How PNG works

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1. General

PNG: Portable Network Graphics

1.1. Understanding the Compression

PNG's compression process is entirely lossless, meaning that the compressed file can reconstruct the source image exactly. Done in two stages: prediction (aka filtering) and then compression.

1.2. Filtering (prediction)

Basic idea of delta encoding: represent any value as a difference from the previous value, so:

[2,3,4,5,6,7,8] can become [2,1,1,1,1,1,1], where

[2,3-2,4-3,5-4,6-5,7-6,8-7]

PNG make use of delta encoding in a format "Filtering". For each scan-line of pixels, a current pixel is encoded in some relation to the pixel to the left, the pixel above, and the pixel above-left.

https://medium.com/@duhroach/how-png-works-f1174e3cc7b7

http://www.libpng.org/pub/png/book/chapter09.html

1.3. Compression (DEFLATE)

Huffman coding LZ77 compression: just like compression RAW-data to Zip file.

https://www.zlib.net/feldspar.html

For images:

BMP 256: Raw color data RGB (for each Red, Green, Blue parameter 8 bit [0 ... 255])

PNG 256: compressed images RGB (for each Red, Green, Blue parameter 8 bit [0 ... 255])

PNG 256 Grayscale: compressed images in grayscale (for just Grayscale value 8 bit [0 ... 255])

2. Radar images calculations

2.1. Frame grabber

2,5s per pictures. -> 17280 pics per day (12 hours of taking pictures on radar per day)

BMP 256: 3,8MB/pic -> 64,125GB per day

PNG 256: 251KB/pic -> 4,13GB per day

PNG 256 GS: 138KB/pic -> 2,274GB per day

2.2. Conclusions

Grayscale is not good enough for men to work with, so in the future with better computer algorithms (motion tracking, machine learning, ...) is grayscale also a good choice due to its compressed sizes.

PNG 256 RGB simple calculations:

Theory: 10TB Hard drive disk -> **12,3 years** (PNG 256 RGB) of taking radar pictures.

In comparison to: BMP 256 -> **159,7 days** of taking radar pictures.