

Application of Self-Organizing Maps to Texture Visualization and Analysis

By

Jacob P. Ratkiewicz
Indiana University South Bend
South Bend, IN, 46634

Faculty Sponsor: Dr. James Wolfer

Butler University Undergraduate Research Conference
Friday, April 11
Butler University, Indianapolis IN

Session: Visualization in Computer Science

The analysis of visual texture occupies a central role in many areas of computer vision. Applications of this technology include product inspection, medical image analysis, and analysis of remotely sensed data, such as satellite images of the Earth. Standard approaches to texture analysis generate a large number of statistics which are difficult to visualize. We explore the application of Self-Organizing Maps (SOM), an artificial neural network that performs a structure-preserving nonlinear mapping of its input vectors, for visualizing these texture descriptors. The statistics we map are derived from Haralick's Gray-Level Co-occurrence Matrices (GLCM). We trained the SOM on three sets of texture images - a baseline set of textures from the Vistex database, NIST fingerprint textures, and composites of the two. We find that the SOM has potential for visualizing these image descriptors, and is capable of producing visual maps which effectively isolate samples between these categories.

