

## MATHEMATICAL MODEL OF THE BIOMETRIC SYSTEM OF FINGERPRINT AUTHENTICATION

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The report considers mathematical models of biometric fingerprint images, as well as basic computational procedures for fingerprinting [1]. The developed software implements the transformation of fingerprint images with the subsequent formation of a crypto-graphically strong password sequence based on them. This allows you to simulate a dactyloscopic authentication system for the purpose of studying certain of its properties, estimating probabilistic performance indicators (error probabilities of the first and second kind) and so on [2].

Structurally, the proposed model of the biometric fingerprint authentication system consists of the following steps [3]. In the first stage, it is necessary to generate normally distributed random variables. We propose using the method of taking the inverse function. At the second stage a chain of points, sorted by minimum distances between the points, will be created. In the third stage, the algorithm "Method of branches and boundaries" will be used to solve the salesman problem. The procedure for finding estimates is to find the upper and lower bounds for solving the problem on a subset of admissible values. The result of this stage is an integer expression, which is the optimal way in the graph, with vertices of which there are minutias. On the last, fourth stage, the formation of a passive sequence occurs. To do this, as one of the options, the SHA-256 hexing algorithm will be applied to the integer expression. The length of the message digest is 256 bits, the length of the internal state is 256 (8×32) bits, the block length is 512 bits, the iteration cycles are 64. It is noted that the developed software performs the transformation of fingerprint images, formed by the normal law of random variables, with subsequent transformation into a passive sequence. Consequently, it can be provided for modeling the fingerprint authentication system in order to investigate certain properties of it, to evaluate the probability indicators of efficiency etc.

### Reference

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