Hadamard Transform: \Rightarrow The 1-D, poward Hadamard Kernel is given by the relation $\underset{i=0}{\overset{-1}{\sim}} b_i(x)b_i(u)$ $g(x,u) = \underbrace{\bot}_{N} (-1) \overset{-1}{\overset{-1}{\sim}} b_i(x)b_i(u)$ i.e. $g(x,u) = \underbrace{\bot}_{N} (-1) \overset{-1}{\overset{-1}{\sim}} b_i(x)b_i(u)$

The 1-D Hodamard transform is given by $H(u) = \frac{1}{N} \sum_{x=0}^{\infty} +(x)(-1)^{\frac{1}{10}}$ where $N = 2^{\infty}$ and u has values in the transform of the transform of the points of the horizon of the transform that the true transform the transform $\sum_{x=0}^{\infty} b_{x}(x)b_{y}(u)$ The inverse Hodamard Transform $\sum_{x=0}^{\infty} b_{x}(x)b_{y}(u)$ The inverse Hodamard Transform $\sum_{x=0}^{\infty} b_{x}(x)b_{y}(u)$ $\sum_{x=0}^{\infty} h(u)(-1)^{\frac{1}{10}} b_{y}(x)b_{y}(u)$ For $x=0,1,2,\ldots,N-1$

The 2-D Kernels are given by $g(x,y,u,v) = \underbrace{1}_{N-1} (-1)^{i=0} [b_i(x)b_i(u)+b_i(y)b_i(y)]$ and $h(x,y,u,v) = \underbrace{1}_{N-1} (-1)^{i=0} [b_i(x)b_i(u)+b_i(y)b_i(y)]$ $f(x,y,u,v) = \underbrace{1}_{N-1} (-1)^{i=0} [b_i(x)b_i(u)+b_i(v)+b_i(v)]$ $f(x,y) = \underbrace{1}_{N-1} \underbrace{1}_{N-1} \underbrace{1}_{N-1} (-1)^{i=0} \underbrace{1}_{n-1} \underbrace{1}_{n-$

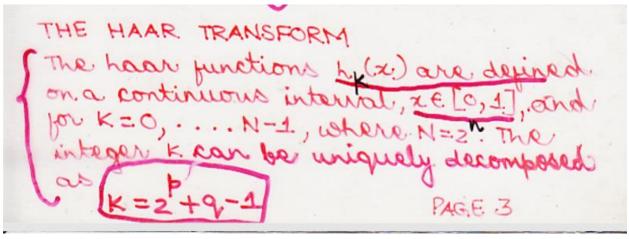
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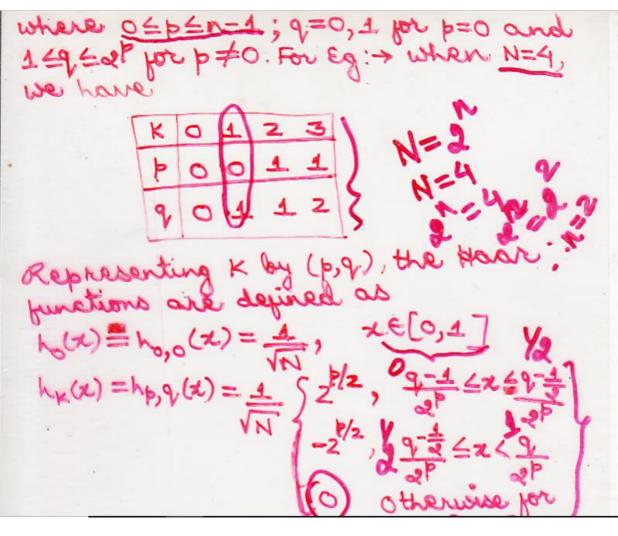
To mirtain and tracardary of pritters ← order of the recursor and, it rabors is

$$H_{2N} = \begin{bmatrix} H_N & H_N \\ H_N & -H_N \end{bmatrix}$$

of order an and N=2" is assumed to order an and N=3"

The transformation matrix is given by $A = \frac{1}{\sqrt{N}} H_N$ $H_4 = \begin{bmatrix} H_2 & H_2 \\ H_2 & -H_2 \end{bmatrix}$ $= \begin{bmatrix} I & I & I & I & I \end{bmatrix}$





S=N rada morphish rack

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Examplify
$$h_{1}(x)$$
 for $x = 0/2$, $4/2$

Nhen $k = 1$, $p = 0 < 0 = 1$

So,

 $h_{1}(x) = h_{0}(x) = \frac{1}{\sqrt{2}}$
 $\begin{cases} \hat{a} = 1 & 0 \leq x < \frac{1}{\sqrt{2}} \\ -\hat{a} = -1 & \frac{1}{\sqrt{2}} \leq x < 1 \end{cases}$

O otherwise for $x \in [0, +1]$
 $h_{1}(1/2) = h_{1}(0) = \frac{1}{\sqrt{2}}$
 $h_{2}(1/2) = -\frac{1}{\sqrt{2}}$
 $A_{2} = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$

[Pace H-6]

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The Cosine Transporm:>
The UXU Cosine transporm matrix C= {c(K,N)} and color transporm transporm also called the discrete cosine transporm (DCT) is defined as

$$C(K,N) = \begin{cases} \frac{1}{N} & \text{op} \ \frac{1}{N} & \text{op} \$$

The one-dimensional DCT of a bequence $\xi u(n)$, $0 \le n \le N-13$ is defined as $9(K) = K(K) \stackrel{N-1}{\ge} u(n) \cos \left[\frac{1}{K(2n+1)} K \right]$, $0 \le K \le N-1$ where $K(0) = \left[\frac{1}{N} \right] K(K) = \left[\frac{1}{N} \right] K(K$

Properties :>

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	L'ie
	Properties of Hadamard Transform:
(1)	It is real, symetric and orthogonal)
	$H = H^* \Rightarrow H^{-1} = H^{T}$
(2)	It is a fast transform and 1-D Hada- mard Transform can be implemented in O (Nlog. N) addition and subtraction.
(3)	It has only binary values in 1 or -1 in its kernel matrix. No multiplications are required in the transform.
	It is used for digital image processing and digital signal processing.
(4	The bas good energy compaction for highly co-related image.

II.	Trage
	Properties of Haar Transform:
(i)	It is symmetric, seperable unitary transform that uses har function for its basis.
(2)	It is orthogonal and real.
-	$T^{-1} = T^{\top} \Rightarrow H_Y = H_Y^{*}$
(3)	It is a fast transform and can be implemented in O(N) operation. Where, N is a number of samples.
(4)	It exist for $N=2^n$, where 'n' is an integer.
(5	It has poor energy comportion property.