BIOMETRIC PERSONAL AUTHENTICATION SYSTEM USING DNA DATA

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Biometric authentication technology has recently experienced a rapid and extensive growth in development. Systems based on fingerprints or irises have been commercialized for on-site identification of individuals, and other systems utilizing retinae, physiognomy, voiceprints, or autography have been proposed. However, since these systems rely on pattern matching or the feature comparison of analog variables, their application is limited to relative recognition at local levels, such as recognition of terminal users. Absolute recognition, valid universally is beyond the scope of these principles.

Integration of DNA information to the process of authentication has been very limited so far due to difficulties in the acquisition and analysis of DNA as well as issues concerning privacy protection. However, the digital nature of DNA information enhances the accuracy in identification by using multiple STRs (short tandem repeats). This technique enables the development of novel application of DNA-based person identifiers (DNA personal IDs).

Short tandem repeats (STRs) in the DNA base sequence are a promising informational source for personal identification. The authors previously generated a person identifier (DNA personal ID) by arranging repeat counts in two or more STR positions (loci) in predetermined order and constructed several basic experiments to investigate practical applications. The present paper proposes a biometric identification system and a biometric signature system based on the DNA personal ID. An experiment involving more than 500 DNA donors demonstrated feasibility of the biometric identification system. A method of identification using two ID cards was developed as a transitory measure until a real-time DNA analyzer can be developed.