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Construction of the traditional Haar wavelets begins with the Multiresolution Analysis (MRA)  $V^n$ , for  $n \in \mathbb{Z}$ , where  $V^n$  consists of square integrable functions that are constant on intervals formed by consecutive multiples of  $1/2^n$ . An orthonormal basis for  $V^0$  consists of the function  $\phi = \chi_{[0,1]}$  and all of its integer translates. An orthonormal basis for the wavelet space  $W^0 = V^1 \ominus V^0$  consists of a single wavelet  $\psi$  and all of its integer translates.

For this project fix integer  $j > 0$  and consider the MRA  $V^n$  consisting of square integrable functions that are constant on intervals formed by consecutive multiples of  $1/j^n$ . An orthonormal basis for  $V^0$  still consists of the function  $\phi$  and all of its integer translates. However, an orthonormal basis for the wavelet space  $W^0 = V^1 \ominus V^0$  now consists of a set of  $j - 1$  functions and their integer translates. The construction of the  $j - 1$  multiwavelets uses a modified version of the Gram-Schmidt process. Applications of these multiwavelets will be given. (Received September 20, 2010)