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CSCE 350

Final project written report

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Facial Expression Recognition

In this assignment, we were tasked with implementing a system to recognize human facial action units from facial images. If the computer can recognize facial actions from images automatically, then it can therefore determine our emotions and intentions. For this particular project, we are comparing AU01, which is the raising of the inner brow, AU12, which is the raising of the lip corners, and AU17, which is the raising of the chin. We can use these facial movements to recognize the expressions for surprise, happiness, and sadness.

The methodology used for determining facial expression recognition begins with recognizing the AUs using the k-nearest-neighbor method. Each image in our project is represented by a file containing a vector of 5,632 elements. We want to compare this to a file which contains a given template image that has 138 different vectors in it. We do this by using a similarity function which compares the two vectors and returns a value s. We then sort this s vector descending so that we can keep the ten greatest values and output them. The strategy used to improve efficiency is just basically sorting.

Pseudo-Code for similarity algorithm:

for(every for in template file given)

{

for(every item in each row)

{

Numerator = x \* y

denominatorX = x \* x

denominatorY = y \* y

numeratorAdded = numeratorAdded + numerator; (sums up the numerators)

denominatorXAdded = denominatorXAdded + denominatorX (sums x variable of denom)

denominatorYAdded = denominatorYAdded + denominatorY (sums y variable of denom)

}

Temp variable = numeratorAdded / sqrt(denominatorXAdded \* denominatorYAdded)

s.puch\_back(temp) (adds temp to vector called s)

reset variables back to zero for another loop through a different row

}

Experimental results are attached!

In conclusion, this was a challenging program that was also fun to do. It kept me entertained, and the best part was that I eventually got it to work, or so I think. It is a very gratifying feeling when you get something to work, I know my program will probably not be the fastest, but I also hope that it is not the slowest either!