Processing Soft-biometric Data with Fuzzy Logic and Artificial Neural Networks for Improved Authentication in Multi-biometric Embedded-system Applications

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Abstract: Authentication is becoming ever more important in computer-based applications because the amount of sensitive data stored in such systems is growing. However, in embedded computer-system applications, authentication is difficult to implement because resources are scarce. Using fuzzy logic and artificial neural networks to process biometric data can yield improvements in authentication performance by limiting memory and processing-power requirements. A multi-biometric platform that combines voiceprint and fingerprint authentication has been developed. It uses traditional pattern-matching algorithms to match hard biometric features. An artificial neural network was trained to match soft biometric features. A fuzzy logic inference engine performs smart decision fusion. Finally, a digital signal processor is used to embed the entire identification system. The embedded implementation demonstrates that improvement in performance is attainable, despite limited system resources.