VISION SYSTEM FOR AUTOMATIC QUANTIFICATION OF FABRIC GEOMETRIC DISTORTIONS

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Abstract

Dimensional change of fabrics, especially due to repeated laundering, is a critical attribute and, hence, its accurate quantification is a major concern for all sectors of the textile industry. A vision system for the automatic quantification of fabric geometric distortions has been implemented and tested. At the present time, the intended utility of this system is to replace the manual measurement of fabric shrinkage or growth as governed by the AATCC Test Method 135. The system uses commercial, off-the-shelf hardware components, together with a customized, image-processing algorithm to capture digital images of pre-marked fabric swatches and to accurately measure the distance between the benchmarks before and after laundering. The image-processing algorithm detects the benchmarks without regard to: (1) changes in the texture or the color of the swatches, (2) changes in the benchmark color, (3) changes in the fabric contrast due to scanning or laundering, (4) presence of noise, or (5) slight rotations of the swatches during scanning.

In addition to reporting the percent dimensional change, this algorithm is also capable of computing the skew, or higher dimensional distortions of the fabrics. As a preliminary case study, the system was tested on 30 samples, including a set of 15, 7-inch and another set of 15, 12-inch specimens. Each set was composed of five commodity fabrics (i.e., fleece, twill, jersey, oxford, and pique) with five different colors. The digital images of the smaller samples were captured using an off-the-shelf scanner, while those of the larger samples were obtained with a digital camera. In every case, the developed algorithm successfully detected the benchmarks, with the computed dimensional changes and the manual measurements possessing a nearly perfect linear correlation. Currently, the vision system is under routine use at the International Textile Center and is scheduled to undergo testing at the laboratories of Cotton Inc. in the very near future.

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