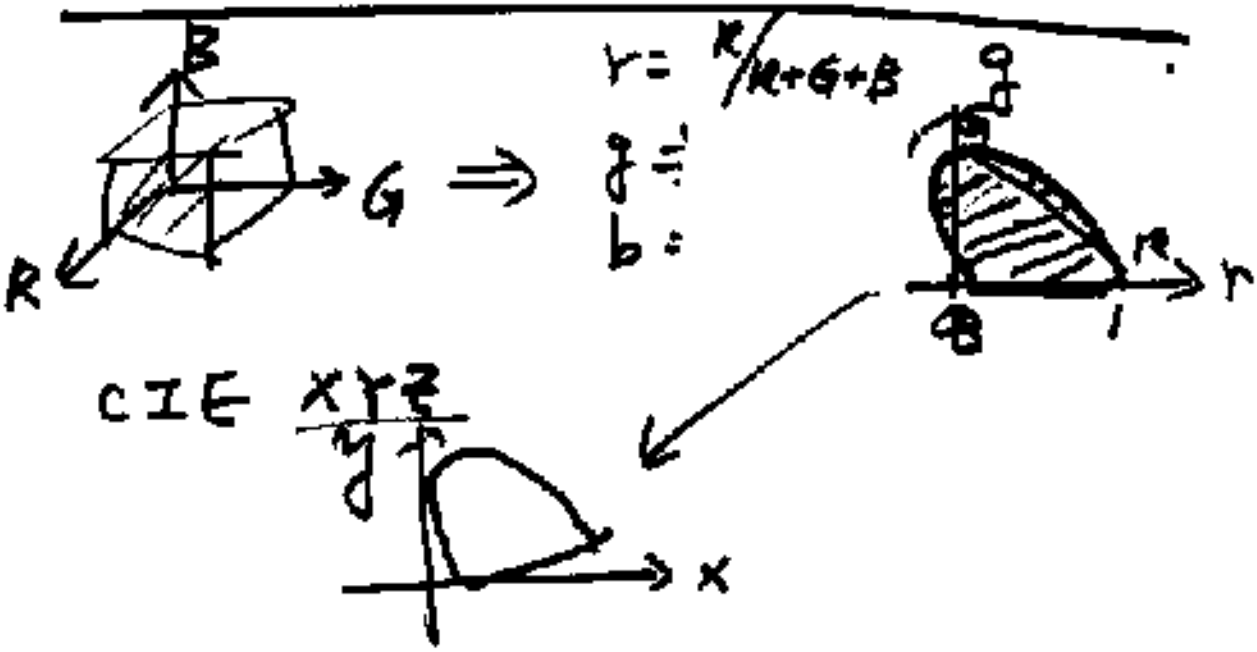
DIP :

The class on Feb 3rd Th. 4:10 - 6:00 will be held on Feb 1st Tue. 4:10 - 6:00, Mudd Rm 545.



$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = \begin{bmatrix} 0.49 & 0.31 & 0.19 \\ 0.18 & 0.81 & 0.01 \\ 0 & 0.01 & 0.99 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

Color Space

$$x = X/X+Y+Z$$
$$y = Y/X+Y+Z$$

LCrCb . Luv . L*u*v* Uniform Color Space

YCrCb
Luminance → Chromance

MacAdam Ellipse

JND : Just Noticeable Distortion

Check Dist(C_1, C_2) >=< Radius

UCS : UVW

$$\begin{bmatrix} U \\ V \\ W \end{bmatrix} = \begin{bmatrix} 0.32 & 0.2 & 0.13 \\ 0.17 & 0.81 & 0.01 \\ 0.02 & 1.06 & 0.41 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

Exact Matrix is in Jain's Book

U* V* W* , YCrCb
↳ JPEG, MPEG, HDTV

Subtractive Color Space

CMYK

$$\begin{bmatrix} C \\ M \\ Y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$
⇒ White

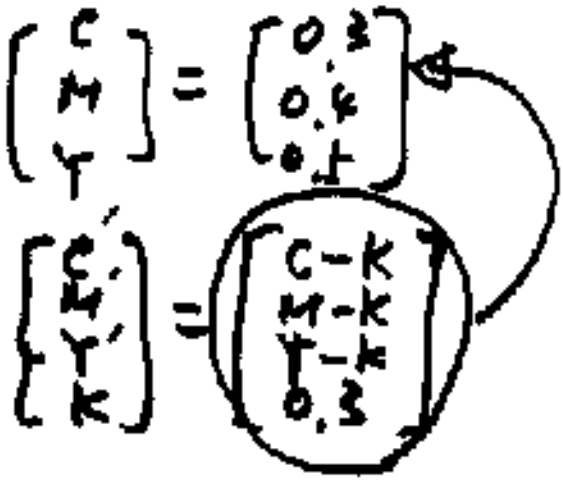
Cyan $C = 1.0 - R$

Magenta $M = 1.0 - G$

Yellow $Y = 1.0 - B$

$$\begin{bmatrix} C \\ M \\ Y \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$
⇒ Black

