

# Design and Production of Bitmap Font Based on Texture Merger

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**Keywords:** Bitmap; Bitmap font; Texture; Texture Merger

**Abstract:** Bitmap Font is a key technology in the computer design and production, which provides the ability to use the excellent font image to show the text that can not be showed in the traditional ways. And bitmap font could be perfect demonstrated in various platform, in spite of different engines used to constitute the core part. In this paper, Bitmap is introduced including the matrix and dot matrix, which is the element of the picture. A kind of numeral bitmap font is designed and the method of making process is listed.

## 1. Introduction

Bitmap font has a wide range of research foundation in computer technology, and has been used in font recognition, artificial intelligence and game design. In the game design there involves the use of a large number of complex art fonts, and these fonts are widely used in the game, but these fonts can not be used with the performance of ordinary text fonts. Therefore, the use of bitmap fonts is essential, so that the overall beauty of the game has been greatly improved, and therefore the operability of the game has been upgraded accordingly. This paper will study and discuss the basic principle of bitmap font, analyzing the bitmap font making software Texture Merger, which is developed to design bitmap font [1,2].

## 2. Bitmap

Bitmap font is also known as dot matrix font. Dot matrix font represents font through dot matrix, that uses pictures to express problems, showed in the Figure 1.

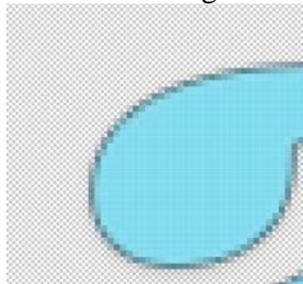


Figure 1 Bitmap font

When using a certain image, the system will call the corresponding image file. A group of fonts is essentially a group of pictures. In general, a font will include a complete set of available characters. A character is a picture, and sometimes there will be a corresponding font deformation state. A character may have multiple states, which requires multiple images to represent [3].

The advantages of bitmap font are fast display speed, high compression rate, and rich font style and artistry. But its disadvantage is that it can't be enlarged. Once enlarged, the jagged edge of the text will be found, and the font library can't be particularly large. Therefore, it mainly covers some commonly used words in the game [4].

## 3. Texture Merger

Texture Merger is a texture set packaging and animation conversion tool. It can merge scattered small images into large texture sets, and improve the speed of resource loading and game

performance. In the process of game research and development, developers can use small pictures to develop, and then merge resources when the product is released without modifying the code. Texture Merge also can easily convert GIF and SWF animation to animation format supported by egret (Figure 2).

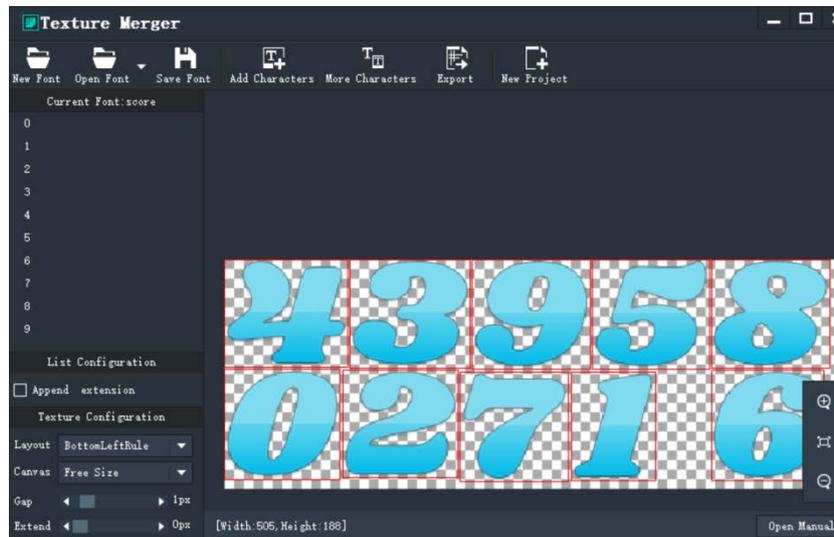


Figure 2 Texture Merger interface

Because of texture Merge can efficiently collect texture sets, so it can be used as a tool for making bitmap fonts. Through the integrated texture collection, images do not need a picture for each text. As long as a complete picture is used, all the text to be used can be included. In this way, the system only needs to load the image once, and then the text can be stored by configuring the file call with the text.

Therefore, Texture Merger is essentially a packing tool for bitmap fonts. It packs the text images to be used into a separate picture, and generates the corresponding configuration file to call each individual text.

#### 4. Design and production

We demonstrate a digital bitmap font, including basic numeric characters 0-9, which can be used to display the numerical value in the game in the future, so as to increase the richness of game text.

