Public Abstract
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In the field of machine learning and pattern recognition, texture has been a prominent area of research. Humans are uniquely equipped to distinguish texture; however, computers are more equipped to automate the process. Computers accomplish this by taking images and extracting meaningful features that describe their texture. Some of these features are the Haralick texture features, local binary pattern (LBP), and the local direction pattern (LDP). Using the local directional pattern as an example, we propose a new texture feature called the histogram of partitioned localized image textures (HoPLIT). This feature utilizes a set of filters, not necessarily directional, and generates filter response vectors at every pixel location. These response vectors can be thought of as words in a document, which causes one to think of the bag-of-words model. Using the bag-of-words model, a codebook is created by partitioning a subset of response vectors from the entire data set. The partitions are represented by their mean texture and thus a word in the codebook. The mean textures now represent the keywords within the document, i.e. image. A histogram descriptor for an image is the frequency of pixels that belong to each partition. This feature is applied to a texture classification and segmentation problem as well as object detection. Within each problem domain, the HoPLIT feature is compared to the Haralick texture features, LBP, and LDP. The HoPLIT feature does very well classifying texture as well as segmenting large texture mosaics. HoPLIT also shows a surprising robustness to noise. Object detection proves to be slightly more difficult than texture classification for HoPLIT. However, it continues to outperform LBP and LDP.