PRACTICAL APPLICATION OF METHOD OF AUTOMATED PERSONAL IDENTIFICATION BY FINGERPRINTS USING CONVOLUTION NEURAL NETWORKS

Yaroslav Novak
Grade 11-B student
Vladimir Krasitsky Lyceum #1,
Khmelnytskyi, Ukraine
yaroslav.novak.im@gmail.com
Oleksandr Mazurets
Ph.D (Engineering Science),
Associate Professor of Computer Science Department
Khmelnytskyi National University,
exe.chong@gmail.com

In the modern world where technologies are developing rapidly, individual identification of a person is an extremely important task in many areas of life, including safety, transport, finance and public services. Traditional identification methods, such as passwords and identification cards, lose their effectiveness and reliability before modern technologies.

One of the promising areas in the field of person identification is the use of fingerprints. Fingerprints have a unique structure that is determined by valleys, tubercles and intersections, and they are practically unchanged throughout life. This makes them perfect for identifying the person.

However, manual processing and analysis of a large amount of fingerprint photographs is a complex and temporal task for people. Curtain neural networks that are powerful tools for automated images analysis come to the rescue. One of the main priorities is the use of this method in the field of security. Biometric identification based on fingerprints provides a reliable level of authentication of the person, which avoids cases of counterfeiting or unauthorized access. The use of this method in the security field may include control, unlock electronic devices or identification of persons at public events [1].

This study proposes a new approach to the identification of fingerprints using the convolution network (CNN) [2]. The method of identification of the face by photographs of fingerprints using convolution neural networks is based on the collection of a variety of photographs of fingerprints and their subsequent processing and training of the model. The architecture of the coagulation neural network, which is capable of showing important features at different levels of abstraction, should be developed, which allows to achieve high accuracy of identification.

This approach includes several components, including the interface, an image processing subsystem, a convolution neural network, an analysis and display of the result (Figure 1).

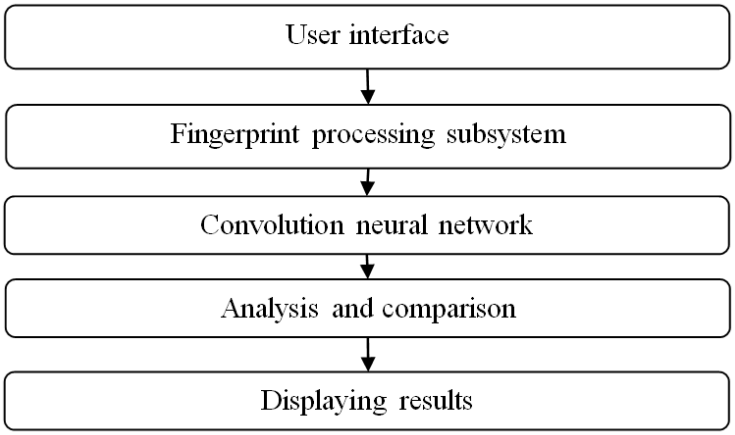

Figure 1. Schematic display of the components of application of method of automated personal identification by fingerprints

The main components of the project of automated identification of the person on the photograph of fingerprints are the user interface module, the image processing subsystem, the convolution neural network and the module of analysis and comparison.

The user interface module provides a convenient way to interact with the user. It enables the user to select a folder with fingerprints for further processing. This module may include a graphic interface with a list of available options and features that allow the user to interact with the system quickly and efficiently (Fig. 2).

