

Relevant data for 1D Haar WT

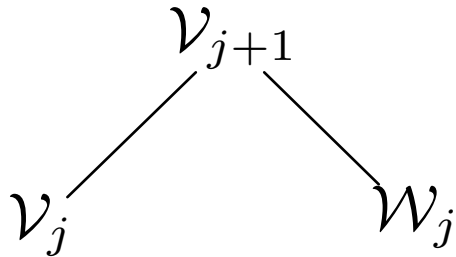
scaling $\phi(t) = \mathbf{1}_{[0,1)}(t) = \phi(2t) + \phi(2t - 1)$ $\phi_{j,k}(t) = 2^{j/2} \phi(2^j t - k)$

wavelet $\psi(t) = \mathbf{1}_{[0, \frac{1}{2})}(t) - \mathbf{1}_{[\frac{1}{2}, 1)}(t) = \phi(2t) - \phi(2t - 1)$ $\psi_{j,k}(t) = 2^{j/2} \psi(2^j t - k)$

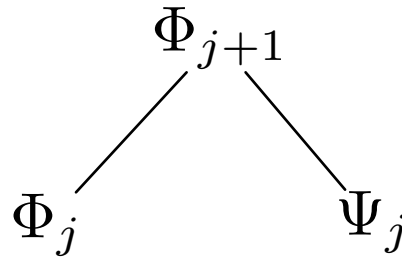
approx $\mathcal{V}_j = \overline{\text{span}} \Phi_j$ $\Phi_j = \{\phi_{j,k}(t)\}_k$ $a_{j,k} = \langle f | \phi_{j,k} \rangle$

detail $\mathcal{W}_j = \overline{\text{span}} \Psi_j$ $\Psi_j = \{\psi_{j,k}(t)\}_k$ $d_{j,k} = \langle f | \psi_{j,k} \rangle$

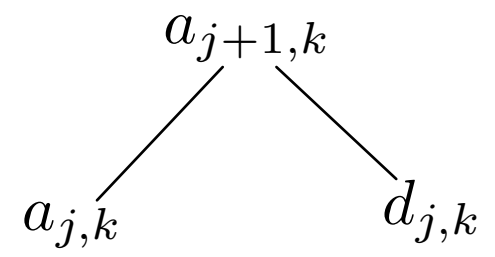
spaces



bases



coefficients



analysis

$$\begin{bmatrix} \phi_{j,k} \\ \psi_{j,k} \end{bmatrix} = H \begin{bmatrix} \phi_{j+1,2k} \\ \phi_{j+1,2k+1} \end{bmatrix}$$

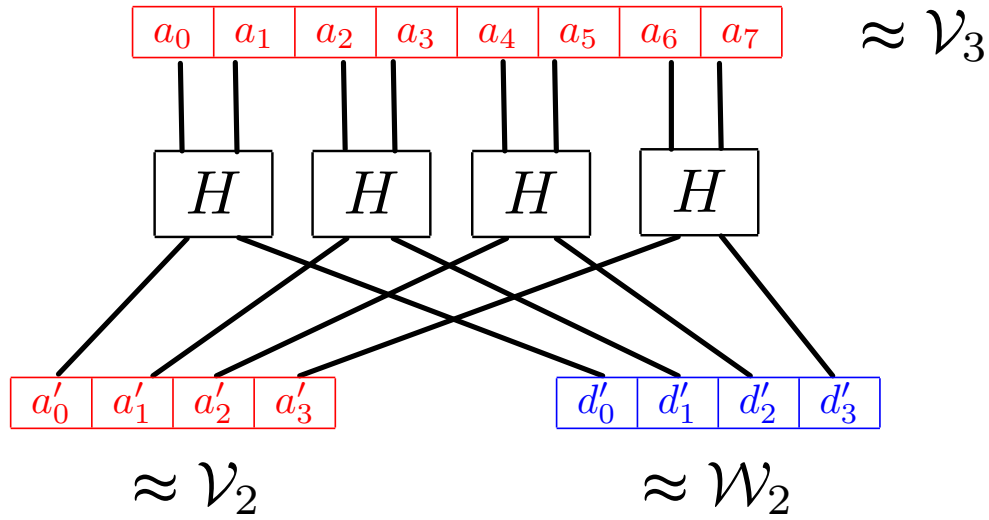
$$\begin{bmatrix} a_{j,k} \\ d_{j,k} \end{bmatrix} = H \begin{bmatrix} a_{j+1,2k} \\ a_{j+1,2k+1} \end{bmatrix}$$

