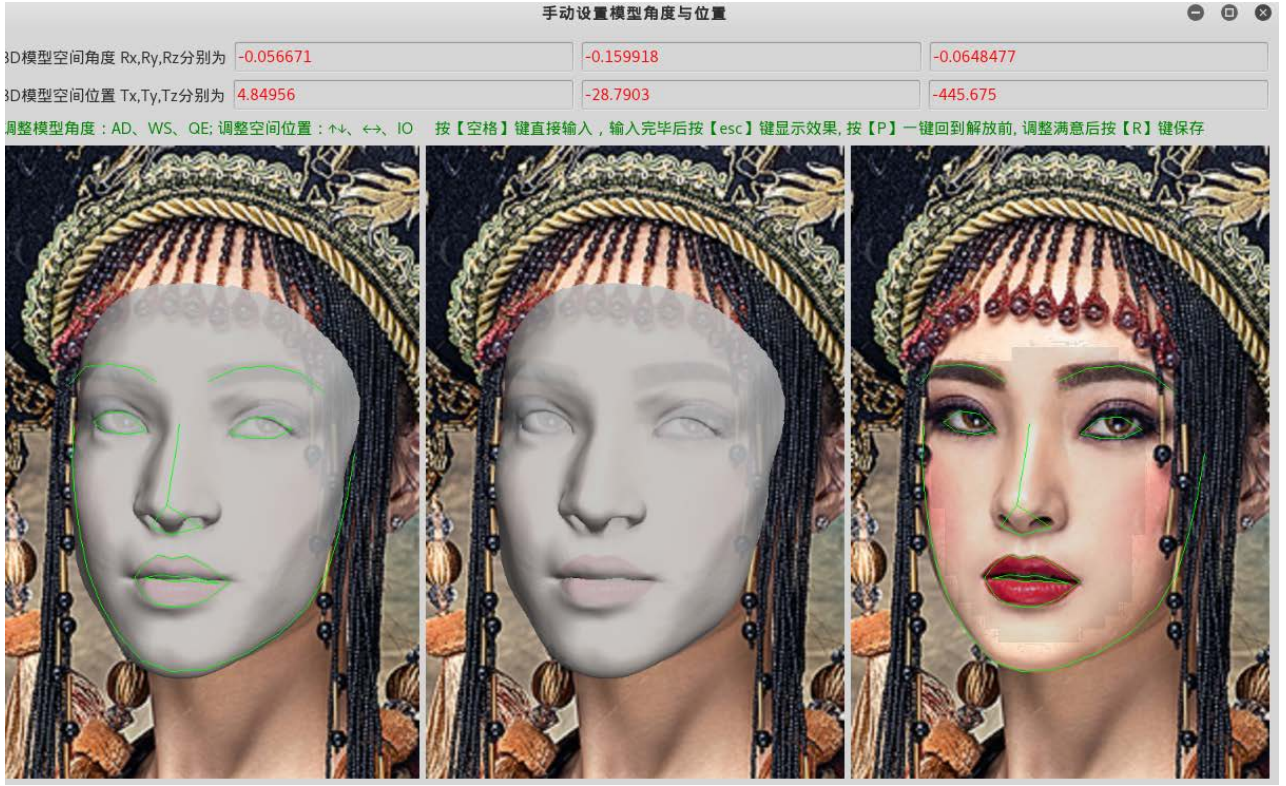
一、由图片生成3D模型与位置角度信息

深度方法生成3D模型，一种改良版的基于3DMM的模型；每个模型198*1个参数，包括shape、expression、texture三个分量

Tran, Anh Tuan, et al. "Regressing robust and discriminative 3D morphable models with a very deep neural network." *arXiv preprint arXiv:1612.04904*(2016).

