**Autonomous Evolution of Digital Art Using Genetic Algorithms**

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**Abstract**

This paper applies a genetic algorithm (GA) to the autonomous evolution of digital art, eliminating the need for a human in the loop. Creative applications of GAs face the challenge of producing art or music to fit a wide range of human tastes. One approach is to use a human in the loop to determine the fitness function in order to direct the selection and evolution. Another approach, which this paper explores, is to define an objective fitness function to automate evolution without the need for human input. In this paper, several features of digital art are identified and used as the basis for fitness functions. The resulting images are recognizable for the intended evolution of the fitness function used. This indicates the potential of an approach to create more robust algorithmic fitness functions capable of evolving creative applications autonomously.

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1 Introduction

A genetic algorithm (GA) is a type of search and optimization based on biological processes. Solutions are encoded into a string of binary numbers, and these representations are treated as chromosomes. The GA replicates natural selection in order to evolve better solutions. The GA uses systematic processes, implemented in ways that yield random results, and have been applied in a wide range of domains. These unique outputs have also attracted attention in applications for creative purposes. GAs and evolutionary computation techniques have been applied to evolving digital arts, in addition to applications within traditional fields of engineering, medicine, science, and mathematics.

The challenge in using a GA to evolve art comes from the fitness function, or the criteria for evaluation. As human tastes vary from person to person, one approach is to use a human in the loop for evaluation to direct evolution, i.e., the human computes the fitness function. While this approach produces art that is a good match for the specific user, it does not reveal much for future implementations of a creative artwork-producing GA. In addition, the human in the loop significantly influences the speed of the evolution process. Another approach is to define the fitness function, based on the fundamentals of art and design. This approach aims to identify characteristics of art that can be evolved to creative designs, without the need for continuous human interaction.

This paper uses an autonomous GA to create artistic designs, based on predetermined fitness functions. Particular aspects of art, such as color or symmetry, are focused on. For each experiment, one aspect is chosen as the criterion for evaluation. The GA evolves the images to better fit the chosen criterion. After the images have been improved, the designs are displayed graphically. Owing to the random element of the GA, the output of every experiment is unique.

2 Background and Related Work

**2.1 Genetic Algorithms**

**------------------------------------ALGORITMOS GENETICOS------------------------------------**

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https://shahriyarshahrabi.medium.com/procedural-paintings-with-genetic-evolution-algorithm-6838a6e64703

El articulo más relacionado donde puede obtenerse la base de datos.

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genetic algorithm dataset csv file

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