

IS FINGERPRINT AUTOMATION FOR YOU -- A FOLLOW - UP

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I read with considerable interest the article by Terry K. Lindh and Stephen G. Ferris, entitled "IS FINGERPRINT AUTOMATION FOR YOU" that appeared in the December 1983 issue of The Identification News. The results of the survey of police agencies mentioned in the article and the statistics compiled will be valuable reference material for years to come. I believe that the article contains valuable information and should be read by all departments that maintain fingerprint files, process ten-print cards and conduct latent print examinations. It would be of particular interest to latent examiners who realize the potential of latent fingerprints in solving crimes and appreciate the limitations imposed by a manual system.

In the article Mr. Ferris and Mr. Lindh report, for a manual system, an accuracy search rate of approximately 65% in processing ten-print cards. Later in the article they state "a reliability not exceeding 60-65% is the rule (that is, even though the master print is in the master file, the fingerprint search process fails to locate the master 35-40% of the time). Note, we are talking about the fingerprint search process only, not name search, or a combined name search/fingerprint search system reliability." The accuracy of the manual classification and search system will remain the same, that is, after those ten-print cards identified as a result of the same search are processed, for every ten fingerprint cards with prior records in the

master file, 3 to 4 will be missed. Consider the potential for recrimination against the department if only a few of the missed identifications are escaped rapists, murderers or other such/criminal type that will, because of the missed identifications, be released back on the street. Comparing the accuracy rate (60-65%) of a manual search system with the accuracy rate (about 95%) of an automated search system and one can readily see the desirability of the automated system.

The article compares to a degree the two concepts of automation, the first which uses classification-ridge count of the fingerprints and the second which uses classification plus minutiae. All who are knowledgeable in the fingerprint discipline are well aware of the limitations of fingerprint classification: That arches are only 5%, whorls 35% and loops 60% of the fingerprints and consequently classification does not provide an equal file distribution. In such groups as 1/1, 9/1, 17/1, etc, it is extremely difficult to arrive at a classification/ridge count that is sufficiently unique to keep respondents to a reasonable number.

Minutiae arrangement on the other hand is unique to each finger and is the basis for the whole fingerprint identification process. The FBI, in developing the Automated Technical Search System (ATS), realized that only a system based on minutiae reading would provide the accuracy reliability needed to meet their needs. The FBI ATS system is completely functional in that all current ten-print cards showing a date of birth after 1928, with no amputations or missing fingers, following a name search and manual classification, are searched by the minutiae based automated system. They are realizing an accuracy rate of better than 98% as compared to an accuracy rate of less than 85% under the previously manual search system.

The FBI currently has let contracts to develop an improved automated classification process that will meet their standards and will alleviate the need for the current manual classification.

The minutiae bases systems currently available are all or in part based on the concept, research and development that was involved in developing the FBI ATS system. The current development contracts let by the FBI for an improved automated classification system, as well as an automated storage and retrieval system, will improve performance and will be compatible with at least one of the minutiae based systems on the market. A major feature of the minutiae based automated system, in addition to the processing-search of ten-print cards, is the ability to conduct 'cold searches' of latent fingerprints showing a reasonable number of minutiae in or near the pattern area. The system that I am familiar with, in storing minutiae from ten-print cards in the data base, stores minutiae from the center of the fingerprint in an ever increasing circle until 150 minutiae is stored for fingers 1-2-3 and 6-7-8, 100 minutiae for fingers 4&9 and 80 for 5&10. This will include practically all the minutiae in a normally rolled fingerprint and will give the examiner a good working knowledge of what is needed in a latent fingerprint for search. Usually ten or more minutiae in the latent fingerprint is sufficient for the automated search.

The minutiae from the latent fingerprint are plotted into the system by the latent examiner, together with any available information such as pattern type, finger if known, sex, race, etc. The latent fingerprint is queued into the system and is searched in order by the system so that the examiner can continue entering latents. The results of the search are printed with respondents in descending order by probability. Usually the top fifteen respondents are checked by the examiner. If an identification is not effected as a result of the search of the latent fingerprint against the data base, the latent fingerprint remains in the system and all current ten-print cards are automatically searched against the unidentified latent file. A major city

police agency, which recently acquired a minutiae based system, is reporting almost as many identifications from the search of new ten-print cards through the system as from the original search of the latent fingerprint against the data base.

This capability to conduct a "cold search" of a latent fingerprint against a ten-print file using minutiae in the latent fingerprint has long been the ambition of dedicated latent print examiners. This concept is now available in the minutiae based system and to delay acquiring such a system because of the possibility of improvements in the system or price reduction is questionable. First, any changes and/or improvements such as the improved/automatic classification should be compatible with the existing system. Secondly, to delay with the expectation of a price reduction is hardly realistic. While there has been reduction in the cost of computer hardware, the cost of software with the highly sophisticated algorithms involved, together with the research necessary for constantly improving the product, tend to keep the price up. While the current price of about \$1.5 million for a fully automated minutiae system for both ten-print and latent searching might seem high, when the potential for savings that can be realized through case closures from "cold search" latent fingerprint identifications are considered, the initial cost may well be justified.

I am not aware of the availability on the market of a classification based system for processing fingerprints. I would think that to devote the expertise to plan such a system locate and purchase the necessary hardware configuration, and write the software to accomplish the desired results would be time consuming and costly. When such a classification system is developed and all the bugs worked out, it is still basically a system for ten-print searching with extremely limited latent print application. While the ten-print card processing is very important with speed and accuracy a prime consideration,

to not incorporate a complete latent fingerprint searching capability is surely questionable. The currently available minutiae based systems combine ten-print card searching that is much faster and far more accurate than a manual system with a latent fingerprint search feature that allows you to take a reasonably good latent fingerprint, plot the minutiae into the system and have the computer conduct a search against the ten-print card file. To settle for anything less is at best short sighted.