Earlier, the size of a single image text was 32\*32 pixels, but now due to the emergence of high-definition display and retinal display, the image size is set to 128\*128 pixels, with a resolution of 72 ppi, and transparent background. The single image we made through graphics software, and some styles are added to the text appropriately, and the storage format is PNG, as shown in the Figure 3.

The detailed steps are as followed.

Step 1: Use graphic software to make corresponding 0-9 pictures, one picture for each text, and name them, showed in Figure 3.

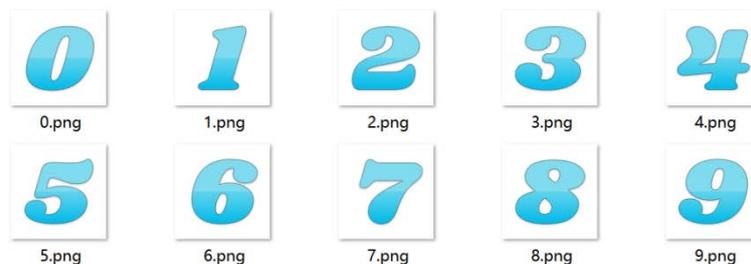


Figure 3 Single text bitmap image

Step 2: Next, we use Texture Merger to package bitmap fonts and select bitmap font mode, as

shown in the Figure 4.

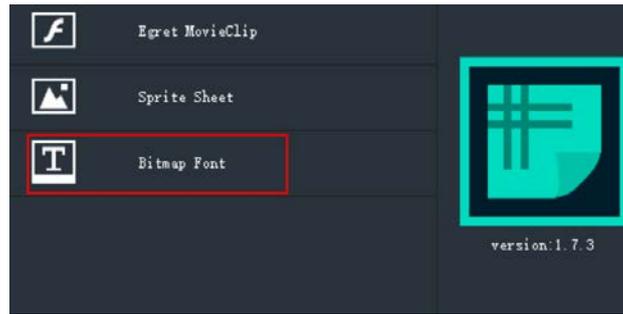


Figure 4 Mode selection

Step 3: The imported image is one-to-one correspondence between text and image, and image fusion is performed to generate a new image, as shown in the Figure 5.

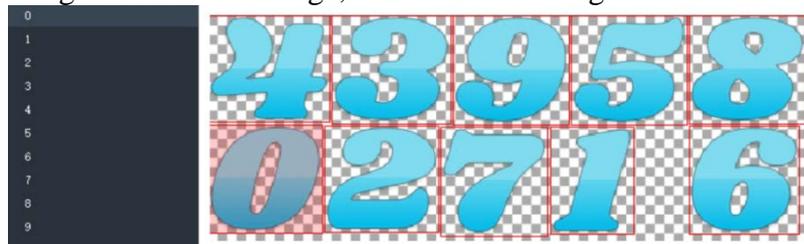


Figure 5 Imported Texture

Step 4: Export the arranged texture set image and configuration file, as shown in the Figure 6.



Figure 6 Exported texture and configuration

Step 5: Analyze the configuration file for later use. The configuration file is shown in the figure below, including texture set file and texture set framework. The texture set framework contains coordinate position, height width and coordinate offset position, showed in the Figure 7.

```
{
  "file": "score.png",
  "frames": [
    {
      "x": 0, "y": 92, "w": 96, "h": 92, "offX": 18, "offY": 19, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 288, "y": 94, "w": 70, "h": 91, "offX": 29, "offY": 19, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 98, "y": 93, "w": 96, "h": 90, "offX": 16, "offY": 20, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 104, "y": 0, "w": 100, "h": 91, "offX": 15, "offY": 20, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 0, "y": 0, "w": 102, "h": 90, "offX": 13, "offY": 20, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 306, "y": 0, "w": 97, "h": 92, "offX": 16, "offY": 19, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 405, "y": 93, "w": 93, "h": 92, "offX": 21, "offY": 19, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 196, "y": 94, "w": 90, "h": 92, "offX": 26, "offY": 19, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 405, "y": 0, "w": 98, "h": 91, "offX": 16, "offY": 20, "sourceW": 128, "sourceH": 128,
    },
    {
      "x": 206, "y": 0, "w": 98, "h": 92, "offX": 15, "offY": 19, "sourceW": 128, "sourceH": 128,
    }
  ]
}
```

Figure 7 Configuration json

## 5. Conclusion

Bitmap font can be widely used in games, and therefore it is necessary to conduct a wide range of in-depth research. This paper introduces the related concepts of bitmap text, analyzes the advantages and disadvantages of using bitmap text, carries out the packaging and production of bitmap text by using Texture Merger. The research method in this paper has certain universality, and can provide positive reference for bitmap font design.

## References

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