UNIVERSITY OF THE WESTERN CAPE

Computer Science 211
Practical 1

16 January 2016

Question 1

Ridges (raised sections) and furrows (lowered sections) are easily identifiable in a fingerprint. A bifurcation is a ridge that splits into two. The coordinates of the start of a bifurcation (exact point where the split occurs) can be calculated relative to a system of axes. It is claimed that two fingerprints belong to the same person if the distances between the starting points of all the bifurcations in the one fingerprint match the distances in the other fingerprint. Three files that contain coordinates of starting points of bifurcations of three fingerprints are attached (TestFile1.csv, PersonA.csv, PersonB.csv). Your task is to try and match the fingerprint in TestFile1.csv with that in files PersonA.csv or PersonB.csv. First create a Java class Coordinate with attributes x and y, both of type integer. Code appropriate constructors, accessors, mutators and a toString method. Note, w.r.t sorting in ascending order, coordinate1 (i.e. (x1, y1)) 'comes before' coordinate2 (i.e. (x2, y2)) if x1 < x2, or if (x1 = x2 and y1 < y2). Two coordinates are equal if x1 = x2 and y1 = y2. Code method compareTo(Coordinate *otherCoordinate*) so that it returns (a) -1 if the coordinate under consideration comes before *otherCoordinate*, (b) 0 if the two coordinates are equal, (c) otherwise it returns 1. The distance between two coordinates denoted by (x1, y1) and (x2, y2) is calculated as,

$$d = \sqrt{((x2 - x1)^2 + (y2 - y1)^2)}$$

Code method distanceBetween(Coordinate *c1*, Coordinate *c2*) (of type double) that calculates the distance between coordinates *c1* and *c2*. Your program should read the data from the TestFile1.csv and store it in a 1-dimensional array of type '*Coordinate'*. Then sort the coordinates in 'ascending order'. The distances between the starting points of all bifurcations should then be calculated and stored in 1-dimensional array *d1*. Do the same for the data in the first database file (i.e. PersonA.csv) and store its distances in array *p1*. Matching should then commence by comparing the distances of the two fingerprints. A match occurs between the two fingerprints if all the distances stored in the two arrays match each other. To simplify the matching process ensure that the distances are sorted in ascending order before commencing with the comparison of the distances. If no match is found then continue matching with the remaining database files. Your program should cater for more than one database file.
First develop an algorithm to match a fingerprint and then code it in Java. Save your program as **Matcher.java**

Question 2

This year the university did not supply a timetable in tabular format to students. Your task is to develop an algorithm (to be implemented in Java) that reads timetable slots from the file TimeTableSlots.csv and outputs a timetable in tabular format as indicated in file "TabularFormat.pdf". Your program output should include all modules that appear in the comma separated (CSV) textfile. The name of the fields appear in the first row of the file. Note, there are 1847 entries in the textfile.

Hint: Use a 2-dimensional string array (10 rows and 5 columns) in your design. Save your program as **TimeTable.java**

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