# "Intelligent Genetic Algorithms: a new approach"

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*Review by **Roberto Hoyos Morales*** *January the 27th, 2005*

## 1. Main Ideas

Genetic algorithms are adaptive search algorithms premised on the evolutionary ideas of natural selection and genetic. They simulate processes that occur in natural evolution, specifically "survival of the fittest".

Experiments using genetic algorithms have proven to be effective for solving problems like the traveling salesman problem, using techniques like mutation, recombination and selection methods, just as they happen in DNA, which is the new trend for evolutionary computing.

The capability for adaptation has been highlighted in the experiments, albeit they tend to be slow, and that has been a major critic.

Genetic algorithms are the new research line for Evolutionary Computing and a complete Theory is under development. They represent an intelligent exploitation of a random search within a defined search space to solve a problem, but are difficult to prove and analyze (if not impossible) because it is based in completely random events.

## 2. Results and Conclusions by the speaker

Experiments undergone by the speaker has shown that for a population of viruses, the ones that could mutate faster had the greatest chance to survive. In this, there is shown some sort of 'randomly induced' intelligence. The most astounding feature is that this mutations and recombination occur randomly. The speaker has mentioned two techniques: roulette and tournament, as the elimination process.

Indeed, they are an alternative for optimization problems, but they cannot go beyond 20! Input size, because they become so slow that are not practical anymore.

These kinds of algorithms generate contingency, that is, a state that is not anticipated, or deterministic, and has to shift that state into some order, or result. Genetic algorithms may not be efficient but they certainly *solve* problems.

# 3. Discussion

Genetic algorithms, in my perspective, are such and important topic to talk about, but I'm afraid that the speaker could not communicate that idea appropriately. The topic was hugely compressed so that important questions are just left aside. Also, I have to say that even when it was a structured talk, it did not give relevant conclusions. I think he should have focused more on the experiments performed rather than giving theoretical information that could be easily obtained from the internet.

Now, referring to the topic itself, I must agree in the need for the improvement of the genetic algorithm theory. To the likeness of computer science (and mathematics in general) this problems appear to have too much of uncertainty, randomness which is difficult to model mathematically. I imagine that it must be as in Quantum mechanics, we need to use a statistical approach to understand the problems, quitting from a more deterministic modeling.

# 4. Conclusions

DNA replication and Darwinist theories have given key answers to model computer algorithms, and are to this day, very practical and simple models. This may be helpful to remind us of how much we can learn from our environment.

There is an amount of computational power wasted in the randomness of 'genetic bits', which could be eliminated or carried along and cannot be predicted with certainty. This is a task that genetic algorithms may tackle: how to build more deterministic scenarios.

Even when they are not new (they were pioneered by a man named Holland in the 60's) they are now still very helpful, for they possess the ability to explore and learn from their domain, which is quite remarkable.