

RUBIK'S REVENGE APPLICATION TOOL

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ABSTRACT: The Rubik's revenge is really captivating and fascinating puzzle. It is a three dimensional game. In the literary survey, there are several applications available in Rubik's revenge. Some of them are in two dimensional games, some of them has not whole cube rotation using mouse. In this work, we introduces a new user friendly application tool which has three dimensional Rubik's Revenge. To play the game using this application tool user can rotate whole cube using mouse and rotate each layer using buttons. If the user is not familiar with solving Rubik's revenge, they can use the help menu. It has the algorithm for solve the Rubik's Revenge. Learning to solve the Rubik's revenge helps teach many life lessons such as following direction, perseverance, memorization and focus.

Keywords: Rubik's Revenge, Game, Tool

1. INTRODUCTION

The Rubik's Revenge also known as Master Cube (4x4x4 Rubik's Cube) is a puzzle in three dimension. There are several applications available on Rubik's revenge. This paper presents a different user friendly tool to play the Rubik's revenge in desktop application.

There are few differences between the 3x3x3 cube and 4x4x4 cube. Rubik's cube (3x3x3) has 3 layers and each face has a single center piece. Rubik's revenge has four layers and each face has four center pieces.

In Rubik's Revenge, each of the six faces is covered by sixteen stickers, among six solid colors. A pivot mechanism enables each face to turn independently, thus mixing up the colors. The main target of the puzzle is to show that each face of the cube is in a solid color. There is no single center piece, but four center pieces per color; therefore they are not fixed in their positions. They can be rotated into any center positions. That means we cannot determine the cube color-scheme by looking at the center pieces. So, four center pieces solved together we call a center block. The color of a cube face is therefore decided by its center block. There are 24 edge pieces, each with two colors and 8 corner pieces of which each with three colors in different combinations.

Using this mechanism desktop application tool was created. Using this tool user can shuffle the cube, reset the cube and play the game using shuffle button, reset button and start game button respectively. The whole cube can be rotate using mouse and rotate the layers using 24 turn buttons.

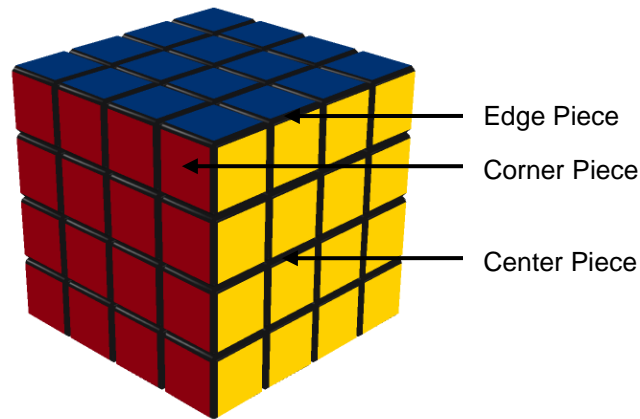


Figure 1: Rubik's Revenge Structure

2. METHODOLOGY

Proposed tool is developed using Visual Studio 2010 and NET, C# and WPF (Windows Presentation Foundation) where WPF is selected to create three dimension graphics easily.

The basic idea of creating three dimensional graphics is to have a three dimensional model of an object. Because our screen is only two dimensional, a camera, that takes a picture of the object. The picture is a projection of the object to a planar surface. This projection is rendered into a bitmap by the three dimension rendering engine. The engine determines the color for every pixel by calculating the amount of light that is reflected by any light sources to the projection surface by the objects in the three dimension space.

Main elements of scene are camera, three dimensional model and light. In camera, a three dimensional model can be viewed in different angles. The camera can be positioned at any distance from the model for a particular view angle. A three dimensional model defines an object in the scene. It has a geometry that is the mesh and a material that can be a diffuse. The material itself has a brush. At least one light is included in the three dimensional model scene. This makes the three dimension model visible. We can create different effect shadow, reflection effect on the materials surfaces.