手动调整模特图的角度



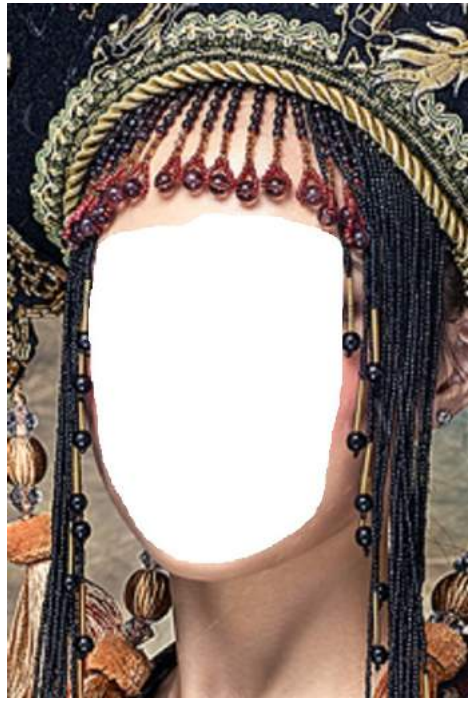
设定好模特的3D模型、头部角度、空间位置、面部分割

存储模特所有信息以备用

```
模型保存文件ply
保存3个向量m_vecR, m_vecT, m_K和3个矩阵shape,tex,expr
向量用于描述模型的空间位置，矩阵构建模型
Header_End
vect_R -0.056671 -0.0999177 -0.0648477
vect_T 0.349557 -27.7903 -445.675
vect_K -1000 0 248 0 1000 336 0 0 1
shape_data -1.3444 -0.026379 -0.0639834 0.218212 -0.329127 0.813975 -0.0424043 -0.15409 -0.175027 -1.16833 -1.58207 0.589024 -1.42223 0.0431088
-2.42199 1.2075 1.03042 -0.121303 -1.62066 0.213241 -0.51538 0.0478195 0.357375 -0.48519 1.5437 -0.726267 -0.627514 -1.20023 -0.823877 -1.09519
-0.248772 -0.124615 -0.969744 0.815059 0.124542 -0.896468 0.381306 -0.0690798 0.0193271 -0.332422 0.699704 -0.573884 -0.766623 0.171043 -0.175221
-0.148233 0.0595314 -0.00020656 -0.386678 -0.465945 -0.671599 0.6383 0.839324 0.398591 0.927453 0.454129 0.304332 0.241246 0.192287 0.154871 -0.555925
-1.24352 0.224275 0.047141 -0.357374 -0.743419 -0.509662 -0.127149 0.0693858 0.940132 0.[illegible] 0.0726145 -0.112722 -0.140252
0.103177 -0.0641844 0.812603 0.478291 -0.864422 0.328183 0.236481 0.0708674 -0.410904 -0.[illegible] 0.195355 0.293652 -0.00126304
0.600791 0.781891 -0.463982 0.477519 0.480673 -0.0965187 0.581918 -0.382645
tex_data 0.00584725 -0.406829 -0.729265 1.10846 -0.433079 -2.01674 -2.92696 -0.773431 0.855946 0.872356 0.533727 1.68479 -0.88049 1.45887 1.37488
-1.39246 0.284403 -0.652815 -0.476655 0.808748 -1.15596 0.274173 -0.441652 0.654266 -0.791801 0.104742 0.162918 -0.0918211 1.44066 -0.732683 -0.992935
0.247774 0.0715285 -0.450746 -0.368095 -1.4754 0.0960572 -1.41964 1.30331 0.310811 1.02175 0.63841 -2.08121 1.68878 0.0395648 1.33043 0.940363 0.616947
-0.302602 0.137535 -0.932236 0.950286 0.0166381 1.80797 -0.628714 -0.958618 -0.412853 0.589384 1.5259 -0.354255 1.2294 -0.0569956 -0.189051 1.86877
0.219536 0.10252 1.22214 0.214422 -0.287476 0.20046 0.32658 -0.849979 1.28471 -0.127511 -0.194838 0.730218 -0.290389 -0.956125 -0.152211 -0.222549
-0.214573 -0.704728 0.425477 1.91617 0.519147 -1.09219 0.851005 -0.302859 0.545656 -0.164195 0.294621 -2.61217 -0.580813 -1.1452 -1.43822 -0.721508
-0.118894 0.470415 1.13063
expr_data 0.129969 -0.694712 0.463738 0.411804 0.369816 0.710836 0.706789 1.00836 0.708453 0.565288 -0.0793441 1.62277 0.088726 -0.0516649 0.122149
0.376029 0.238939 -0.0813139 0.00855838 0.495385 0.584285 -0.124009 -0.935308 -1.62329 -0.0013264 -1.35626 0.434856 -1.06546 -0.693389
bbox_data 0 0 496 672
landmarks_data 87 334 85 375 88 419 94 462 103 505 119 546 140 582 168 613 203 626 245 623 292 605 332 581 366 549 389 509 403 463 414 415 422 367 82
283 101 263 130 260 160 265 185 281 248 280 282 265 321 262 357 271 386 294 213 331 209 363 203 396 198 428 179 452 190 458 203 463 220 459 238 454 110
329 129 316 153 319 173 340 150 343 125 340 274 343 297 324 323 323 347 338 325 348 298 348 159 515 172 497 188 487 204 492 222 488 245 500 273 520 246
540 222 549 204 549 187 546 172 536 169 515 189 511 205 513 222 512 261 521 222 518 204 519 189 516
```

