

POTENTIAL USE OF FINGERPRINTS IN FORENSIC INTELLIGENCE: CRIME SCENE LINKING

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ABSTRACT: Crime scene linking is a basic inference in criminal investigations. Links may be found when comparing all types of traces collected in different cases. The possibility of using fingermarks for crime scene linking has not been systematically explored yet. Two different sets of data have been used in order to explore the potential of fingermarks to link cases: the content of the Swiss AFIS system and data collected by a regional law enforcement agency (canton de Vaud, Switzerland). The aim of this study is to provide data that can be used to design a methodology of how fingermarks can be used in forensic case linking processes.

KEY WORDS: Fingerprints; Forensic intelligence; Crime scene linking; AFIS system; Databases.

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INTRODUCTION

The role of intelligence in policing strategies has greatly increased during recent years. Forensic science participates in the debate mainly through thoughts on how to extract intelligence from databases. In this context, DNA databases have a recognised efficiency in identifying the source of a trace or linking criminal cases. Conversely, automated fingerprint identification systems (AFIS) are essentially, if not exclusively, used for their capacity to link an individual to a trace. In general the possibility that different fingermarks come from the same source is not systematically explored, even if computerised systems can provide efficient help in this regard. The required interpretation from a trained analyst throughout the process, and the complexity of the database searches themselves are seen to consume too many resources for a limited number of concrete and useful results.

However, linking crime scenes is a basic inference in criminal investigation and such an approach based on various types of information can facilitate the discovery of crucial relations [1]. This study aims at providing data

that can be used to design a methodology of how fingermarks can be used in forensic case linking processes.

CRIME SCENE LINKING

Crime scene linking is a specific form of analysis. It is a primitive inference in the detection of a series of crimes. Crime scene linking is possible through the comparison of all types of collected traces obtained from different cases. Such comparisons are efficiently implemented through the use of databases. For instance, DNA and bullet databases are successfully used for this purpose. This means that for those traces, mark-to-mark (or unknown-to-unknown) comparisons are used successfully and routinely. But this is not the case for fingerprints.

The potential of fingerprints for crime scene linking through the use of databases has to be explored. In fact, some specific examples show that fingerprints can provide links, but the AFIS systems are not systematically used for the mark-to-mark comparisons and consequently for linking crime scenes. These observations lead us to the following question: "Does the systematic comparison of latent prints through AFIS systems allow a significant increase in the detection of links between cases?"

METHODS

Two different sets of data have been used in order to explore the potential of fingermarks to link cases.

Content of the Swiss AFIS system

The system contains all the ten-prints cards and marks centralised at the level of the country. Only traces and ten-prints cards submitted during 2001 have been considered.

Data has been collected in a regional law enforcement agency (canton de Vaud, Switzerland).

The study has been carried out on marks collected on crime scenes by a regional law enforcement agency (Police Cantonale Vaudoise) and which have been not sent to the Swiss AFIS system, because of their poor quality.

AFIS

The following indicators have been considered:

- the number of marks that have been linked to a suspect through the system during year 2001;
- the proportion of marks that were used to identify an individual more than once;
- the number of marks left by the same finger;
- the proportion of individuals identified through the same finger.

Regional law enforcement agency

An important series of burglaries ostensibly linked through shoemarks has first been considered. Fingermarks collected from each case were compared in order to determine if they had a potential to establish links.

Finally, to complement the first study, perpetrators that have been identified more than once through fingermarks and whose fingerprints have not been integrated into the AFIS system were considered. It was then determined if a mark of the same finger had been used for more than one identification.

RESULTS

AFIS

During 2001, 3671 fingermarks were sent to the AFIS system. 1001 of those marks have been linked to 867 persons (27.3%). 800 of the 1001 marks were attributed to 800 persons (single identifications) and 201 were attributed to 67 persons (multiple identifications) (Figure 1).

