

# Fractal image and video compression and decompression

This folder contains codes for fractal compression and decompression techniques for images and videos as discussed in the following papers.

1. Mukherjee, J., Kumar, P. and Ghose, S.K. (2000): A new graph-theoretic approach for studying the convergence of fractal image compression, IEEE trans. on Image Processing, vol. 9 (3), 366-377.
2. Mukhopadhyay, J. and Ghosh, S.K. (2002): Low bit rate video compression using relative fractal coding, Proc. of EUSIPCO-2002, Toulouse, France, Sept. 3-6., Vol. II, pp. 125-128.
3. Ghosh, S.K. and Mukhopadhyay, J. (2004): A novel fractal technique for color image compression, IEEE INDICON, Kharagpur, Dec., pp. 170-173.

The complete source code, with example data set, a conversion program for converting raw binary grey and color images into **ppm** and **pgm** format, respectively (and vice versa) , and shell script for compilation are provided here. It may be noted that these codes were developed almost a decade ago. So some of these features are out-dated and may produce warning message during compilation. However, they may be ignored, and hopefully the executables are generated at the end. I struggled a bit to make them adaptable to the latest gcc version. There is no library function, source codes of all the classes and functions are made available under different sub-folders, and they are included in the main program file. The documentation of these classes are not prepared. If you are willing to tweak with the codes, you need to slog with them. Following are the description of different directories:

1. **classes\_linux9** : It consists of base classes of different types of data such as polygon, grey images, color images, grey video, color video, etc. There are also some global utility functions and constants defined in some of these header files. These classes may be used for developing programs for many other image and video processing operations.
2. **fractal\_codec\_classes**: It consists of classes for fractal image and video compression and decompression. It has also a class for relative fractal coding and decoding. Fractal compression algorithm is the base PIFS (Partitioned Iterated Function System) algorithm implemented under quad-tree partitioning of range blocks. Both iterative and non-iterative fast decompression algorithms are implemented. Also relative fractal coding and decoding are also implemented.
3. **util**: There are shell scripts for compilation of program and image conversion program ("**conv\_pbm.c**"). Use "**ccomp conv\_pbm**" for compiling "**conv\_pbm.c**". Different command line switch options are as follows:  
    "**rg**" → Raw to PGM.  
    "**rp**" → Raw to PPM.  
    "**gr**" → PGM to Raw.  
    "**pr**" → PPM to Raw.  
For Raw images width and height of the images are asked from the users. The raw color image format consists of three consecutive bytes of red, green and blue values of each pixels , and the file extensions are denoted by "**.jrgb**".
4. **data**: Example input image and video files.
5. **fractal\_coding**: This is the directory which contains the main programs for different fractal compression and decompression schemes. Every file (say "**xyz.C**") can be compiled by the shell script "**cc++**" (under **util** directory, make it executable a), as "**../util/cc++ xyz**". While running the executable, users would be asked to provide inputs for data files and other

parameters. If it is not specified the output is provided in a specific file in raw format (for images) and text format (for compressed video). No binary compressed file is generated, the compression performance is reported by computing the memory requirements of symbols. There are also typical input files created for running these programs, e.g.

**“./xyz <xyz.input”.**

A brief description of these files are given below.

(a) **fqdcdec.C**: Fractal compression and decompression of grey level images.

Outputs: Compressed file: **qdres.dat**

Decompressed image: **dcqdout**

(b) **cfcodec.C**: Fractal compression and decompression of color images.

Outputs: Compressed file: **cres.dat**

Decompressed image: **dcomp.jrgb**

(c) **vcolfencode.C**: Fractal compression of color video.

Output: Compressed file: **cvres.dat**

(d) **vcolfdecodefile.C**: Fractal decompression of compressed color video. Output filename is provided by the user.