

Heady Liar — A Mugshot AI Magician

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1. Overview

Our project is an application project for the processing of large mugshots based on computer vision technology. People have an innate yearning for beauty, which is strongly confirmed by many people's love for beauty cameras. Face processing and modification technology has high importance and market value. In the previous experience of using beauty camera, we were shocked by the "magic" of beauty camera. After studying computer vision related courses, we were surprised to find that we can use what we learned in the course to realize a beauty camera with multiple functions by ourselves. In addition, we will enrich the functions of vallina beauty cameras. We focus on magshots modifications and we believe that this application can give you a new understanding of your appearance, so we named it Heady Liar. And the Heady Liar may either produce beautiful photos that amaze the users or produce deformed photos that make users laugh.

2. Related Works

As [2] introduced, with the progress of society and the vigorous development of the beauty industry, how to help people quickly and accurately find their own beauty products has gradually become a research hot spot, for which there are a lot of traditional and deep-learning-based models trying to implement makeup transfer, including GAN and Flow generative models.

[4] proposed a new method to get the specified network parameters through one time feed-forward propagation of the meta networks and explore the application to neural style transfer. They build a meta network which takes in the style image and produces a corresponding image transformation network directly.

[3] on GitHub is a sample project which can whiten, add filters and minute adjustments on the mugshots using traditional computer vision technology.

Dlib[1] is a modern C++ toolkit containing machine learning algorithms and tools for creating complex software in C++ to solve real world problems, and its Python edition can also m It is used in both industry and academia in a wide range of domains including robotics, embedded

devices, mobile phones, and large high performance computing environments. And our Beautification module is mainly based on the Dlib library and the pretrained model "shape_predictor_68_face_landmarks.dat".

3. Details

We have implemented 3 main modules of the Heady Liar, including Beautification, Photo Modification and Style Transformation. Especially, the Beautification can do embellishments on photos with multiple faces and the latter 2 modules are also available for photos without faces. And the Heady Liar is suitable for variable photo types including *.png, *.jpg and *.jpeg.

3.1. Beautification

The Beautification module includes skin gridding, whitening, eye enlargement, face slenderization, V-face shaping, face shortening, nose slenderization, lip reddening, ocular distance widening and lip thickening.

3.1.1 Skin gridding

It is implemented by imposing Gaussian Blur on each face, but with alleviated blur on nose since prominent nose can add to the handsomeness of the mugshot, and intensified blur on forehead since there may be more acnes and poxes needed to be erased.

3.1.2 Whitening

It is implemented by lifting the V value (brightness) of the organs in HSV color model.

3.1.3 Eye enlargement and face modifications

Face modification includes face slenderization, V-face shaping and face shortening. The two parts are similarly implemented by moving the key points in both sides detected by the model "shape_predictor_68_face_landmarks.dat": in eye enlargement part, the key points are moved outwards; in face slenderization, the key points are moved inwards; in V-face shaping, the key points are prone to be colinear; and in face shortening, the key points are moved upwards.



Figure 1. The interface of the Heady Liar.

3.1.4 Nose slenderization

It is implemented by moving the key points of the nose inwards which are detected by the model "shape_predictor_68_face_landmarks.dat".

3.1.5 Lip reddening

It is implemented by rendering the parts of the lips more reddish.

3.1.6 Ocular distance widening

It is implemented by translating the parts of eyes outwards.

3.1.7 Lip thickening

It is implemented by moving the key points of the mouth outwards which are detected by the model "shape_predictor_68_face_landmarks.dat".

3.2. Photo Modification

The Photo Modification module includes modification of brightness, contrast, saturation, sharpness, color temperature, hue, noise reduction/film graininess.

In detail, the modification of brightness is implemented by changing the value of all RGB coordinates synchronously; the modifications of contrast and sharpness are

implemented with the help of Image library; the modifications of saturation and hue are implemented by changing the Hue or Saturation value in HSV coordinates; the modification of color temperature is implemented by changing the Blue weight reversely with the Green and Red weight; the modification of noise reduction/film graininess is implemented by either imposing Gaussian Blur or adding random noise.

3.3. Style Transformation

The Style Transformation module includes styles of astringently green, light spot, blues, sharpening, medium grey, halo, nostalgia, morning light.

In detail, the styles of astringently green, blues, medium grey, halo, nostalgia, morning light are implemented by linear transformation of RGB coordinates; the light spot effect is implemented by increasing the brightness of the pixels linearly with distance attenuation; and the sharpening effect is implemented by Laplacian-of-Gaussian filter.

4. Results

The interface of the Heady Liar is shown in Figure 1 and the modified results of the Heady Liar is shown in Figures 2-3. Each figure is imposed by multiple transformations to get different effects. We can see that the Heady Liar can indeed beautify the mugshots.

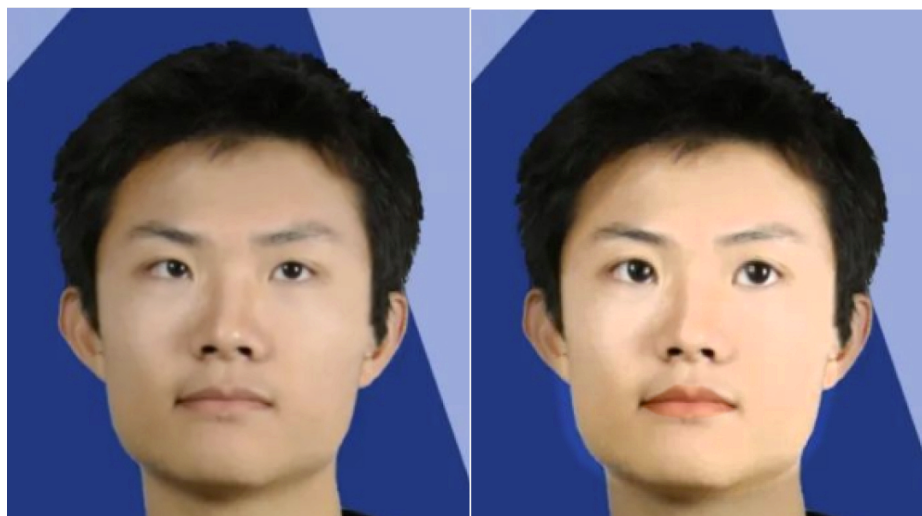


Figure 2. The first result of the Heady Liar. It is imposed the functions of whitening, lip reddening, eye enlargement, nose slenderization.



Figure 3. The second result of the Heady Liar. It is imposed the functions of morning light, lip reddening and thickening, V-face shaping, nose slenderization and the modification of brightness, hue, saturation and noise reduction.

5. Conclusion

We have just implemented 3 modules, a total of 25 functions of Beautification, Photo Modification and Style Transformation by comprehensively using the pretrained model, matrix transformation and other technologies in the field of Computer Vision. And the Heady Liar is beginning to take shape. In the future, we will add more functions including Background Transform, Hair Style change, Imitated Makeup and Expression Change to make the Heady Liar more powerful.

References

- [1] Dlib. Dlib c++ library. 2022. 1
- [2] Xiaohan Ma, Fengquan Zhang, Huan Wei, and Liuqing Xu. Deep learning method for makeup style transfer: A survey.

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- [3] PerpetualSmile. Beautycamera. 2018. 1

- [4] Falong Shen, Shuicheng Yan, and Gang Zeng. Meta networks for neural style transfer. 2017. 1