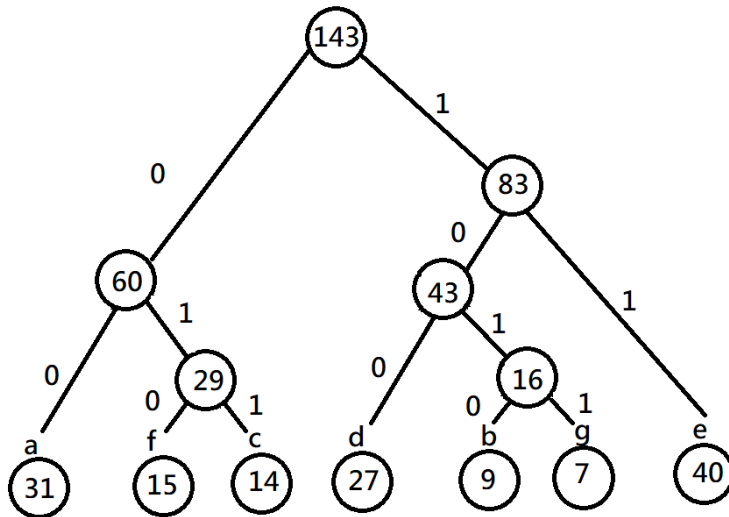


Video Communication Homework #1

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Problem 1: Huffman Coding



L ave = 2.616

Entropy = 2.57

Problem 2: Hamming Code

(a) C1: 1 1 0 0 0 1 -> 1

C2: 0 1 1 0 0 1 -> 1

C4: 1 0 0 1 -> 1

C8: 0 1 1 1 -> 0

C = 0 0 1 1 = 3

The 7th bit is corrupted, the correct bit stream should be 1 0 1 0 0 1 1 1 0 0 1

(b) C1: 1 0 1 1 0 0 -> 0

C2: 1 1 1 1 0 -> 0

C4: 0 1 1 -> 0

C8: 0 1 0 -> 1

The generated hamming code is: 0 0 1 0 0 1 1 1 0 1 0

Problem 3: JPEG

(a) $Y = 0.299 R + 0.587 G + 0.114 B$

= [161.216, 160.464, 163.872, 163.313,]

[160.449, 166.943, 167.246, 164.969,]

[168.644, 166.16 , 175.97 , 171.181,]
 [176.269, 172.269,179.253, 178.419]

$Cb = (B - Y)$
 = [-42.216, -27.464, -31.872, -36.313,]
 [-35.449, -33.943, -26.246,-25.969,]
 [-33.644, -32.16 , -35.97 , -29.181,]
 [-36.269, -36.269,-41.253, -24.419]

$Cr = (R - Y)$
 = [55.784, 56.536, 53.128, 55.687,]
 [59.551, 54.057, 49.754, 53.031,]
 [53.356, 51.84 , 47.03 , 46.819,]
 [47.731, 47.731, 41.747, 39.581]

將原來 RGB 的格式由數學轉換成 YCbCr，其中 Y 是亮度，Cb、Cr 是色差。利用人類視覺對亮度比較敏感，對彩度比較不敏感的特質"偷"一點色差向量，減少 CbCr 的取樣個數。

(b) DCT coefficients =[162, -6, -2, 5,]
 [-22, 1, -2, -3,]
 [3, 1, 4, 0,]
 [0, -1, 2, 4,]

Quantized coefficients=[10 -1 0 0]
 [-2 0 0 0]
 [0 0 0 0]
 [0 0 0 0]

(c) Zig-Zag = 10, -1, -2, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 Run-Length-Encoding = (0, -1), (0,-2) EOB