$K = \min\{C, M, Y\} = 0.3$
0.3 0.6 0.5



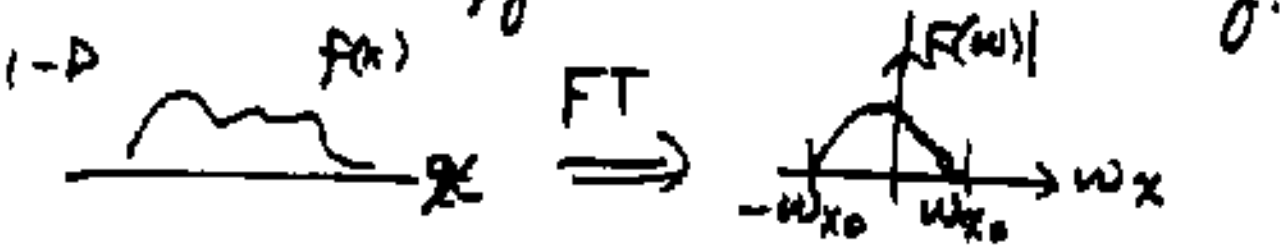
This is a very simple way of using CMYK.

Resolution : Spatio-Temporal

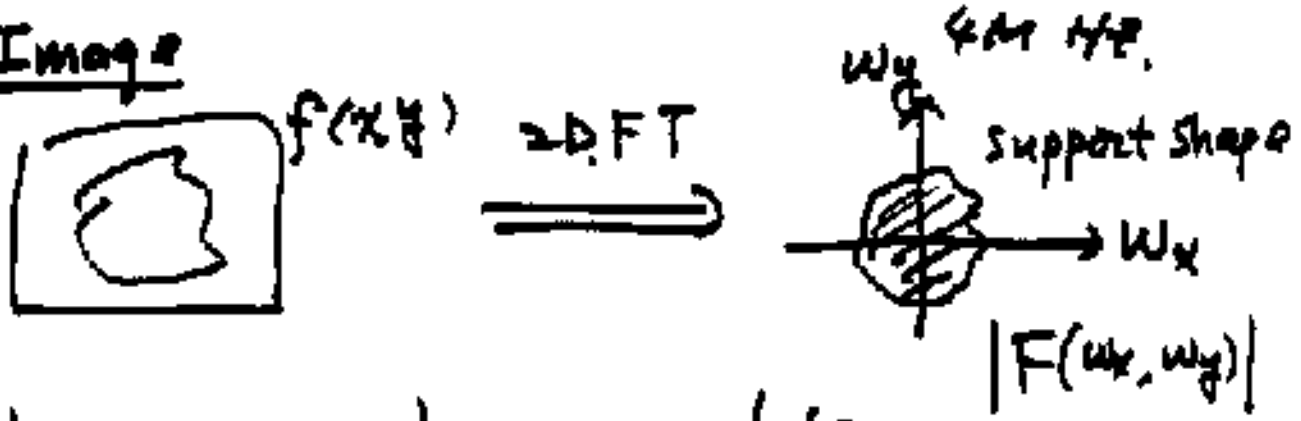
pixels in a frame — # frames in second.

Sampling Thm : DSP, 5.2.5

Rate > = Nyquist Rate = 2 · Max Freq.