A Point is a reference to position in three dimension, point is represented by x, y, z coordinate with respect to the coordinate system. Figure 2 shows the shape with six square sides formed by connecting eight Points. This is one piece of three dimensional cube. In the similar way, separate 64 cubes are created and placed them to different position using coordinate system. Figure 3 shows the placement of 16 cubes forming the bottom layer of Rubik's Revenge.

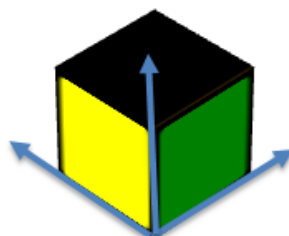


Figure 2: A piece of 3D cube

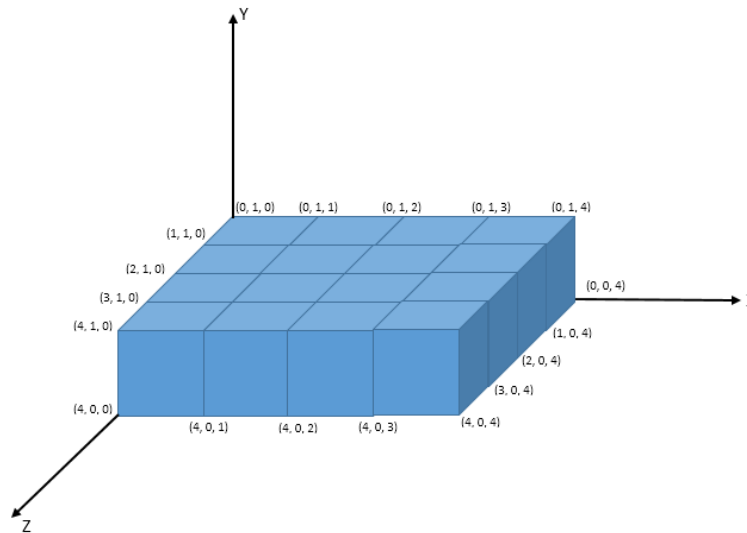


Figure 3: Bottom layer of the Rubik's Revenge

To do the rotation of one side, 16 small cubes out of 64 will be rotated by 90 degree. Animation was added to transform 16 cubes by 90 degree to visualize there is a rotation. Each layers will have two turns – Clock wise and Anti clockwise. So, there are 24 possible turns in Rubik's Revenge. Twenty four buttons are added to rotate the cube.

A Rubik's Revenge has 24 turns. Give the 24 numbers to the 24 turns and choose 25 random numbers from the turn numbers. Then make the rotation using 25 random numbers. So, the cube turns 25 times. Finally shuffle Rubik's revenge is ready.

If the cube is shuffle cube, all the original positions are changed. Then transform the original positions into current positions. Then in cube all positions are in their positions.

If the user click the start game button, all the 24 turn buttons and stop button are visible. Also count the number of turns and time running is available. User can solve the cube using 24 buttons. When the user solved the cube, a congratulation message will be shown with the number of turns and time.

3. RESULTS AND DISCUSSION

The Rubik's Revenge is created in three dimension. It can rotate whole cube using mouse and rotate the layers using 24 turn buttons. User can shuffle the cube then click the start button they can play game using 24 turn buttons. During the playing time it counts the number of turns and time. If the user finishes the solving process successfully it gives the success message with the total time and number of turns taken. If the user wants the algorithm to solve the cube user can use the help document to show the solution guide. This application is very useful to play the game and study about solving the Rubik's Revenge.

4. CONCLUSIONS

Rubik's Revenge is successfully developed to play the game. Learning Rubik's Revenge is a good exercise which will teach many life lessons such as following direction, perseverance, memorization and focus. This application is developed more user friendly manner and it helps users to play and learn Rubik's Revenge. Using mouse and buttons user can easily play the game. If users get trained in using this application, they can learn the game. And also they can become either an expert in playing the game or can easily win in Rubik's competition.

5. REFERENCES

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