The prospect of differentiating benign from malignant calcification clusters in stereotactic biopsy images based solely on their morphological characteristics was investigated in this study. The aims were to gain information that will improve CAD design for full digital mammography and develop a tool that will assist in the BIRADS characterization of calcifications. Wavelet segmentation, shape analysis, and neural network classification was used on thirty stereotactic needle biopsies of calcifications (MammoScan System - FischerImaging). Twenty of the cases were benign and ten were malignant. The images were 1024×1024 pixels with 48 μm and 12 bits per pixel. Needle artifacts were eliminated from the images by reassigning the corresponding pixels to the average image value. The calcifications were then segmented using a four-band symmlet wavelet transform. False positive signals in the segmentation were reduced by applying a threshold to eliminate areas that were either too large (≥150 pixels) or too small (≤2 pixels), by keeping the nearest neighbor distances to ≤0.5 cm, and by limiting the image size to 512x512 pixels around the center of the cluster. Twelve shape features (area, compactness, Fourier descriptors, moment, eccentricity, spread, and their standard deviations) were calculated for each segmented calcification. Their mean values were then estimated and used as input features to a backpropagation neural network. Using the leave-one-out subsampling technique, an 85% correct cluster classification was achieved. Results were encouraging and have led us to the next phase of the study that aims at automatically classifying the calcifications in BIRADS categories.