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Mark Iwen (markiwen@math.duke.edu), Department of Mathematics, Duke University, Durham, NC 27708, **Fadil Santosa*** (santosa@umn.edu), School of Mathematics, University of Minnesota, Minneapolis, MN 55455, and **Rachel A Ward** (rward@math.utexas.edu), Department of Mathematics, University of Texas, Austin, TX 78712. *A symbol-based approach to bar code decoding*

Information encoded in a bar code can be read using a laser scanner or a camera-based scanner. For one-dimensional bar codes, which are in most prevalent use, the information that needs to be extracted are the widths of the black and white bars. The collection of black and white bars may be viewed as a binary one-dimensional image. The signal measured at the scanner amounts to the convolution of the binary image with a smoothing kernel. The challenge is that the smoothing kernel, in addition to the binary image, is also unknown. We present an approach that is based on the language of bar code and devise a sparse representation of the unknown using the symbol dictionary. A greedy algorithm is propose. We further show that the algorithm recovers the correct bar code when there is no noise, but more importantly, we show that it is robust to noise and unknown properties of the smoothing kernel. (Received October 05, 2011)