空间位置、角度

3D模型数据



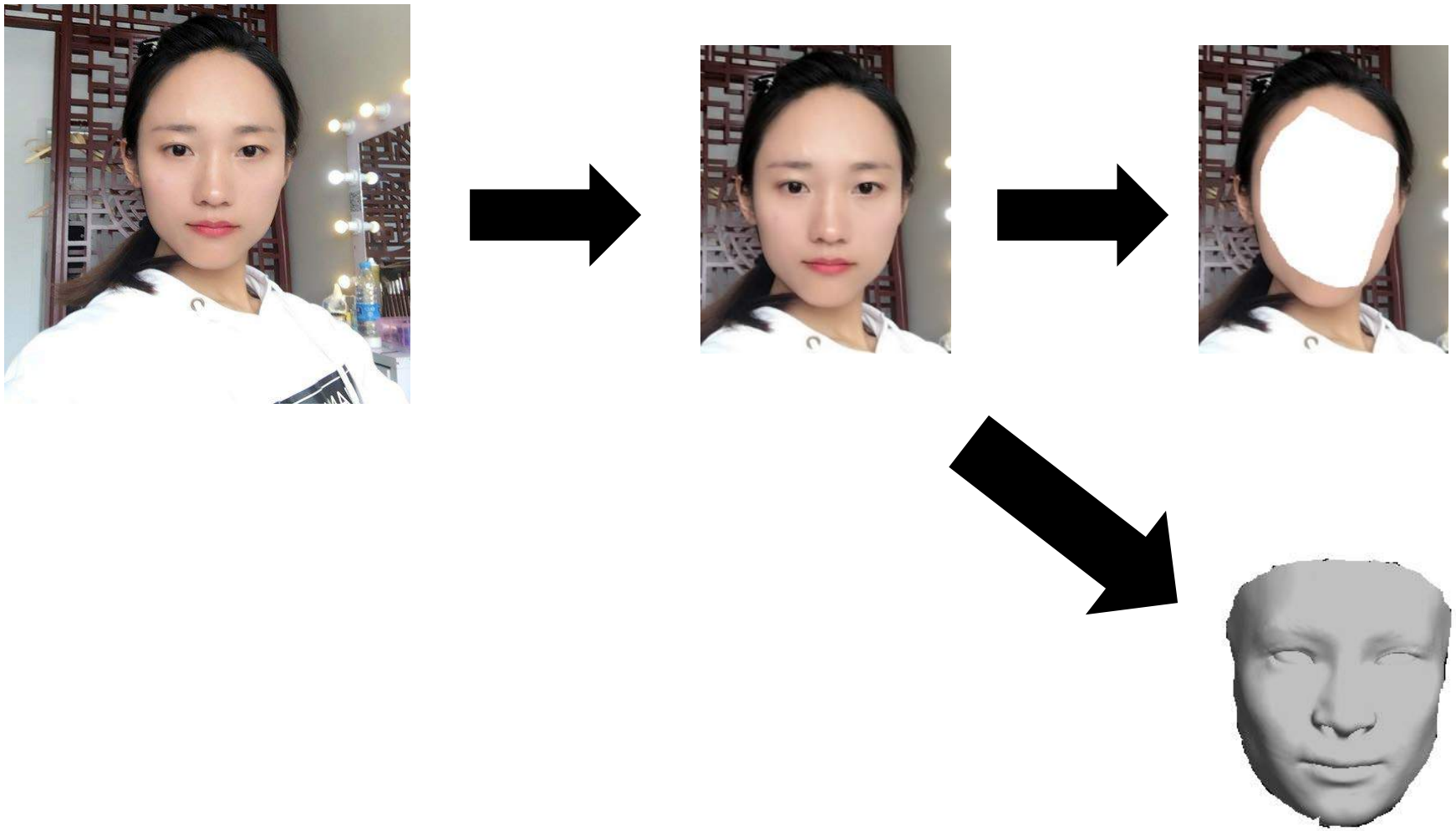
二、用户图片预处理——图像类比



保证用户图像与模特图像具有一样的色调、肤色风格

Liao, Jing, et al. "Visual Attribute Transfer through Deep Image Analogy."*arXiv preprint arXiv:1705.01088* (2017).

