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## Recognition of Handwritten Cursive Arabic Characters

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**Abstract**—An automatic off-line character recognition system for handwritten cursive Arabic characters is presented. A robust noise-independent algorithm is developed that yields skeletons that reflect the structural relationships of the character components. The character skeleton is converted to a tree structure suitable for recognition. A set of fuzzy constrained character graph models (FCCGM's), which tolerate large variability in writing, is designed. These models are graphs, with fuzzily labeled arcs used as prototypes for the characters. A set of rules is applied in sequence to match a character tree to an FCCGM. Arabic handwritings of four writers were used in the learning and testing stages. The system proved to be powerful in tolerance to variable writing, speed, and recognition rate.

**Index Terms**—Arabic cursive characters, character graph model, clustering, fuzzy numbers, off-line character recognition, skeletonization, tree structure.