Smiling Detection

-- explanation

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# Definition of smiling:

## 1. Definition of smiling:

As I decide to use the keypoints from mtcnn to decide if smiling, here is what we can use as inputs:

position of five keypoints: [left\_eye , right\_eye , nose , mouth\_left , mouth\_right]

Then, we can find, while smiling, the mouth will be wilder and moving up

So I use the following two parameters simulate:

Smiling 🡨 mouse\_wilder 🡨 mouth\_width / eye\_distance 🡨 name it horizontal\_ratio

Smiling 🡨 overall\_mouth\_near\_to\_nose 🡨 mouse\_to\_nose / eye\_to\_nose 🡨 vertical\_ratio

You can find the all the details in the program, function wink(), from line 73 to 110

## 2. Quantization of parameters

We already know bigger horizontal\_ratio will increase the possibility of smiling, and smaller vertical\_ratio will increase the possibility of smiling. But how to quantize them?

Here we gathered 50 smiling images and 50 non-smiling images, calculate the two parameters in both data set:

Note: s-h is smiling horizontal ratio and n-v is is non-smiling vertal ratio

we can see horizontal ration in smiling faces is, in most cases, bigger than non-smiling faces, and vertical ratio also represent some trendency.

So I calculate the average horizontal ratio = 0.9 and avervage vertical ratio = 0.84 as threshould.

And as horizontal ratios are more reliable, assign more weight on it, we get our algrithm like this:

For each piture:

standard\_horizontal\_ratio = 0.90

standard\_vertical\_ratio = 0.84

result = 0

result += (horizontal\_ratio-standard\_horizontal\_ratio)\*3

result += -(vertical\_ratio-standard\_vertical\_ratio)

if result > 0:

return True

else:

return False