$$x[k,l]$$

$$x[k,l] = \begin{bmatrix} x[0,0] & x[0,1] & \cdots & x[0,L-1] \\ x[1,0] & x[1,1] & \cdots & x[1,L-1] \\ \vdots & & & \vdots \\ x[K-1,0] & x[K-1,1] & \cdots & x[K-1,L-1] \end{bmatrix}$$

$$y[k,l] = x[k,l] + const.$$

$$y[k,l] = x[k,l] \times const.$$

$$y[k,l] = 0, \quad \text{pokud} \;\; y[k,l] < 0$$

$$y[k,l] = 1, \quad \text{pokud} \;\; y[k,l] > 1$$

$$y[n] = x[n] \star h[n] = \sum_{k=0}^{Q} h[k]x[n-k]$$

$$y[k,l] = x[k,l] \star h[k,l] = \sum_{m=-\frac{I-1}{2}}^{\frac{I-1}{2}} \sum_{n=-\frac{J-1}{2}}^{\frac{J-1}{2}} h[m,n]x[k-m,l-n]$$

1	2	3
4	5	6
7	8	9

9	8	7
6	5	4
3	2	1

$$\sum_k \sum_l |h[k,l]| = 1$$

$$h[k,l] = [1]$$

$$h[k,l] = \frac{1}{9} \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

$$h_v[k,l] = \frac{1}{8} \begin{bmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{bmatrix}$$

$$h_h[k,l] = \frac{1}{8} \begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix}$$

$$y[k,l] = |y_v[k,l]| + |y_h[k,l]|$$

$$y[k,l] = \text{median}_{k=-\frac{I-1}{2}\ldots\frac{I-1}{2}, \quad l=-\frac{J-1}{2}\ldots\frac{J+1}{2}} x[k,l]$$

$$c = \sum_{n=0}^{N-1} x[n]a[n]$$

$$\cos(2\pi\frac{k}{N}n)$$

$$e^{-j2\pi\frac{k}{N}n} = \cos(2\pi\frac{k}{N}n) - j\sin(2\pi\frac{k}{N}n)$$

$$e^{jx} = \cos(x) + j\sin(x)$$

$$c = \sum_{k=0}^{K-1} \sum_{l=0}^{L-1} x[k,l]a[k,l]$$

$$a[k,l] = 1$$

$$a[k,l] = \cos(2\pi \frac{1}{100} l)$$

$$a[k,l] = \cos(2\pi \frac{2}{100} l)$$

$$a[k,l] = \cos(2\pi \frac{1}{100} k)$$

$$a[k,l] = \cos(2\pi \frac{2}{100} k)$$

$$a[k,l] = \cos(2\pi \frac{7}{100} k)$$

$$a[k,l] = \cos(2\pi \frac{3}{100} l)$$

$$a[k,l] = \cos\left[2\pi(\frac{7}{100}k + \frac{3}{100}l)\right]$$

$$X[m,n] = \sum_{k=0}^{K-1} \sum_{l=0}^{L-1} x[k,l] \cos\left[2\pi(\frac{m}{K}k + \frac{n}{L}l)\right]$$

$$x[k,l]$$

$$X[m,n]$$

$$Hz = \frac{1}{s} \qquad F_s = \frac{\#samples}{s} \qquad f_{norm} = \frac{f_{skut}}{F_s} \qquad f_{skut} = \frac{k}{N} F_s$$

$$dpi = \frac{1}{inch} \qquad F_s = \frac{\#pixels}{inch} \qquad f_{norm} = \frac{f_{skut}}{F_s} \qquad f_{skut,vert} = \frac{m}{K} F_s, \quad f_{skut,horiz} = \frac{n}{L} F_s$$

$$X[m,n] = \sum_{k=0}^{K-1} \sum_{l=0}^{L-1} x[k,l] e^{-j\left[2\pi(\frac{m}{K}k + \frac{n}{L}l)\right]}$$

$$X[0,1] = \sum_{k=0}^{K-1} \sum_{l=0}^{L-1} x[k,l] e^{-j\left[2\pi(\frac{0}{K}k + \frac{1}{L}l)\right]} = \ldots$$

$$X[3,0] = \sum_{k=0}^{K-1} \sum_{l=0}^{L-1} x[k,l] e^{-j\left[2\pi(\frac{3}{K}k + \frac{0}{L}l)\right]} = \ldots$$

$$X[4,7]$$

$$X[m,n] = \sum_{k=0}^{K-1} \sum_{l=0}^{L-1} x[k,l] e^{-j2\pi\left(\frac{mk}{K} + \frac{nl}{L}\right)} = \sum_{k=0}^{K-1} e^{-j2\pi\frac{mk}{M}} \sum_{l=0}^{L-1} x[k,l] e^{-j2\pi\frac{nl}{L}}, \quad \ldots \quad \text{nebo naopak}$$

$$2DDFT\{x[k,l]\} = 1DDFT_{sloupce}\{1DDFT_{radky} x[k,l]\} \quad \ldots \quad \text{nebo naopak}$$

$$X[m,n] = X^{\star}[K-m, L-n]$$

$$x[k,l] = \frac{1}{KL} \sum_{m=0}^{K-1} \sum_{n=0}^{L-1} X[m,n] e^{+j2\pi\left(\frac{mk}{K} + \frac{nl}{L}\right)}.$$

$$X[k] = \sum_{n=0}^{N-1} x[n] \cos\left[\frac{\pi}{n}(n + \frac{1}{2})k\right]$$

$$X[0] \ldots \times \sqrt{\frac{1}{N}}$$

$$X[1 \ldots N-1] \ldots \times \sqrt{\frac{2}{N}}$$

$$2DDCT\{x[k,l]\} = 1DDCT_{sloupce}\{1DDCT_{radky}x[k,l]\}$$