Nano Imaging

Arto Health

Technical Protocols and Specification

Compression Techniques

By default, "Arto Health" compresses non-image file data using a binary compression algorithm provided by ZLib, which provides us with a Lossless compression on all types of data. A limitation of binary compression is that images contain a broad range of random values, which counteract this compression technique.

The most frequently used lossless compression formats will compress images at a rate of 2 to 1. The encoding algorithm used in "Arto Health" provides us with an average Lossless compression of 6:1. If required the user may select the JPEG 2000 encoding algorithm within the software.

Two primary methods of compression have been developed to utilise the unique properties of image data, which are DCT (Discrete Cosine Transform) and Wavelet. In essence, these types of image compression techniques will take advantage of that fact that an image can be altered to a certain extent and still be recognisable as the same image to another person. The altered/compressed image therefore communicates the same information or meaning as the original image.

"Arto Health" uses a DCT-based image compression which operates by reducing a closely grouped set of pixels of a similar colour to a set of pixels of the same exact colour. By repeating this throughout an image, long patterns are formed by new blocks of same colour pixels, thereby making the image more suitable for compression.When dealing with medical images for review we can adopt a compression technique termed "Visually Lossless". This method of compression produces an image that is "visually impossible to differentiate from the original", however there is still loss involved in the compression. The metadata is essential when diagnosing Dicom images as the patient details and technical data is stored within the image. Due to its ability to compress and extract the image in its original format "Arto Health" retains all the metadata information set, as per the international Dicom standard.

Therefore, Visually Lossless allows high compression where speed or reduced file size is critical, and exact content can be slightly sacrificed. This compression technique gives us a considerable reduction in ratios ranging from 20:1 to as much as 150:1.

Binary Encryption

"Arto Health" uses the AES algorithm with a 256 bit (32 character) key which is an encryption algorithm that has undergone years of professional and academic scrutiny before it has been accepted as a viable encryption mechanism. Encryption algorithms typically operate by applying a mathematical transformation on the data it is encrypting. Additionally, a unique password or encryption key is supplied to the algorithm to be incorporated into the transformation. Given the same password or key, this process can be reversed through decryption to recover the original data.