AI-Enhanced Wave Function Collapse Algorithm for Complete Solution Generation

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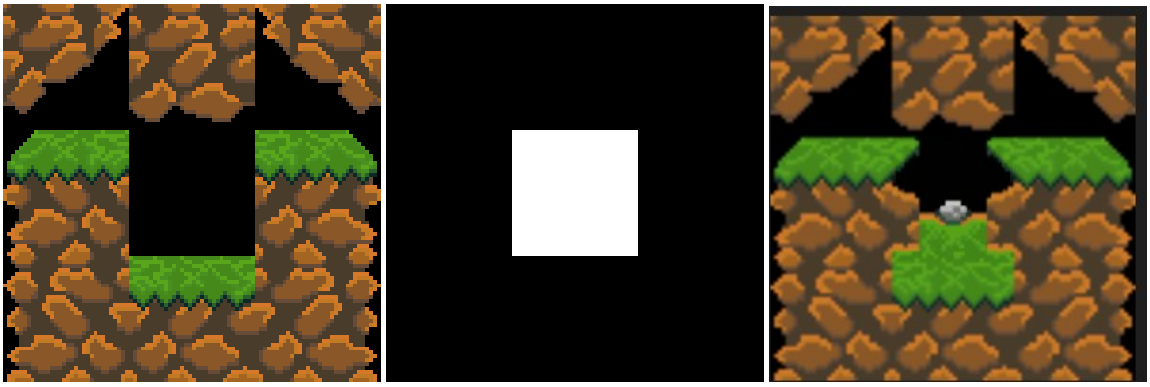

Fig. 1. From Left to Right: cell with no solution, input mask, inpainted solution

The wave function collapse algorithm has been widely used in image processing, natural language processing, and other fields for solving constraint satisfaction problems. However, one of the major challenges faced by this algorithm is the possibility of no solution existing due to the restrictive nature of the adjacency matrix. Previous approaches attempted to resolve this issue by recomputing the wave function collapse repeatedly until a solvable solution was found. In this paper, we propose a novel approach to the wave function collapse algorithm that utilizes AI image inpainting to overcome the issue of restrictive adjacency matrices.

Our approach involves appending additional information to the adjacency matrix that allows the wave function collapse to complete without the need for repeated computations. Specifically, if we encounter a grid cell that cannot be filled due to adjacency matrix restrictions, we use AI image inpainting to create a new image that can fit into the cell. We then append this new image to the adjacency matrix, allowing the wave function collapse algorithm to generate a completed approximate solution.

The main implication of our approach is that the wave function collapse algorithm will always be able to complete and provide a solution, even in cases where the adjacency matrix is highly restrictive. Our experimental results demonstrate the effectiveness of our approach in generating high-quality solutions for image processing problems. Additionally, we show that our approach is more efficient and requires fewer computations compared to the previous approaches that rely on repeated re-computations. Our proposed approach represents a significant step towards achieving complete approximate solutions with the wave function collapse algorithm, and has the potential to be applied in a wide range of practical applications.

useful in research as it helps make a complex problem easier to handle for researchers. works by adding a relaxation to a very restrictive set of constraints.

run-time debugging

Moreover, our proposed approach can contribute to computer science education by highlighting the importance of algorithm optimization and interdisciplinary approaches in solving complex problems. The wave function collapse algorithm is an important algorithm in computer science, and our proposed approach represents an important advancement in the field of constraint satisfaction problems. By introducing AI image inpainting to overcome the challenges posed by restrictive adjacency matrices, we have shown the potential benefits of interdisciplinary approaches in enhancing traditional algorithms. Additionally, our experimental results showcase the effectiveness of our proposed approach in generating high-quality solutions, which can be used as a practical example in computer science courses to teach students about the importance of algorithm efficiency and the potential of AI in enhancing traditional algorithms. Overall, our proposed approach demonstrates the relevance of computer science concepts in solving real-world problems and highlights the potential of AI in contributing to advancements in the field.