

Biometric Identification

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Exercises of Part 1: Biometrics for Human Identification

Week 1

1.

Take the Bertillon measures from two people and fill the first table (in centimetres). Then, fill the second table with the Euclidean distances and decide which is the maximum threshold such that the four people are considered as different subjects. After that, suppose that Will West and William West were actually the same person as was thought at first. What are the minimum and maximum threshold values?

Trait	Will West	William West	Person 1	Person 2
1) Height (fig. 1)	178.5	177.5		
2) Arm with (fig. 2)	187.0	188.0		
3) Height seated (fig. 3)	91.2	91.3		
4) Head width (fig. 4)	19.7	19.8		
5) Head length (fig. 5)	15.8	15.9		
6) Cheek width (fig. 6)	14.8	14.8		
7) Right ear length (fig. 6)	6.6	6.5		
8) Left foot length (fig. 7)	28.2	27.5		
9) Third left finger length (fig. 8)	12.3	12.2		
10) Small left finger length (fig. 8)	9.7	9.6		
11) Left forearm length (fig. 9)	50.2	50.3		

Distance	Will West	William West	Person 1	Person 2
Will West	0			
William West		0		
Person 1			0	
Person 2				0

2. Which is the percentage of revenues of the fingerprint trait with respect to the whole biometric features? And what is the second biometric characteristic with the highest revenues?
3. Revenues of biometric systems from 2007 to 2015 with respect to time can be easily modelled as a linear function. What is the equation of the line? If predictions hold, which value is estimated in 2020?

Week 2

4. Explain the differences between the verification and recognition systems. When is the first used and when is the second used? The algorithms to compare biometric traits can be very expensive temporarily. For this reason, it is usual to use algorithms that deduce sub-optimal distances very fast but can fail to get the exact distance. In which cases is important to use a sub-optimal algorithm?
5. Explain in what consists the enrolment to a biometric system. Typically, in the enrolment systems, there is a responsible for verifying the data in a whole process of capturing biometric features. Why it is so important to verify that this process is done correctly?
6. What are the six processes related on the verification, identification and registration systems?
7. Describe a real application that uses an off-line system and another that uses an online system.
8. Explain the difference between the two possible types of queries: Positives and negatives. Describe a pair of real applications that are of two types.

9.
Describe and relate with the Universality and Particularity.

10.
Describe and relate with the Permanence and its Measurability.

11.
Describe and relate with the Performance and Acceptability.

12.
Make a table showing all the biometric traits classified by the body part where they are. Describe its main features and a real application in which it could be used.

13.
What is the difference between the behaviour-biometric features and physical-biometric features?

Week 3

14.
Analyse in detail the tables showing the goodness of biometric features. The valuations are very suggestive, would you modify any value? Please note the comments about these tables. Which values do you think will change in 10 years?

15.
Describe the different type of contexts that exist in biometric applications. Give an example of each through a real application.

16.
Describe the different types of horizontal biometric applications. Give an example of each through a real application.

17.
Describe the different types of vertical biometric applications. Give an example of each through a real application.

18.
Since when can we consider biometrics has been used to identify people? Explain the first known cases.

19.
Do you think that the biometric examples previous to the XIX century are really biometric applications used to verify or recognise people?

20.

What is phrenology? Do you think it is a science?

21.

What is anthropometry? Do you think it is a science?

22.

Describe the first biometric system put into operation. Which biometric feature used? Was it used to identify or verify?

23.

Do you think it is correct to implement a biometric system to give access to a school? And to identify people in conflict areas or war? Do you think there should be a special commission to decide whether or not you can use a biometric system? At a global or national level?