

## **Research Work Proposal**

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Title of the Research Work: Hand Geometry Recognition based on Graph Representation

MEIS

Student:

### **Abstract**

The actual hand recognition methods are based on two techniques. The former is the recognition of the hand through the comparison of the shape, the latter is the recognition of the hand through the comparison of some specific distances. Both methods have some advantages and inconveniences.

- Extracting a shape and generating a linear code that represents its outline is very simple given a binary image. But, the drawback is that, the code generated is dependant on the rotation of the hand and the movement of the fingers. For this reason, it is necessary the scanners to have some marks to help the user to position the hand.
- On the other hand, extracting some specific distances of the hand, *i.e.* the length of the fingers, is an awkward task, since it is difficult to concretise the beginning and ending points, which are used to measure their distance. The advantage of this last method is twofold. First, the comparison is easy to perform and it has a constant computational cost if the distances are given. Second, scanners do not need to have marks to help the positioning of the hand.

In this work, we propose to represent the hand by attributed graphs. Nodes of the graphs will represent special points of the hand (ending of the fingers, junctions,...). And, given several instances of the same hand, that is, a set of graphs that represent the same individual, we will generate a prototype.

Advantages of our proposal:

- Scanners do not need to have marks.
- The prototype will capture the variability of the hand.

Drawbacks of our proposal:

- Comparing graphs is much more costly than comparing linear codes or distances.

### **Specific objectives**

- State of the art: Study and implement the previous commented models based on shape and based on distances.
- Define and implement a new model based on graphs that considers the variability of each hand
- Define and implement an algorithm that obtains a sub-optimal distance between hands in polynomial time.
- Compare the three models in a real database of hands

### **References**

- Handbook of Biometrics, Anil K. Jain (Editor), Patrick Flynn (Editor), Arun A. Ross (Editor), 2009
- Introduction to Graph Theory, Douglas Brent, Prentice Hall, ISBN 0-13-014400-2 , 1999