synthesis

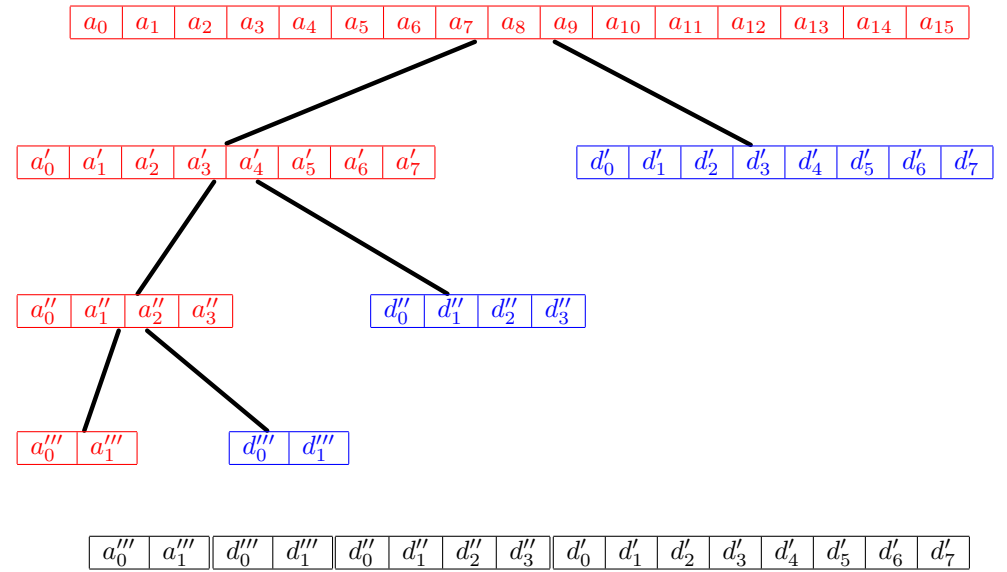
$$\begin{bmatrix} \phi_{j+1,2k} \\ \phi_{j+1,2k+1} \end{bmatrix} = H \begin{bmatrix} \phi_{j,k} \\ \psi_{j,k} \end{bmatrix}$$

$$\begin{bmatrix} a_{j+1,2k} \\ a_{j+1,2k+1} \end{bmatrix} = H \begin{bmatrix} a_{j,k} \\ d_{j,k} \end{bmatrix}$$

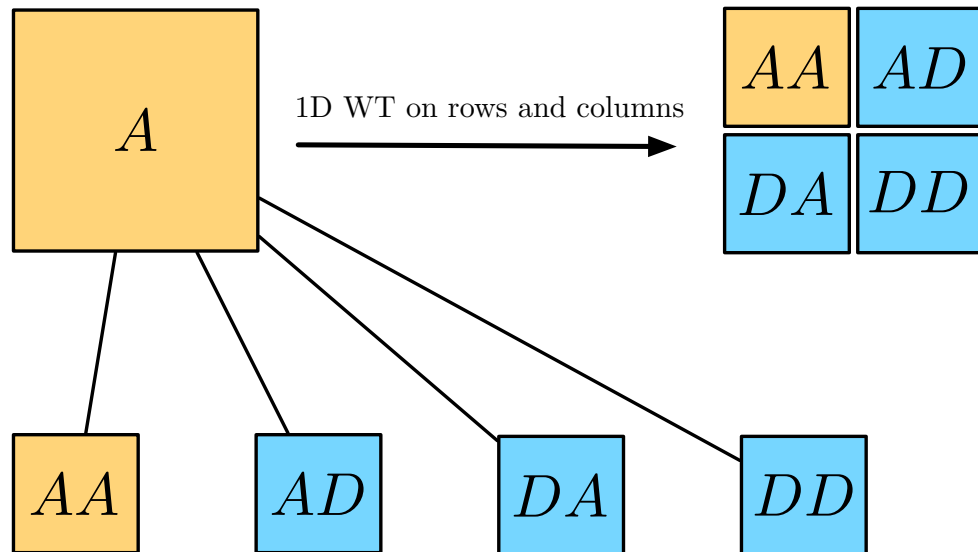
Scheme of 1D Haar WT (one level)



Scheme of 1D Haar WT (three levels)



Scheme of 2D WT (one level)



Scheme of 2D WT (two levels)

