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BIOST
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Abstract – fingerprints are considered to be one of the most useful biometric characteristics with a very high evidential value as well as their acceptability for use in the justice system as well as their, reliability, high security level and low cost. We propose a fast, reliable and automated algorithm for pattern recognition, classification and matching of digitized fingerprints. The algorithm employs convolutional neural networks as extractors of peculiar texture patterns by ridge skin impressions of the surface of fingers.

Introduction

Fingerprint recognition looks for the unique patterns of ridges and valleys that are present in an individual's fingerprint. These patterns are unique to every individual and thus help to identify individuals from an entire population.


Fig 1a: Important fingerprint traits

ineffective traditional ways of collecting fingerprints at crime scenes (dusting, tape lifting, photography) as they sometimes lead to smudging fingerprints or destroying very important characteristics of the fingerprint.

Fig 1b: scanned and dusting fingerprint

The algorithm employs convolutional neural networks as extractors of peculiar texture patterns by ridge skin impressions of the surface of fingers. The system consists of 3 levels which are used to establish the similarity score between two fingerprints and a database for registering and updating users.
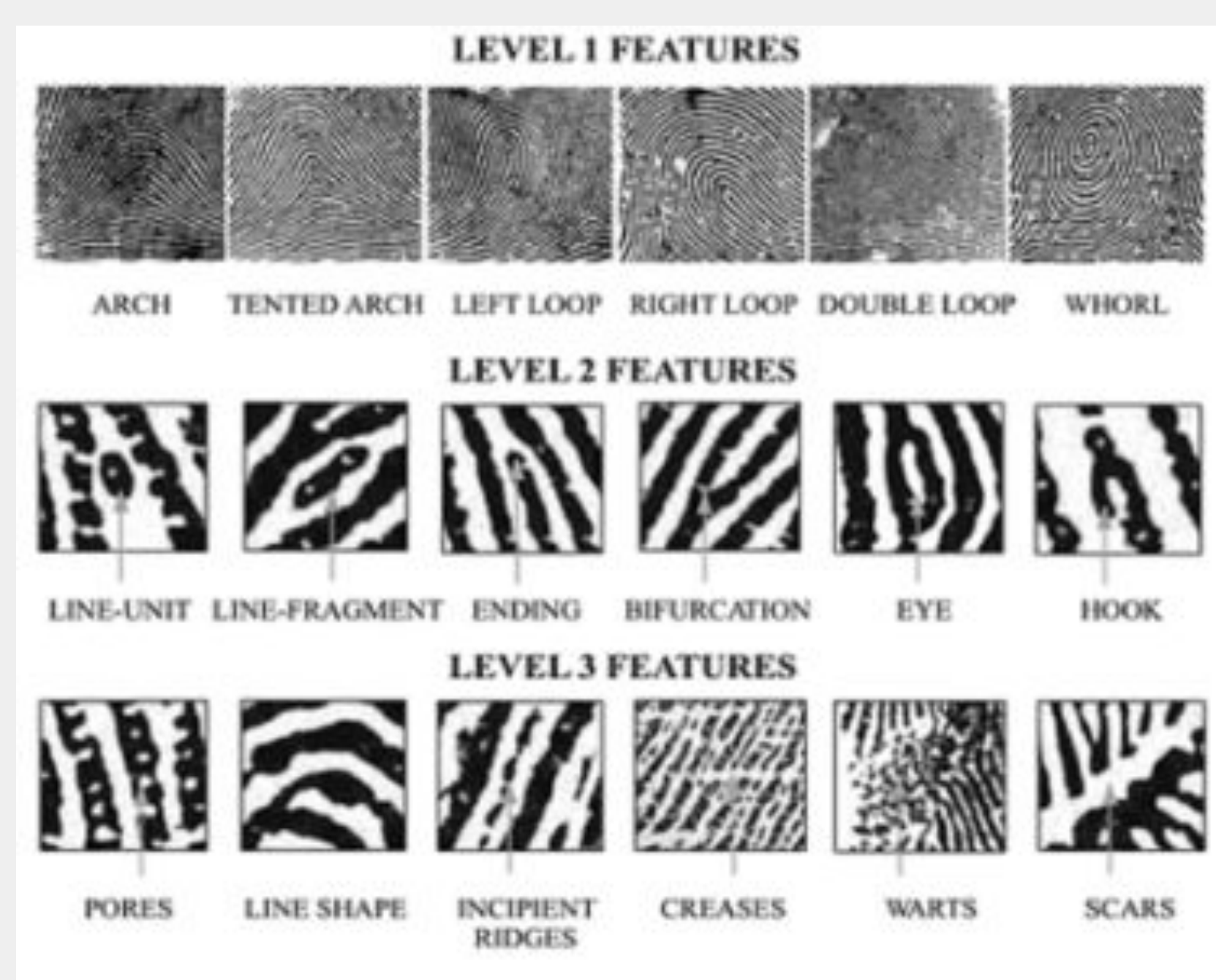
Aims/Objective

