmative. If they succeed in making their plans plausible, funding will shift from technology research concerning insulation, nourishment etc. to natural language processing. Even considering SDI, this will mean the biggest basic research boom in US history.

The result remains to be seen - and heard, of course. But CL experts are confident. And if the project succeeds, it will mean the final breakthrough in artificial intelligence: The facility of small-talk is regarded as the ultimate litmus test of thinking like a human. «Critics contend identification will fail», Prof. Higgins says, «they say: A difference will always remain between a human being and a machine. But time will prove this a conservative fallacy. If you really have no way of predicting what the machine will say next, how can you tell the difference? You'll be equally delighted to hear or read the statement as if it were spoken or written by some carbon-based creature."