

## Description of the performed steps for each image.

The main operations that were performed are Gaussian Blur, Median filtering, Erosion and Dilation.

Some results of oval selection after these operations are present in the HW3/ovals folder.

In case of multiple oval regions the biggest one was selected assuming that is the face region.

```
open("9-11.jpg");
run("Gaussian Blur...", "sigma=2");
run("Compile and Run...", "compile=HSV_Threshold.java");
run("Erode");
run("Convert to Mask");
run("Erode");
run("Erode");
run("Fill Holes");
run("Analyze Particles...", " show=Ellipses display clear");
```

```
open("10-11.jpg");
run("Gaussian Blur...", "sigma=2");
run("Median...", "radius=2");
run("Compile and Run...", "compile=HSV_Threshold.java");
run("Convert to Mask");
run("Erode");
run("Erode");
run("Erode");
run("Erode");
run("Median", "radius=3");
run("Erode");
run("Erode");
run("Erode");
run("Erode");
run("Erode");
run("Erode");
run("Dilate");
run("Dilate");
run("Dilate");
run("Dilate");
run("Fill Holes");
run("Dilate");
```

```
open("13-11.jpg");
run("Gaussian Blur...", "sigma=5");
run("Median");
run("Median...", "radius=5");
run("Compile and Run...",
"compile=/Users/macbook/Downloads/ImageJ.app/plugins/HSV_Threshold.java");
run("Fill Holes");
run("Convert to Mask");
run("Fill Holes");
run("Erode");
run("Analyze Particles...", " show=Ellipses display clear");
```

```
open("14-11.jpg");
run("Gaussian Blur...", "sigma=5");
run("Median...", "radius=5");
run("HSV Threshold");
run("Convert to Mask");
run("Erode");
run("Erode");
run("Erode");
run("Erode");
run("Fill Holes");
run("Erode");
run("Erode");
run("Analyze Particles...", " show=Ellipses display clear");
```

[illegible]

```
run("Erode");
run("Erode");
run("Fill Holes");
run("Analyze Particles...", " show=Ellipses display clear");
```

```
open("16-11.jpg");
run("Gaussian Blur...", "sigma=5");
run("Median");
run("Median...", "radius=5");
run("HSV Threshold");
run("Convert to Mask");
run("Fill Holes");
run("Erode");
run("Erode");
run("Analyze Particles...", " show=Ellipses display clear")
```

Result of oval selection manual and algorithmic:

|           | Top-Left<br>Coordinate<br>X | Top-Left<br>Coordinate<br>Y | Width | Height |  | Top-Left<br>Coordin<br>ate X | Top-Left<br>Coordin<br>ate Y | Width | Height |
|-----------|-----------------------------|-----------------------------|-------|--------|--|------------------------------|------------------------------|-------|--------|
| 9-11.jpg  | 199                         | 97                          | 248   | 286    |  | 239                          | 99                           | 168   | 293    |
| 10-11.jpg | 227                         | 113                         | 198   | 255    |  | 214                          | 161                          | 208   | 202    |
| 11-11.jpg | 237                         | 119                         | 188   | 233    |  | 244                          | 122                          | 171   | 351    |
| 12-11.jpg | 233                         | 94                          | 182   | 252    |  | 220                          | 107                          | 214   | 334    |
| 13-11.jpg | 232                         | 99                          | 191   | 250    |  | 237                          | 101                          | 186   | 251    |
| 14-11.jpg | 223                         | 114                         | 187   | 260    |  | 212                          | 126                          | 221   | 329    |
| 15-11.jpg | 232                         | 91                          | 179   | 255    |  | 217                          | 105                          | 207   | 364    |
| 16-11.jpg | 217                         | 98                          | 187   | 265    |  | 209                          | 344                          | 189   | 244    |

For most of the images the results are nearly close.

The biggest difference is visible for the height of the oval, which is because of the region of the neck.