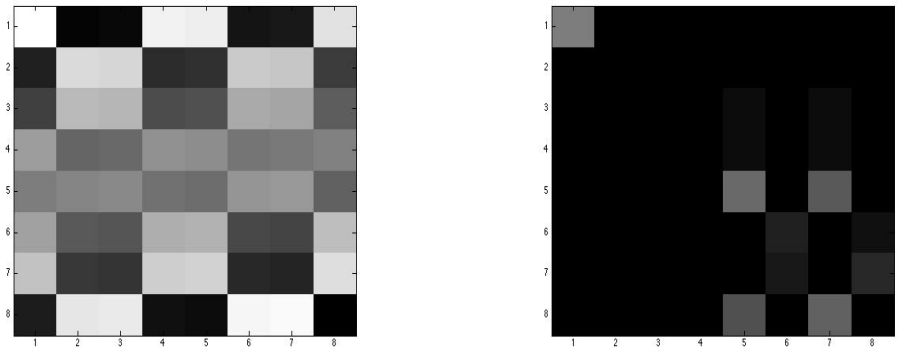

Figure 5.10: An image and its Haar transform.

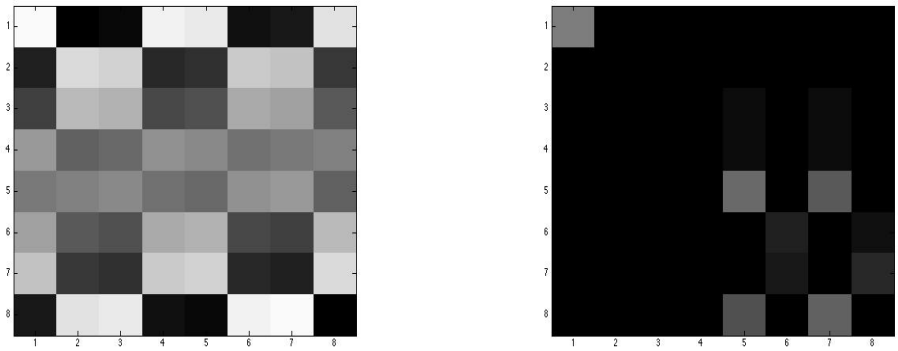

Figure 5.11: Compressed image and its Haar transform.

Observe that instead of performing all rounds of averaging and differencing on each row and each column, we can perform partial encoding (and decoding). For example, we can perform a single round of averaging and differencing for each row and each column. The result is an image consisting of four subimages, where the top left quarter is a coarser version of the original, and the rest (consisting of three pieces) contain the finest detail coefficients. We can also perform two rounds of averaging and differencing, or three rounds, *etc.* The second round of averaging and differencing is applied to the top left quarter of the image. Generally, the kth round is applied to the $2^{m+1-k} \times 2^{n+1-k}$ submatrix consisting of the first 2^{m+1-k} rows and the first 2^{n+1-k} columns ($1 \leq k \leq n$) of the matrix obtained at the end of the previous round. This process is illustrated on the image shown in Figure 5.12. The result of performing one round, two rounds, three rounds, and nine rounds of averaging is shown in Figure 5.13. Since our images have size 512×512, nine rounds of averaging yields the Haar transform, displayed as the image on the bottom right. The original image has completely