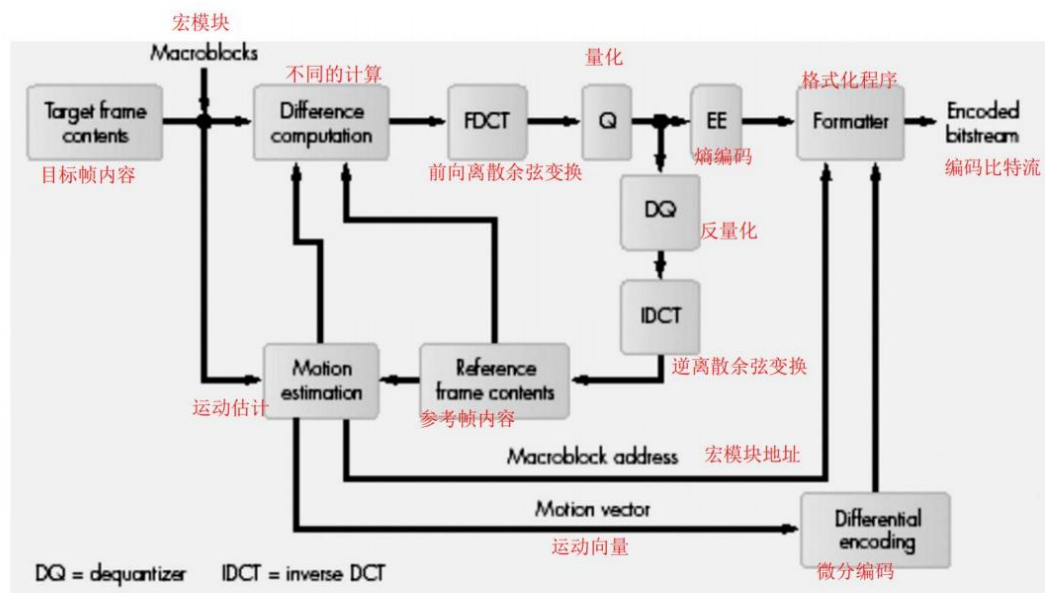


(a) The purpose of chroma subsampling:

- Human visual system is less sensitive to chrominance (color) component than luminance (brightness) component.
- Hence, chroma subsampling samples the chrominance pixels to reduce the number of pixels that need to be stored, thereby improving the compression efficiency.

色度子采样的目的:人类视觉系统对色度(颜色)分量的敏感度低于亮度(亮度)分量。

(b) 因此，色度子采样对色度像素进行采样，以减少需要存储的像素数，从而提高压缩效率。



熵编码的作用是使用**可变长度编码**，
如更可能的符号被分配更短的**码字**，
而更不可能的符号被分配更长的码字。
这将确保每个符号的**平均位数更小**。
对直流系数和交流系数采用**熵编码**。

The role of entropy encoding is to use variable length coding such as more probable symbols are assigned shorter codewords, and less probable symbols are assigned longer codewords. This will ensure the average number of bits per symbols will be smaller. Entropy encoding is used in coding the DC and AC coefficients.

(c)

(i) 计算速度: 三步搜索>二维对数搜索>全搜索

(ii) 精度：全搜索>二维对数搜索>三步搜索

(d)

The MPEG-2 scalable coding uses:

- Layered coding: A base layer and one or more enhancement layers.
- The base layer can be independently encoded, transmitted and decoded to obtain basic video quality.
- Bitstreams of base layer are sent first, to give users a fast and basic view of the video, followed by enhancement layer to improve quality.
- The encoding and decoding of the enhancement layer, however, are dependent on the base layer or the previous enhancement layer.

For a network with variable bitrate channels:

- When the bandwidth is high, MPEG-2 transmit both the base layer and enhancement layer.
- When the bandwidth is low, MPEG-2 transmit only the base layer.

MPEG-2可扩展编码使用:

- 分层编码:一个基础层和一个或多个增强层。
- 基础层可以独立进行编码、传输和解码,以获得基本的视频质量。
- 首先发送基础层的比特流,给用户一个快速和基本的视频视图,然后是增强层,以提高质量。
- 然而,增强层的编码和解码依赖于基础层或先前的增强层。

对于具有可变比特率通道的网络:

- 当带宽较高时, MPEG-2同时传输基础层和增强层。
- 当带宽较低时, MPEG-2只传输基础层。