PROPOSAL FOR A MINI-SYMPOSIUM ON
GENETIC ALGORITHMS APPLIED IN INDUSTRY

I am encouraged in submitting this proposal by the success of the first mini-symposium on Genetic Algorithms held at the 9th ECMI Congress in Copenhagen in 1996. I have organised that mini-symposium together with prof. Kornelia Kalker-Kalman from Netherlands. The papers presented there were rather specialised, but a great interest in the overall paradigm has been obvious. The relatively large number of participants (some 50 persons have attended), and the numerous specific questions clearly indicated that Genetic Algorithms as an optimisation tool are of great interest for the ECMI community.

I will not review again here as I did two years ago, when submitting the first proposal, which has been successful - the spectacular results in optimisation and machine learning obtained lately by means of Genetic Algorithms, in such various application domains as aircraft design, circuit design, network design, timetabling, signal/image processing, time-series analysis and prediction. This time, I will just state the impact of Genetic Algorithms (and of Soft Computing at large) on problem-solving, including optimisation: the new problem-solving paradigm is "look for a (near-)optimal solution to the problem at hand, even if the mathematical model is not yet complete". That is to say, Genetic Algorithms allow for solving difficult optimisation or learning problems not only in cases where polynomial, exact, deterministic algorithms do not exist, but also in cases where the problem has not been (completely) studied from a theoretical point of view. A good example is the result of John Koza (Standford University), who succeeded to obtain, via a Genetic Algorithm applied to a population of computer programs, an accurate programme which gives a correct classification of DNA sequences, while Geneticians do not have, as yet, a set of rules for performing this classification. Simpler applications tend to have a similar impact, since in many cases, Genetic Algorithms are used as a final choice, after everything else failed.
The theory of Genetic Algorithms include the Schema Theorem - which explains why a standard GA converges - and Markov chains-based approaches. New theoretic studies, based on various relations between the topologies of the two spaces involved - called "the phenotype space" and "the genotype space" - are very promising.
Numerous successfull applications of Genetic Algorithms, including industrial ones, seem to "ignore" the existence of some gaps in the theory; such applications are undoubtly ahead of theoretic developments and favor new theoretic studies. It is such successfull industrial applications of GAs that the mini-symposium will focus on.

In case of acceptance, I intend to present myself in the Symposium two applications which I have carried out:
- the Genetic-Algorithm based solution for detecting mobile-phone clone-calls (which is more accurate and much faster than classical methods, including regression-based ones)
- a Genetic Algorithm for cross-classification (a problem which is important in chip design, in processing images taken by a moving camera, when there exist moving objects, as well as in archaeology and

ecology).

I have also invited to give talks in the mini-symposium Jacques Perriau, from Dassault Aviation, and a German researcher from Dortmund University, whose name will be decided by the team leader of this major international node in Evolutionary Computing and Genetic Algorithms.

Finally, it is very likely that a similar mini-symposium proposal will come fom somewhere else, as it happened two years ago; this would enlarge the number of persons giving talks in the mini-symposium.

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