Task Number: 2016-004

Article Title: Beyond the individuality of fingerprints: a measure of simulated computer latent print source attribution accuracy

Origin: Law, Probability and Risk

Date Published: 2008

Author: Simon A. Cole, Max Welling, Rachel Dioso-Villa, and Robert Carpenter

Article's Subject Matter:

The authors are trying to estimate in some way the accuracy or "error rate" for fingerprint comparisons. They recognize that practicing latent print examiners (LPE) are very reluctant to participate in this kind of study. In an attempt to simulate what a LPE would do, they are using an AFIS to do the comparisons. The authors are aware that AFIS does not identify suspects from latent prints, but they decided to proceed anyway with this project.

Three different experiments were attempted. In the first one, 6750 mated pairs in a NIST database of 54,000 prints were compared. In the second experiment, students attempted to create and collect latent prints from other students. In the third experiment, NIST-generated latents were compared to a database.

Key Points in Article

- The use of AFIS really has nothing to do with the comparison done by a LPE. The authors seem to realize this, and say their data should be viewed with caution.
- The criterion used to gauge accuracy was to see if the correct print came up as #1 in the AFIS search, or in the #2 - #10 positions.
- In the first experiment, the correct finger came up in the #1 position 75% of the time and 4% of the time in positions #2 - #10. The authors wanted to call the "misses" an error of 25% (not in the #1 position). False idents, where the AFIS score was incorrectly high, were estimated at being as many as 40 per 10,000 (0.4%).
- In the second experiment, the students collected 1634 latents, but only 1132 (70%) generated any AFIS scores, indicating that the latents created by students were not very good. Only 42% of searches found the correct print in the #1 position. False idents were estimated at between 6 and 24 per 1000 (0.6% - 2.4%).
- In the third experiment, latent prints were generated by NIST, and labelled "good", "bad", or "ugly". The correct print was found in the #1 position 70% of the time, and 12% of the time in positions #2 - #10. For "good" latents, the results were 94% in the #1 position and 1% in positions #2 - #10.
- The use of log-relative scores and decision curves was not described adequately for this reader. The classification error after logistic regression was given as 2.4% for the first experiment, 4.5% for the second, and 5.4% for the third.

Fallacies and or Issues

- The use of AFIS seems to be very unrealistic. The reasons given to do this were that LPEs would be reluctant to participate in this kind of study, and the use of AFIS allows for the quick examination of large sets of data.
- It was perhaps surprising to see how many misses there were in these experiments. However, these would not result in false idents, but would be false negatives, where a guilty party would not be found. It is not clear if in a real search the number of respondents would be increased or not. It is also not clear how good or bad the "latent" prints were, or the 10-print cards for that matter.
- False idents, which corresponded to the wrong print showing up in the #1 position, do not show what the actual prints look like, so it is not clear if these would have easily been dismissed by a human operator.
- Overall, it's not clear if any of the results presented here add anything to the discussion. Use of AFIS does not appear to be a good way to test accuracy or error rate when it really does not simulate what a human examiner would do.