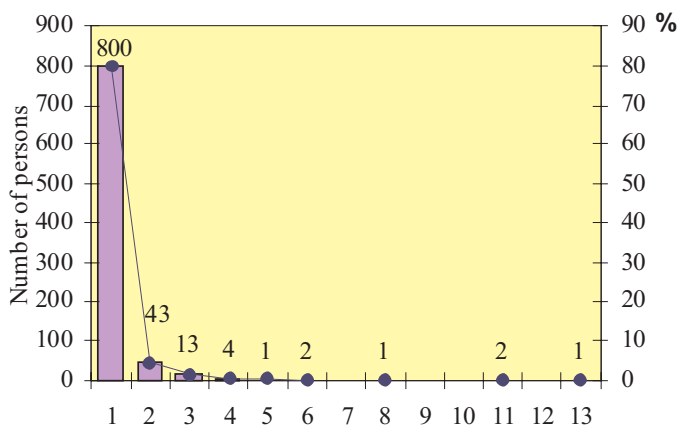


Fig. 1. Distribution of all fingerprint links from AFIS in 2001.

Most of the individuals (43) were identified twice, but the number of identifications range from 2 to 13 for one individual (Figure 2).

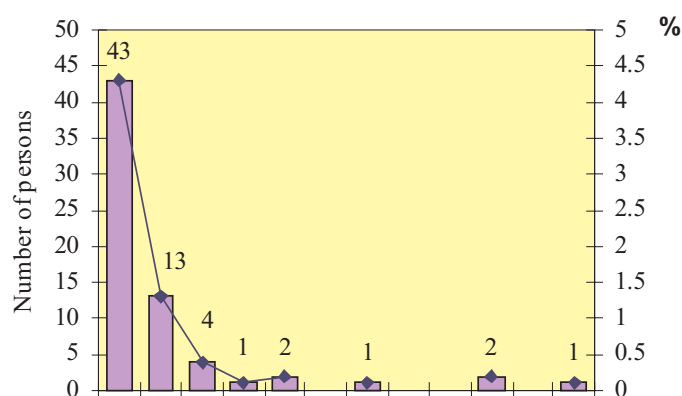


Fig. 2. Distribution of multiple identifications from AFIS in 2001.

Of the 67 persons identified more than once, 11 were identified on the basis of the same finger. The corresponding marks represent the actual potential for crime scene linking through fingerprints. Those 11 persons represent 16% of the persons identified more than once and 1.3 % of all the persons identified in 2001. Those results are not very high. Do they mean that trace-to-trace comparisons are futile, or would a limitation to criminal phenomena which are known to be serial, burglaries for instance, be a more relevant approach?

Regional law enforcement agency

For the first search, the series of burglaries linked by shoemarks, and the second, the fingerprints of the ten persons who had been identified more than once, no case allowed a mark-to-mark identification. However, the reduced extent of the present exploratory study and the poor quality of the marks scrutinised does not allow a generalisation of the results.

DISCUSSION

It has been shown that a mark left by the same finger of the same person has been found for 1.3 % of cases in which the author was identified. This result is rather low, but it has also been demonstrated that in 16% of cases where authors were identified more than once, a mark-to-mark link could have been detected. This is very promising. It would be interesting and more efficient to only confront to the marks database with fingerprints resulting

from specific types of crime, particularly serial crimes, instead of all the fingerprints revealed in any type of case.

For the results coming from the regional law enforcement agency, it has been pointed out that only one series was scrutinised. It would be necessary to repeat the test for other series.

In 2001, the AFIS system in Switzerland received 3671 fingermarks, the source of 1001 of those traces has been determined and constituted the sample for this study. Unfortunately, the remaining 2670 unidentified traces were not available. It would be very interesting to have the possibility to process those marks to see if the overall results would be different.

Further studies are obviously needed in order to better understand the circumstances in which the AFIS database can provide a higher rate of links. For instance, it could be valuable to consider from which finger the more frequently collected traces originate, and to treat different types of crimes differently.

CONCLUSION

AFIS systems could be systematically used to provide links, but this study tends to show that their potential is rather low. However, crime linking is crucial to criminal investigation and the potential of fingerprints has yet to be fully explored. Further studies that aim at better understanding the circumstances in which the comparison of traces have the best potential to provide links are needed. This could result in guidelines to define an economically acceptable systematic forensic intelligence method.

References:

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