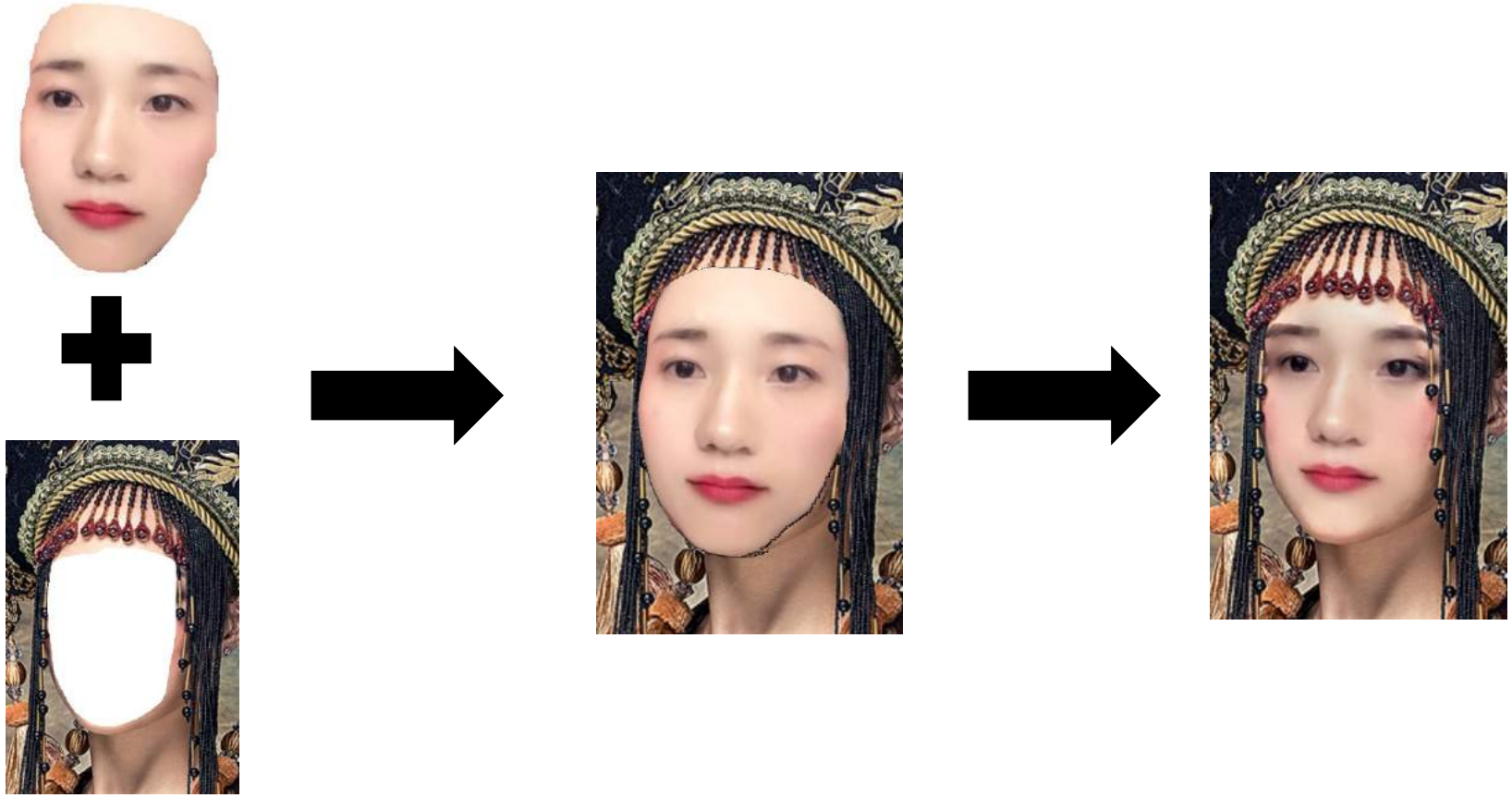
用户图片预处理——裁剪、分割、建模



三、渲染调转角度后的用户图片

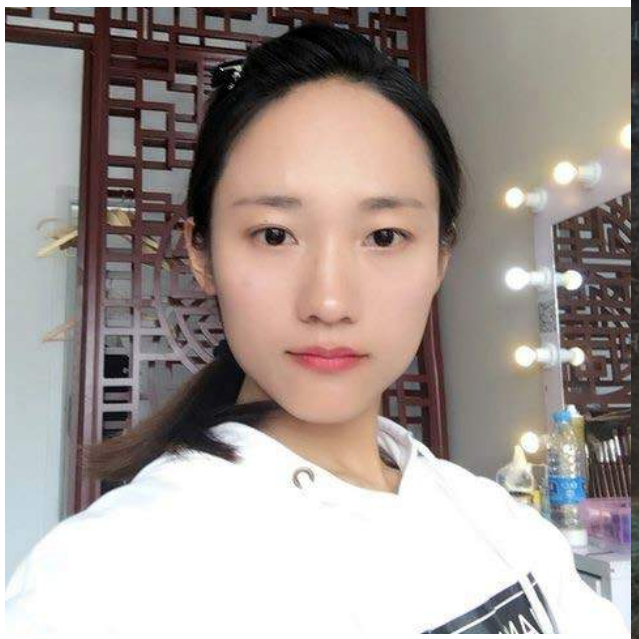
旋转用户头像3D模型，使之与模特的3D模型角度位置一致

四、泊松融合



使用opencv自带函数seamlessClone进行融合

Pérez, Patrick, Michel Gangnet, and Andrew Blake. "Poisson image editing."