Synthesis of Visual Reality

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Synthesis of Visual Reality technique has been widely used in computer filed, especially for computer visual project. We have made three different types of sea world based on visual C++. And we have successfully achieved object extraction, background extension, synthesis generation and object movement with acceptable processing time and 3D scene modeling. By using our improved algorithm in texture synthesis and basic texture processing, our result can be used in a wide range of applications such as computer game design. Some test results are included to show that we achieved a good performance.

**Project Overview**

**System Block**

1. **Use Visual C++/MFC to develop a platform of the software.**
2. **Get the image data by Visual C++.**
3. **Analysis and process the data.**
4. **Get the result data.**
5. **Output to computer Vision**
Results

Result of sampling the image

(a) 4x4 square sampling. (b) 8x8 triangle sampling.

This is the result by using 4x4 square sampling. There are 16 blocks being divided. Figure (b) is the result by using 8x8 triangle sampling.

Result of filling hole

(a) original image with hole (b) fill the hole the sample the image 50% (c) fill the hole of sample by shifting the image 10% and sample 50%

Result of background generation

The small block on the left is the original texture sample, and the generated pattern is on the right. The size is 152 x 152. In these examples, the number of level of the Laplacian pyramid is 2 or 3, and the number of small blocks of texture is 100-800.
Result of 3D modeling

A is the origin image. After put the fish in to our 3D coordinates, the image is at [0 0 0] in b. C is the result of counter clock wisely rotating the image. This movement needs to change the object axis. D is the result of clock wisely rotating the image similar to c.

Result of fish animation

After apply the partially scaling algorithm, when the fish moves, its tail and fins will behave smoothly. This is the result of the final motions of the fish vs. frames

<table>
<thead>
<tr>
<th>1st frame</th>
<th>3rd frame</th>
<th>5th frame</th>
<th>7th frame</th>
<th>9th frame</th>
<th>11th frame</th>
<th>13th frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 s</td>
<td>0.4 s</td>
<td>0.8 s</td>
<td>1.0 s</td>
<td>1.4 s</td>
<td>1.7 s</td>
<td>2.0 s</td>
</tr>
</tbody>
</table>

Final scene result

After generating the background, object, and animation, we get our final result.