

2008 TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY : Computer Science

**PROJECT : Image Compression Program Using
Different Fractal Formulas**

AWARDS : Computer Science Second Award

SCHOOL : Philippine Science High School Main Campus

FINALISTS : Nikkei Pfeiffer M. Tadili

COUNTRY : Philippines

Taiwan International Science Fair

ABSTRACT

CATEGORY: Computer Science

TITLE: Design of an Image Compression Program Using Different Fractal Formulas

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File compression has become a very important tool in the technology field because it allows faster data transfer rates over the internet and decreased file size on data disks. File compression aims to reduce file size while still retaining the quality of the file. Lossy file compression methods are not very efficient because the compressed files end up losing more data than what is usually intended causing a considerable loss in quality. Lossless file compression methods, on the other hand, take time to process since they require decompression to retrieve the original file. In this study, a lossless algorithm which does not require decompression was created. The resulting Fractal File Compression (FFC) algorithm contains two parts, the IFS algorithm and the Huffman Tree generator. Both algorithms were created using Java language and JCreator. The finished program was tested on an image file with 2542 x 1944 pixels dimensions. The image file was compressed using JPEG, BMP, PNG and FFC formats. For each method, the image file was compressed at three different resolution settings; low, medium and high. All the compressed images were then viewed under 500% zoom using Adobe Photoshop CS2. In an area of 40 by 40 pixels, the number of distinct boxes, which served as a measurement of image quality, was determined. Compressed images for JPEG, BMP, and PNG for both the low and medium settings have low image qualities, while the fractally-compressed images have a high image quality. For the high resolution setting, both JPG and fractally-compressed images have

high qualities while BMP and PNG still have low qualities. Based on the measurements obtained from the box-counting method and the file sizes, the absolute image quality for each compressed image was calculated. The absolute image qualities of the compressed images used for each setting were then compared. Coupled with large file size and small pixels per area count, the conventional methods have lower absolute image quality than the images compressed using the FFC method. This was true for the low and medium settings, however, JPG compression has a higher absolute image quality than the fractally-compressed images. This meant that JPG compression is more efficient than fractal compression when an image has a high resolution. The resulting FFC algorithm is lossless since it uses pattern searches and replacements in order to decrease the file size. To make the program more suitable for high resolution images, the FFC algorithm may be modified. Most of the changes in the FFC algorithm should be done in the IFS generator. High resolution images can be compressed fully if the pattern that was used for compression is more representative, but even shorter. A more representative bit pattern would create a high quality, high resolution image with a smaller file size.

評語

The author proposes an image compressing algorithm to generate files with high compression ratio with the game image quality, which may reduce the transmission and storage cost for image files. The topic is not new. The author should do more survey work. Furthermore, more experimental data should be carried out. The author should say more details about the proposed algorithm.