Summary of the doctoral dissertation

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Biometric verification of the computer system user with an automatic update of the activity profile

Thesis:

It is possible to improve the accuracy of computer system user verification by introducing continuous verification using a biometric activity profile based on the observation of keystroke dynamics and an automatic profile update strategy activated by decision thresholds.

The main objective of the dissertation was to develop an original algorithm for the creation of a biometric user profile and a novel method for continuous user verification based on classifiers, that allows automatic updating of the behavioural profile. The task of the algorithm is to determine the biometric profile of an authorised user based on a keystroke dynamics analysis (KDA). The profile is used to verify the user on the basis of their current activity and allows users to be verified on a continuous basis. The developed algorithms were compared with other verification techniques based on the analysis of typing dynamics. The subsequent stages of the main objective include **the specific objectives** defined in the dissertation:

1. Biometric data acquisition.
2. Preparation of the test database.
3. Development of a biometric user profiling algorithm based on keyboard-related events.
4. Development of a method for user verification based on a biometric activity profile.
5. Testing the developed methods using real data.

The dissertation presents an original method for user verification, based on classifiers supported by competences and decision thresholds, which allows automatic updating of the behavioural profile. Continuous verification enhances the security of the system and improves the accuracy of user verification. The detailed solutions of the proposed method have been validated in extensive empirical studies. **Therefore, the thesis of the dissertation was confirmed**.

As part of the work, software for continuous recording of user activity was designed and implemented. A data acquisition process was carried out under real working conditions of users. On the basis of the recorded system events, a customised test database called ***realKDD*** was created.

This allowed the development of a novel biometric user profiling algorithm using KDA and the development of a method for user verification based on a behavioural profile. The dissertation investigated the effect of profiling parameters on verification accuracy and experimentally selected optimal values of profiling algorithm parameters to maximise verification accuracy.

The dissertation presents several approaches to user verification, in which the verification module is based on classifiers used singly or in an ensemble and on competency-supported classifiers. The proposed verification method was extended to include an alert strategy with automatic updating of the behavioural profile controlled by decision thresholds, which improved the verification accuracy.

The author's original profiling and verification strategies described in the dissertation were tested on real data and compared with other methods validated on the same test data set. In the case of experiments using the *realKDD* database, the methods developed were compared with those using the ClarksonII database, which was most similar in characteristics to the *realKDD* database. The proposed algorithms were further validated using the benchmark database Bufallo. The experiments confirmed the high accuracy of the methods proposed in the dissertation. In comparative studies, the superiority of the author's original methods over other methods known from the literature was demonstrated using statistical tests.

Therefore, all the objectives specified in the dissertation have been met.