八

原 30 KB

4:2:0 15 KB

2.

(1) always real

(2) $\sum |X[k]|^2 \, Bm[k]$ has much less probability to be 0

(3)

The cut off frequencies of windows match the characteristic of hearing

(4)

DCT is applied instead of the IFT

3.

4.

(a) $f = \frac{V}{\lambda}$, $\lambda = 2L$, $V = 331 + 0.6t = 340$

$\Rightarrow 250 = \frac{340}{2L}$

$\Rightarrow L = 0.68$ (cm)

(b)

$Hz(La) = 2^{\frac{18}{12}} Hz(D_0)$

$\Rightarrow Hz(La) = 250 \times 2^{\frac{9}{12}} = 420.45$

$\Rightarrow L = \frac{340}{420.45 \times 2} = 0.404$ (cm)

5.

(a)

① Music signal 的頻率分佈較固定

② Music signal 的節拍固定

③ 單一音高頻率固定

→ 有一致性，易壓縮

(b)

① Edge 通常為簡單的線條

② 顏色在同區塊內大多一致

6.

(a)

$-\cos(1200\pi t) = 600\text{Hz}$

$\sin(5400\pi t) = 2700\text{Hz}$

$\cos(10000\pi t) = 10000\text{Hz}$

在同樣的 dB 下 2700Hz 的 lower bound for hearing 最小

⇒ $\sin(5400\pi t)$ is loudest

(b)

在同樣 dB 下 600 Hz 的 Annoyance curve 最大

⇒ $-\cos(1200\pi t)$ is most suitable to sound

7.

(a)

① DFT 在 compress 中需要記錄虛部導致效能下降

② DCT independent of input compare with KLT

③ DCT 在頻譜轉於 Low F 上，使壓縮更有效率

(b)

① low computational complexity

② reduce buffer size

③ the caracteristics of an image vary with the location

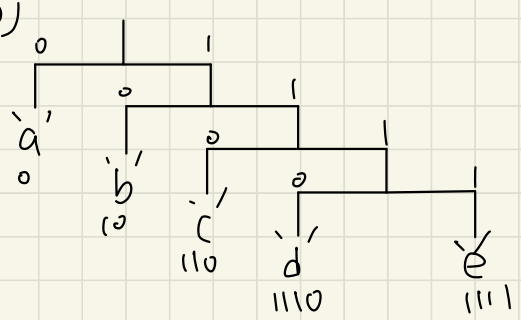
8.

(a)

$$0.45\log\left(\frac{1}{0.45}\right) + 0.3\log\left(\frac{1}{0.3}\right) + 0.16\log\left(\frac{1}{0.16}\right) + 0.06\log\left(\frac{1}{0.06}\right) + 0.03\log\left(\frac{1}{0.03}\right)$$

$$\Rightarrow 0.5593$$

(b)



(c)

$$a' = \frac{P(S_1)}{\ln 2} = 0.225$$

$$b' = \frac{P(S_1)+P(S_2)}{\ln 2} = 0.4514$$

$$c' = \frac{P(S_1)+P(S_3)+P(S_3)}{\ln 2} = 0.635$$

$$d' = \frac{P(S_1)+P(S_3)+P(S_3)+P(S_4)}{\ln 2} = 0.741$$

$$e' = \frac{0.5593}{\ln 2} = 0.807$$

Bonus.

Mel-frequency Ceptrum 擷取前13個 coefficient