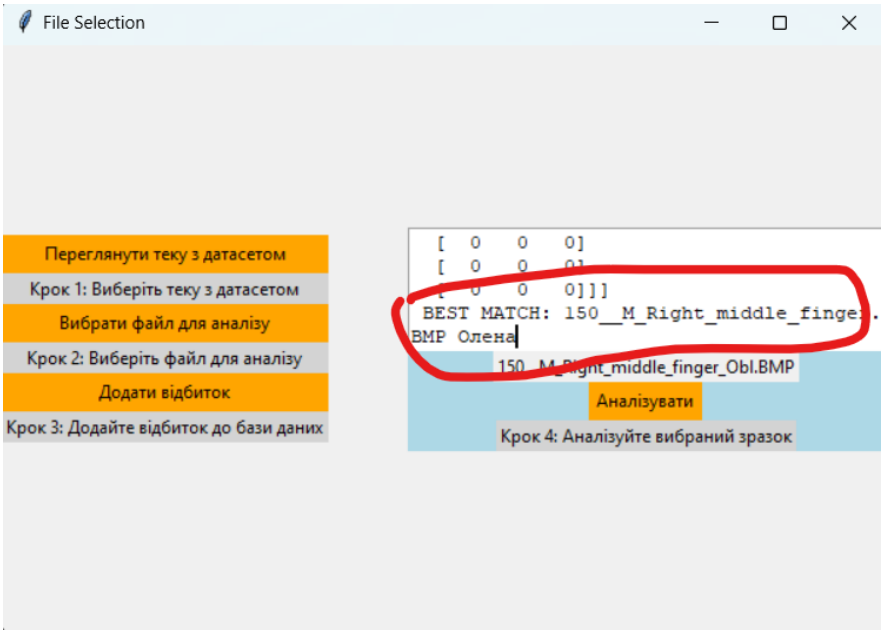

Figure 2. Functionality for additional removal of the result of identification of fingerprints

The image processing subsystem is performed by the pre -proceeding of the fingerprints of fingerprints before their subsequent processing of the coagulation neural network. This module includes algorithms for smoothing images, noise removal and enhancement of contours, which helps to improve the quality of images. Its task is to prepare clean and optimized images for further analysis.

Curtain neural network is a key system module. It is used to recognize and identify the face based on fingerprints. This network reveals unique features of finger prints and creates their vector representations, which are further compared with the preserved templates in the database. Cretaceous neural network can have several layers, including folding layers to detect features, pulling layers to reduce dimension and full -related layers for classification and identification.

The analysis and comparison module is responsible for comparing the vector representations of prints obtained from the convolution neural network, with saved templates in the database. It performs the calculations of similarity between vectors and determines whether a photo is a person. This module can use comparison algorithms, such as Euclidean distance or cosine similarity, to determine the degree of similarity between vectors.

Thus, all of the following components are modules and components of the project of automated identification of the person by photographs of fingerprints. Each of them plays an important role in the functioning of the system and cooperates with other components to achieve the goals.

The scheme of functioning of the studied method of identification of the person by fingerprint is as follows. First, a photograph of fingerprints and a list of people's names should be saved in a format that supports images, for example, in JPG or PNG format. This will make it easy to work with these files in the future. Files should be related to fingerprints and people that belong to. For example, the filename may match the name of the person to whom the fingerprint belongs.

In the next step, you need to get different photos of fingerprints with different types of defects, such as scratches, scratches or contamination. This will check the identification algorithm on different fingerprints with defects. After receiving defects, you need to perform the necessary preliminary operations, such as image processing, size reduction, normalization, etc., to ensure proper quality and uniformity of data.

If errors occur when processing or identifying fingerprints, the processing of these errors should be provided and the corresponding error message. This will help operators or users understand the cause of the failure and take appropriate measures to correct the situation.

After the process of identifying fingerprints (Fig. 3), the source data may include: information about the imprint carrier, such as the name of the person to whom the fingerprint belongs; Photo images with the characteristics of the external difference between images, these can be images that show different defects or differences between the original fingerprint and patterns with defects; The values of compatibility or similarity, which indicates the degree of correspondence between fingerprints, can be numerical values or percentage indicators that reflect the degree of similarity or difference between prints.