*ACM Transactions on graphics (TOG)*. Vol. 22. No. 3. ACM, 2003.

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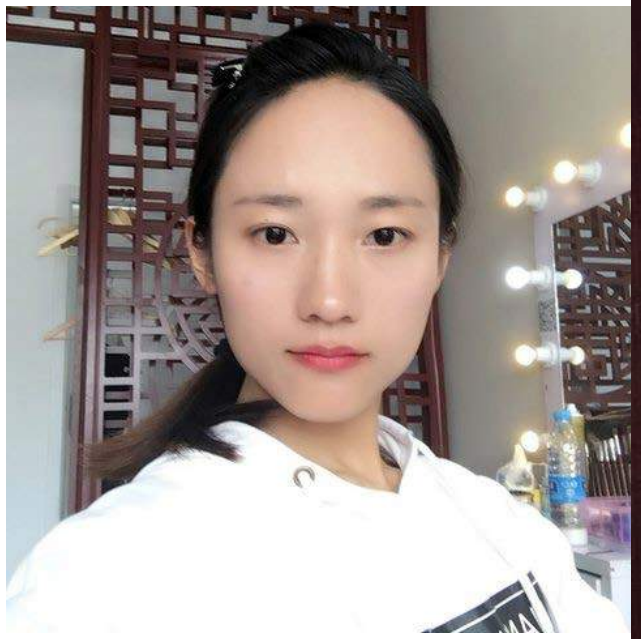


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