Evolvable Hardware Using Genetic Algorithm

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Abstract

An innovative approach for creating electronic circuits that may adapt and evolve in time is called evolvable hardware. It involves the application of evolutionary algorithms to modify and optimize the hardware systems design. The key advantage of evolvable hardware is its ability to modify to the changing conditions and requirements, which makes it suitable for applications with critical flexibility and adaptability. Evolvable hardware has been successfully applied in various domains such as robotics, aerospace, and telecommunications. The technology continues to evolve rapidly, with new techniques and approaches being developed to improve performance and efficiency. Evolutionary algorithms are made use of evolvable hardware, leading to unprecedented advancements and innovations in complex systems design and optimization. A Genetic Algorithm (GA) is utilized in this evolvable hardware that may evolve to find and fix flaws. By applying the ideas of natural selection to the troubleshooting process, the Genetic Algorithm works by constructing a population of potential chromosomes. Using a fitness function that gauges how successfully it resolves the issue, each chromosome is assessed. Through crossover and mutation operators, the most suitable chromosomes are chosen to create the next generation of solutions. This procedure continues until an optimal solution is discovered. However, their performance is highly dependent on the choice of parameters and the quality of the fitness function.