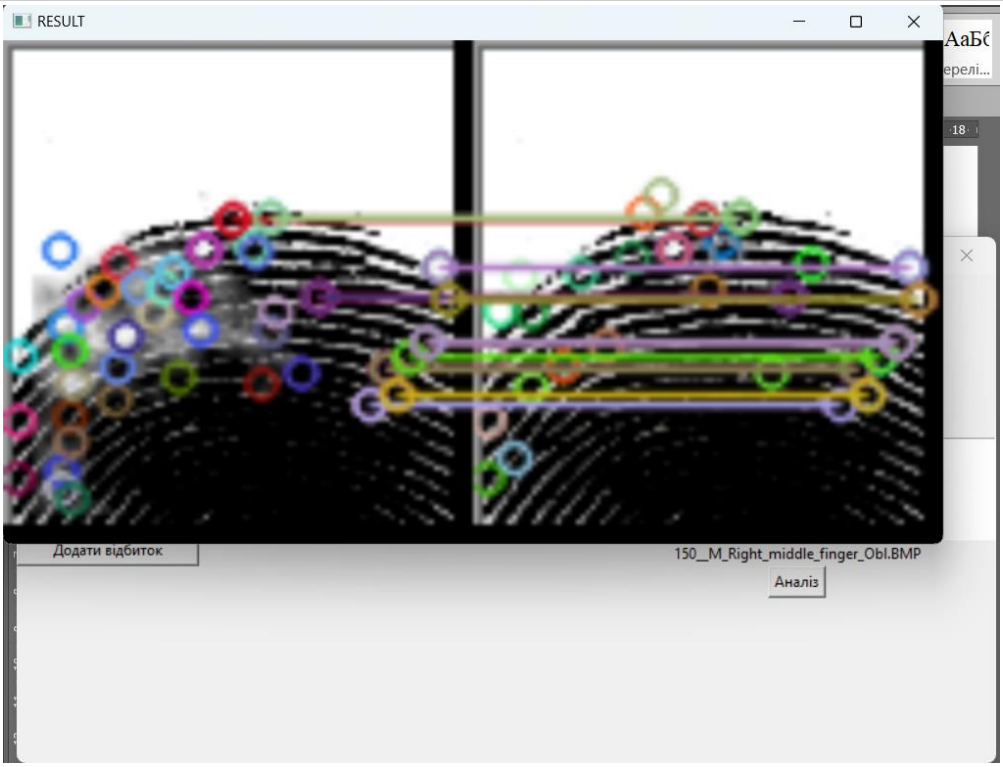

Figure 3. Display the result of automated person's identification by fingerprints

Socofing Fingerprint Database was used to implement the specific action of the software application available on the Kaggle platform and used for fingerprint recognition and fingerprint research. It contains images of real and fingerprints. The real prints are authentic, while the alterated prints have been changed by adding noise, irritation or changing size [3]. Each image in the dataset has a unique file name and a classification tag used to determine the type and quality of the fingerprint. Some images also have a marking (annotation) that provides additional fingerprint information. This dataset enables researchers to use it to develop and test the fingerprint recognition algorithms and to evaluate their effectiveness.

The practical application of the automated identification method by fingerprint photos contains the main modules that correspond to the method of automated identification of the person by photographs of fingerprints using convolutions of coagulation neural networks. Each of the modules contains the necessary stage of functioning of the system for further implementation of the necessary results:

1. Identification Method: Responsible for the basic process of identification on the basis of input photographs of fingerprints.

2. Curtain neural network (CNN): uses convolution neural networks to perform input operations and pull out the features from fingerprints.

3. Fingerprint processing and analysis: is responsible for the processing and analysis of the input fingerprints, including pre -processing of the image and extraction of useful features.

4. Stretching of the features from the prints: used to pull the features from the treated fingerprints that can be used for further comparison.

5. Comparison and identification of the person: compare the features obtained with the database of fingerprints for identification of a particular person.

The above demonstrates the relationship between the modules and the overall structure of the developed method of automated identification of the face by photographs of fingerprints using convolutions of neural networks.

Therefore, the practical application of the method of automated identification of the person by fingerprints with the use of convolution neural networks can be used in safe, medicine, finance and other industries helps to increase the level of safety, convenience and efficiency in many processes. With the growth of technological development in the modern world, methods of fingerprint identification continue to gain popularity and become relevant tools.

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АВТОМАТИЗОВАНА СИСТЕМА КОНТРОЛЮ РЕКЛАМИ НА ВІДПОВІДНІСТЬ РЕКЛАМНИМ ПОЛІТИКАМ META

Маланчук Ілля Іванович
здобувач вищої освіти
work.v3228@gmail.com
Попенко Володимир Дмитрович
к.т.н., доцент
Національний технічний університет України «Київський політехнічний інститут імені Ігоря Сікорського»

Вступ: В контексті сучасного цифрового світу, автоматизація в рекламній індустрії стає ключовою для забезпечення відповідності рекламного контенту політикам соціальних мереж, як на прикладі Meta. Основна актуальність полягає в необхідності створення ефективних та справедливих систем, що впливають як на рекламодавців, так і на користувачів. Політики Meta спрямовані на забезпечення безпечності, прозорості та цивільності реклами, використовуючи при цьому як автоматизовані, так і ручні інструменти перевірки.