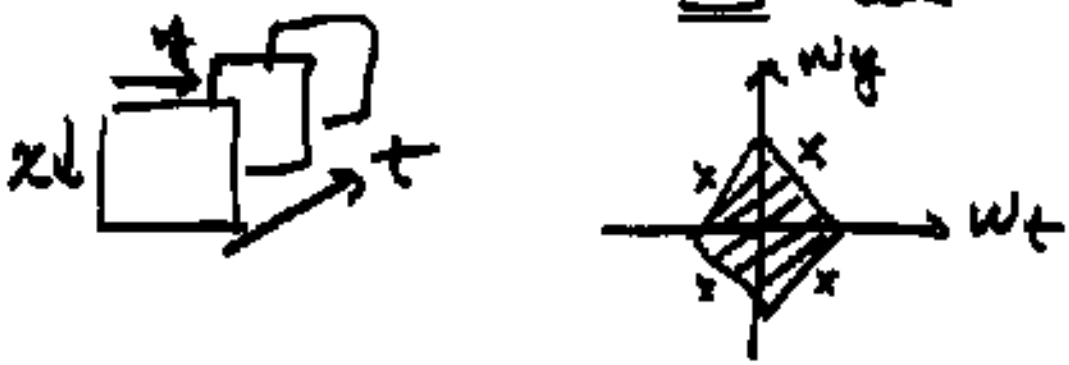
Image



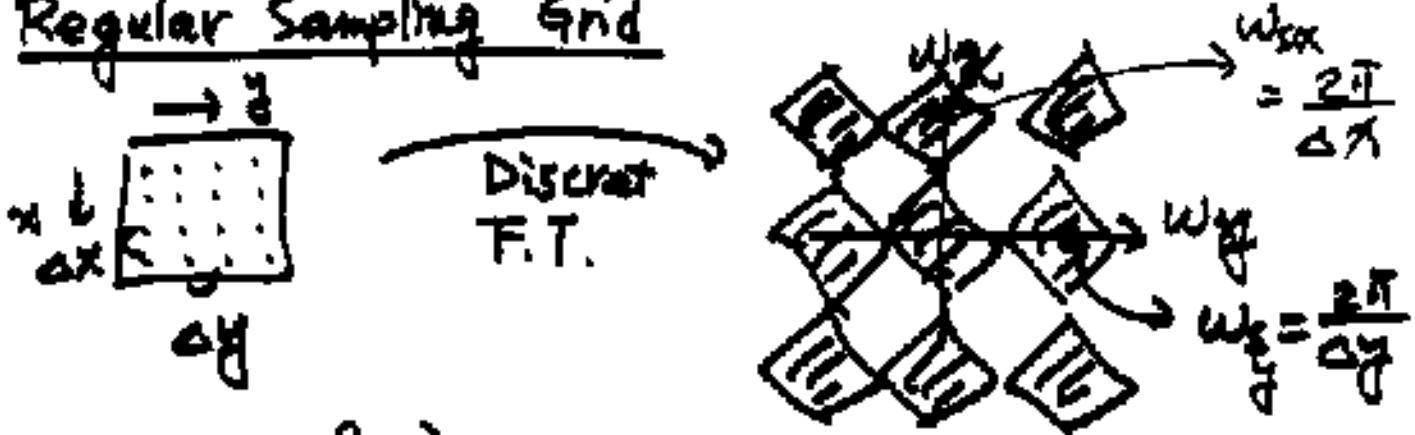
How many samples are needed?

