Selfie Promotion with Dynamic Stickers

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1. Definition of project goals

This project is a three-people project. There are several goals.

* 1. *Understanding some computer version theories*

We have learnt comp9517(computer version) for nine weeks. It’s time for us to review previous chapters, and there are many theories which need us to take time to understand. Besides these theories will help us to complete this project, and they are the bases for it.

* 1. *Learn how to complete a group work*

This is a group wrok, so it is important for us to arrange our time to work together, because we enrolled in other different courses which lead to different timetables. To make our best to complete this project, we'll have to adjust to each other. Hence we need to make a group timetable which can be accepted by everyone. And this would be the best benefit which group work can give us.

* 1. *Realise an actual program*

The final result will be a program which can be executed. We want to realise a program which can detect face and then add dynamic stickers. As for the face detection, it is the based function for this project. Real-time adding dynamic stickers is the final result.

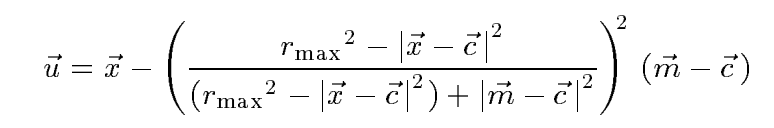
1. Sub-goals
   1. *Theory backgroound*

* The histogram of oriented gradients (HOG) is a feature descriptor used in computer vision and image processing for the purpose of object detection. The main steps for this algorithm implementation are gradient computation, orientation binning, descriptor blocks, blocks normalization, SVM classifier and neural network classifier.
* Feature matching is one feature matching to another if those features are nearest neighbors and their distance is below some thresholds. But there are some difficulties: threshold is difficult to set and non-distinctive features could have lots of close matches, only one of which is correct. To find the best match, alignment and fitting are needed. Alignment is to find the parameters of the transformation that best align matched points. Fitting is to find the parameters of model that best fit the data.
  1. *Face detection*

The face detector it uses is made using the classic Histogram of Oriented Gradients(HOG) feature descriptor combined with a linear classifier, an image pyramid and sliding window detection scheme. Here we use Dlib library as the face detection tool. This tool can detect face and return 68 landmarks and it can detect eyes, eyebrows, nose, mouth, and jawline.

* 1. *Promotion*
* Image partial distortion: local scaling, local transition, local rotation. We can use these to realize bigger eyes and smaller face. Feature matching and face alignment.
* Local transition:

The source coordinate vector u corresponding to a destination pixel with coordinate vector x is calculated as follows:



where c is the center position, m is the current mouse cursor position, and rmax is the radius of the area of influence.

* 1. *Add dynamic stickers*
* The ideal realisation is to add stickers referring to live video from camera.
* To achieve this, following steps will be taken:
* Build preserved face photos with effects wanted. Record abstract facial masks of them, e.g. nose and mouth triangle area.
* Require analysis on the video about face detection part. Get an abstract mask of each frame.
* Swap the masks from the video with the preserved ones using alignment.
* Output to image, which - in this case - frames.
* Several details to be noted:
* Some mistakes could be made during the analysis progress. The algorithm should tolerate and deal with such situation for several frames. One possible solution is to add a memory function.
* The stickers should change size and/or directions as the human face does.
* If time allows, live stickers, i.e. gif stickers instead of bmp, jpg or so, might be considered.

1. Planning

This is a group work and there are several subgoals which can help to complete whole project. So it is necessary to make a plan.

* 1. *Week 10*

Each of us should review the lectures and search some edtra related knowledge online. To achieve this, we should arrange several times studying together and deal with some problems. Besides, we should read some blogs which are related to our project.

* 1. *Week 11*

Write the code relates to the face detection. And run it on pictures and live videos.

* 1. *Week12*

Write the code related to promotion and combined with face detection.

* 1. *Week13*

Write the code related to add stickers and combined with precious code. And demo it with some testing video.

References

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