## **1.6 JPEG Compression**

One of the important topics in image compression technology today is JPEG. The acronym JPEG stands for the Joint Photographic Experts Group, a standards committee that had its origins within the International Standard Organization (ISO). In 1982, the ISO formed the Photographic Experts Group (PEG) to research methods of transmitting video, still images, and text over ISDN (Integrated Services Digital Network) lines. PEG's goal was to produce a set of industry standards for the transmission of graphics and image data over digital communications networks. JPEG provides a compression method that is capable of compressing continuous-tone image data with a pixel depth of 6 to 24 bits with reasonable speed and efficiency. And although JPEG itself does not define a standard image file format, several have been invented or mid fire to fill the needs of JPEG data storage.

JPEG a upt a single algorithm Instead, a may be thought of as a toolkit of image compression without that may be adjusted to fit the needs of the user. JPEG may be adjusted to produce very small, compressed images that are of relatively poor quality in appearance but still suitable for many applications. Conversely, JPEG is capable of producing very high-quality compressed images that are still far smaller than the original uncompressed data.

## 1.6.1 Steps of JPEG compression

The steps of JPEG compression for gray-scale continuous-tone images are as follows

- 1. Segmentation into Blocks The host image data is divided into 8x8 pixel blocks (these blocks are the Minimum Coded Unit). This means that the JPEG compression algorithm depends heavily on the position and alignment of these boundaries.
- 2. Discrete Cosine Transformation (DCT) The image is transformed from a spatial domain representation to a frequency domain representation. Basically, the contents of

- 6. RLE on AC components On the individual entries in the 64-element vector (the AC components), Run Length Encoding stores each value along with the number of zeros preceding it. As the 1x64 vector contains a lot of zeros, it is more efficient to save the non-zero values and then count the number of zeros between these non-zero values. The RLE stores a skip and a value, where skip is the number of zeros before this component, and the value is the next non-zero component.
- 7. Entropy Coding / Huffman Coding A dictionary is created which represents commonly-used strings of values with a shorter code. More common strings / patterns use shorter codes (encoded in only a few bits), while less frequently used strings use longer codes. So long as the dictionary (Huffman table) is stored in the file, it is an easy matter to lookup the encoded bit string to recover the original values.



Fig 1 - JPEG compression and decompression