- To develop fast, reliable and automated algorithm for pattern recognition, classification and matching of digitized fingerprints.

- To enable crime analysts, health department and immigration offices accessible to information rather than each department being a standalone.
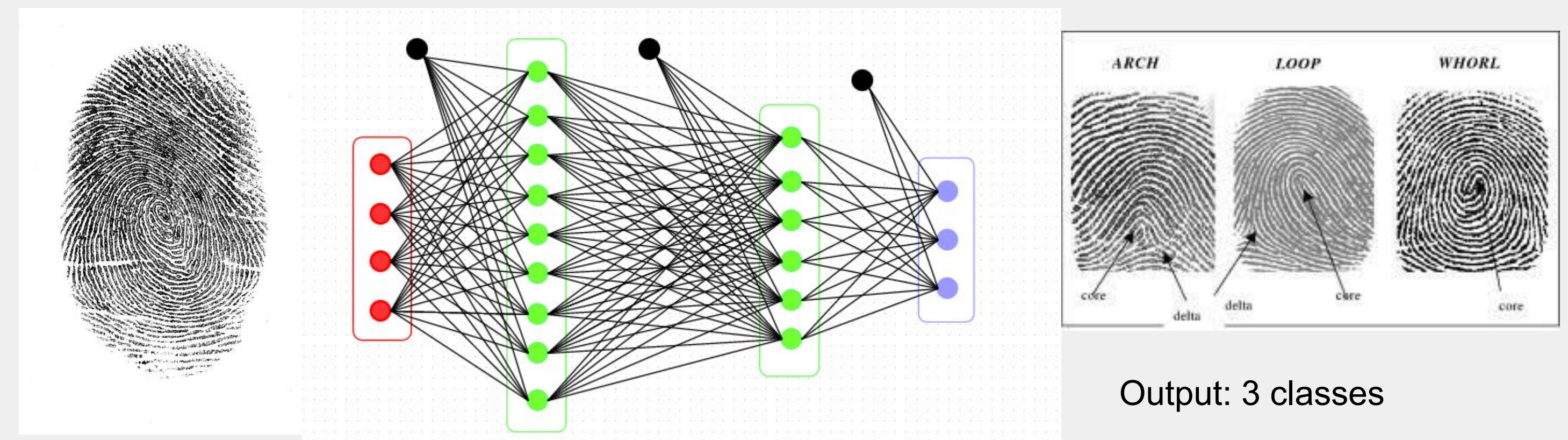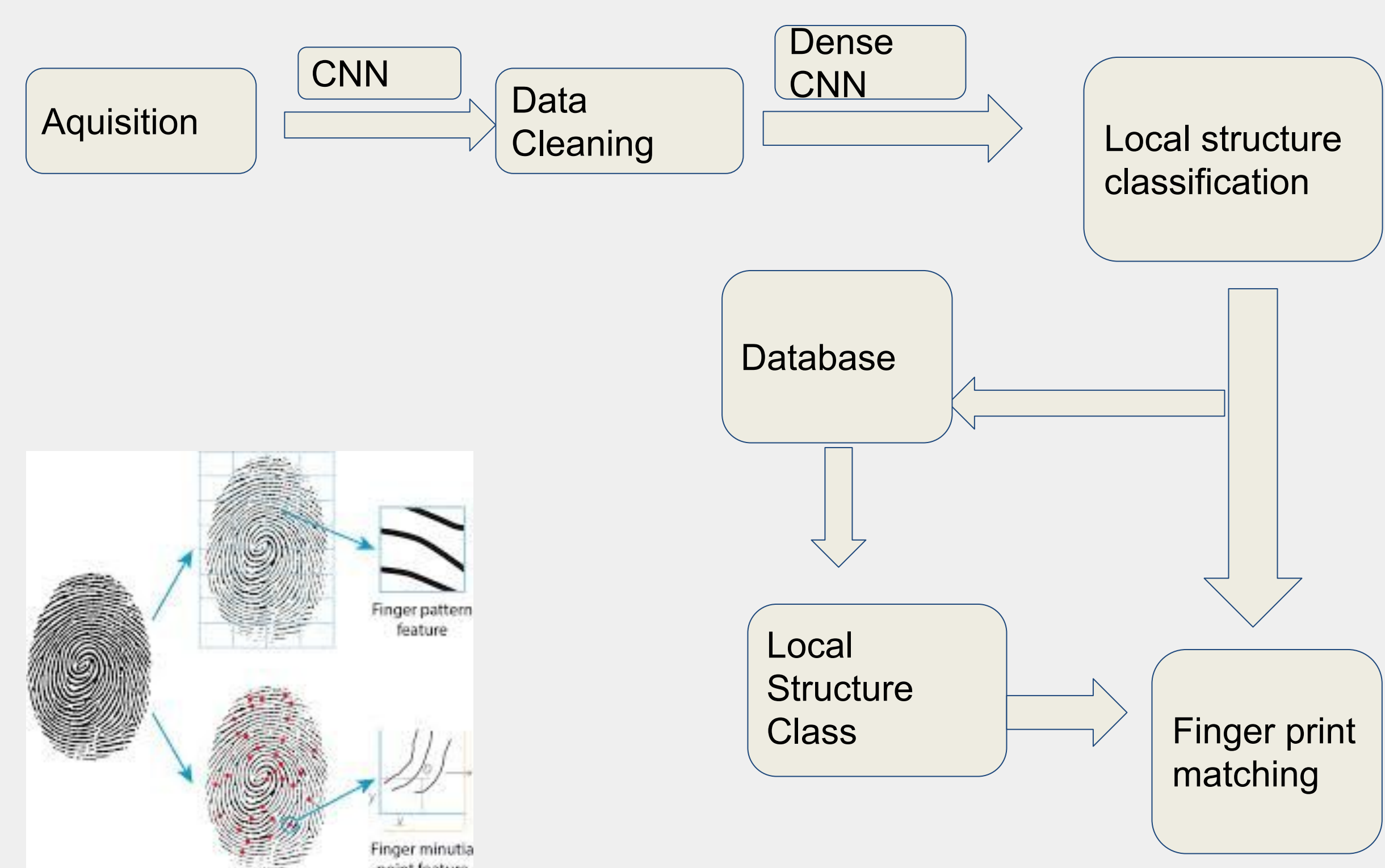
Results and Discussion

Output: 3 classes

Fig 2: Level 1, Global structure classification with single hidden layer CNN

So far,we have tested the level 1 feature extractor with a single hidden layer. The performance evaluation of the model was 68.9% for classifying images into 3 categories.

Further Improvements:

Conclusions

We propose an automateda fingerprint matching algorithn that uses Convulotional neural networks as classifiers and feature extractors. The CNN fingerprint classification algorithm has a performance of 68.9% while other related reseaches indicate a performance of 90- 99%. this is because our data is noisy and we did not implement data cleaning methods like gabor filters. Unlike other reach papers that present MLPs and genetic algorithms for classification, feature extraction and matching we would like to present CNN with other algorithms to have a more powerful functional algorithm.

References

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