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CSC420 Project Proposal

Face Detection and Race Recognition

Our project will perform racial recognition of faces in 2D. To elaborate, when presented with a photo of one or multiple people, our program will be able to draw a box around each face, determine the race of each person in the photo, and be able to provide a description. Note that for simplification, we will only detect the following four races: Asian, Black, Caucasian (White), and Hispanic or Latino. We haven't decided on the format of the description, however, it will be one of the three:

1) a summary on the number of each race in the photo
2) a paragraph description of the races in the photo
3) label of races in order from the left of the photo to the right

Here are the tasks to solve listed step by step:

1) Find large datasets of faces for each race, and calibrate those photos from different datasets.
2) Use a feature detection algorithm to extract features from training datasets that comprises the human face, and generate a binary classier that is able to put a bounding box around a face when detected
3) Use a feature detection algorithm to extract distinctive facial features from grayscale training images, then use them in neural nets to train a classifier that can detect those features using 1-of-k encoding.
4) Use a feature detection algorithm to extract skin colours from coloured training images, then use them in neural nets to train a classifier that can detect skin colours using 1-of-k encoding.
5) When testing the two classifiers with photos of multiple people/races, our program has to use the face detection classifier to detect the faces and draw a bounding box around them, then apply the facial feature classifier and skin colour classifier on those faces that we detected, and combine both results to reach a conclusion on the race
6) Provide a description on the races we have detected in the photo

The difficulties that our project might face are:

1) There are no datasets specifically labelled for races, hence we have to combine different datasets, manually label them by ourselves, and calibrate the size, lighting, angle, and colour of the photos from different datasets to a general specification
2) When detecting the presence of a face in the photo, if the face is angled or covered by some object, the face might be undetectable because less features can be extracted
3) If someone is a mix of two or more races, our program might be unable to correctly classify them.
4) When the photo is taken under certain lighting and exposure, the skin colour classifier might misidentify
5) We are still uncertain about how to combine our skin colour and facial feature classifiers