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CISC 442

Final Project

Our project goal is to count the number of heads in a given image taken from an overhead angle. First, we needed to extract globs from the image that have the potential to be heads. These candidates are given to Adaboost, a machine-learning algorithm, to determine if the extracted object is actually a head.

We tried many different methods to extract candidates for our Adaboost algorithm. In our first attempt, we used an algorithm that detects circles in an image and returns their center point and radius. This failed, because not all heads are circular. People with long hair do not produce a circular shape when their picture is taken from above.

The method we settled on applied a Laplacian filter to the image to capture the gradients of the image. Then we use connected component labelling to distinguish different regions within the image. Then we iterate through this new matrix, looking for border regions. Once a border is found, a marker is placed and the borders in the surrounding area are erased to prevent duplicate areas being covered by the Adaboost algorithm. The result is a series of relatively evenly spaced points in which surrounding area is most likely to contain a head.

TALK ABOUT INITIALIZING ADABOOST HERE  
 TALK ABOUT IMPLEMENTING ADABOOST HERE

Overall, we encountered many problems in our attempts to count heads. Unusual hair colors, hats, and hoodies make it difficult to distinguish a head from an object. Our method for finding candidates could be improved by implementing background subtraction to separate moving objects in the foreground from the objects in the background. This could speed up our candidate finding process and make it more accurate, but we opted to try identification through one still image.

TALK ABOUT OTHER PROBLEMS YOU ALSO HAD IN THE PARAGRAPH ABOVE