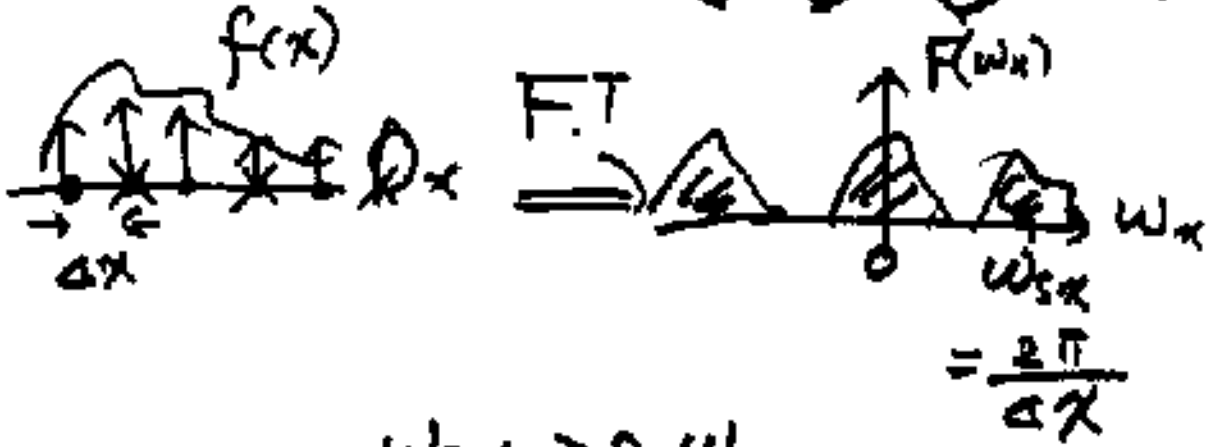
Video : Interlaced Format

HDTV : 60p, 60i

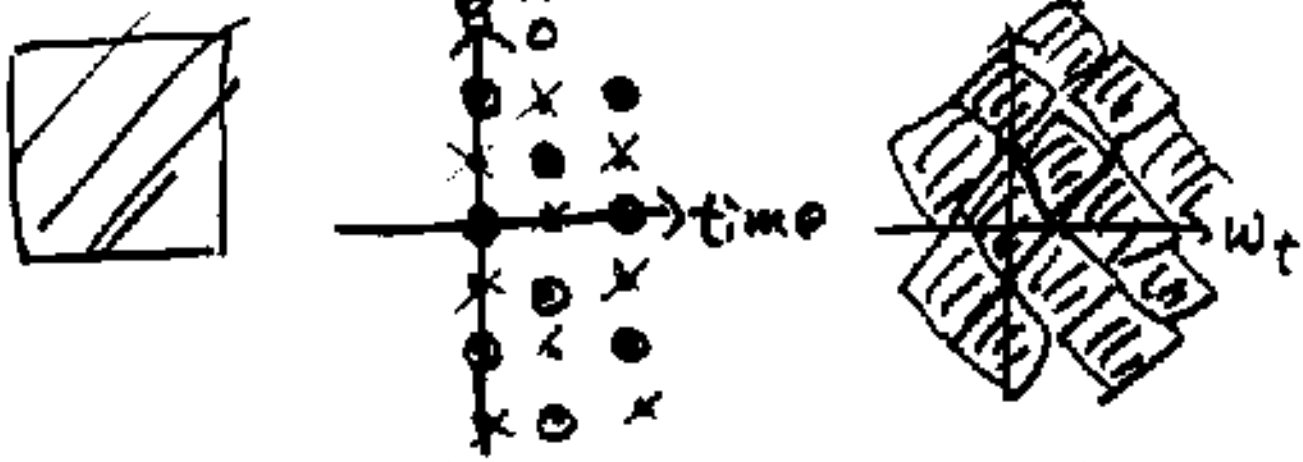


Regular Sampling Grid



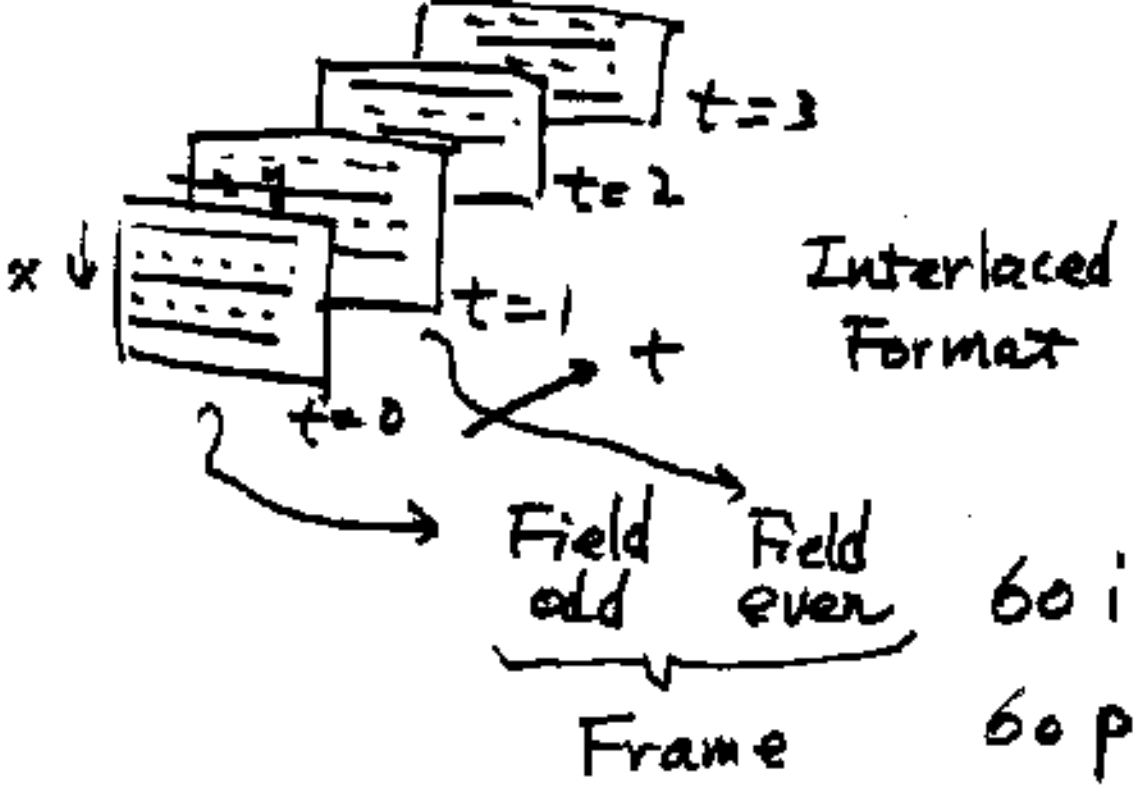


$w_{sx} > 2 \cdot w_0$



Quincunx Sampling Grid

# of Samples : 50%



60 i 60 fields/s

60 p 60 frame/s