UNIVERSITÀ DI BOLOGNA

School of Engineering

Master Degree in Automation Engineering

Computer Vision

Attachment assignment
Visual Inspection of Motorcycle Connecting Rods

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Margo Roncato
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Abstract

This brief report will show you the plot of the result that we have obtained.

For the comment about the code we have done it in the Markdown of the Jupyter notebook.

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Chapter 1

Images clear

1.0.1 Image TESI00

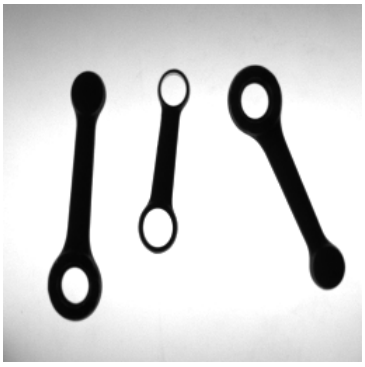

Figure 1.1: Input Image

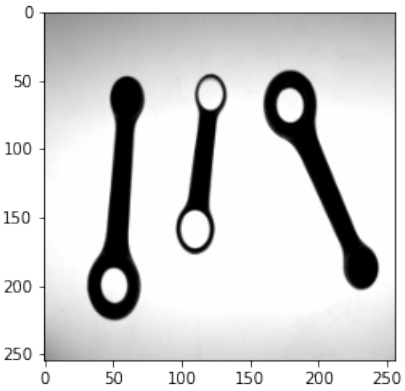

Figure 1.2: output linear stretched image

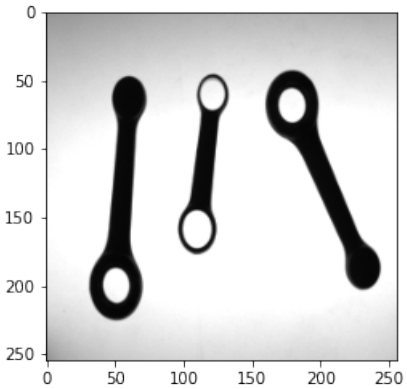

Figure 1.3: output filtered image

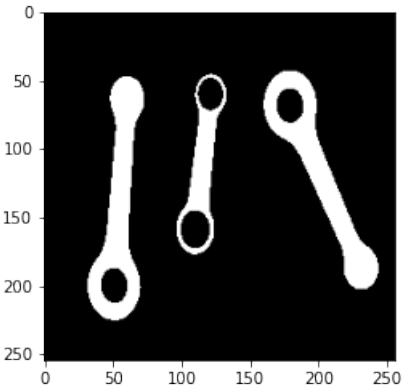

Figure 1.4: output binarized image

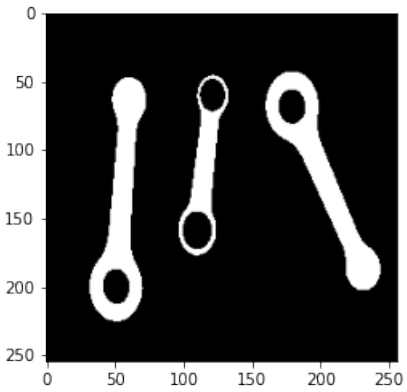

Figure 1.5: output binarized clean image

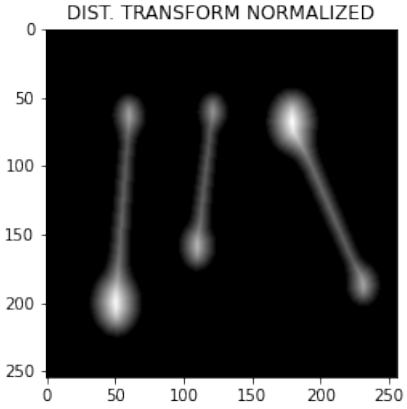

Figure 1.6: output distance transform normalized image

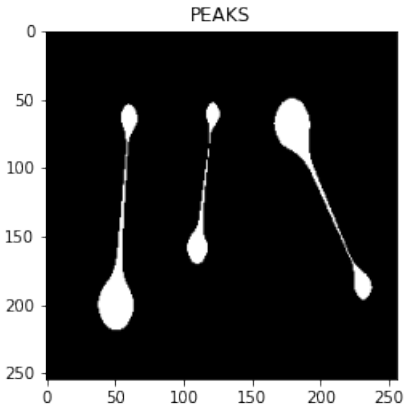

Figure 1.7: output thresholded image

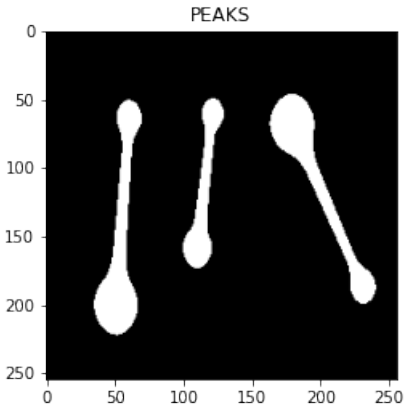

Figure 1.8: output watershed image

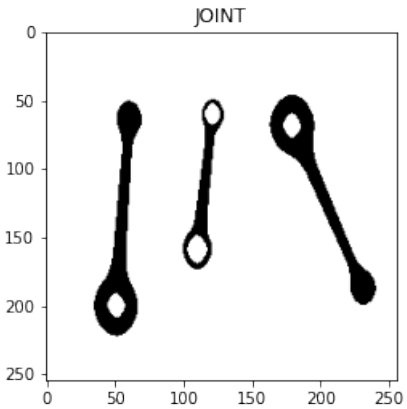

Figure 1.9: output before labeling image

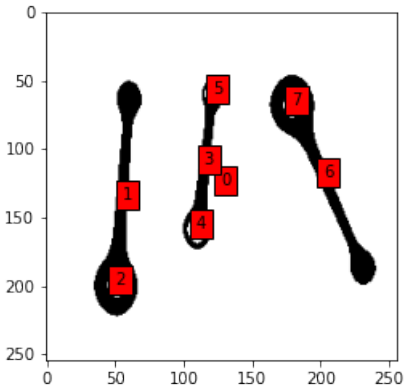

Figure 1.10: output final image

1.0.2 Image TESI01

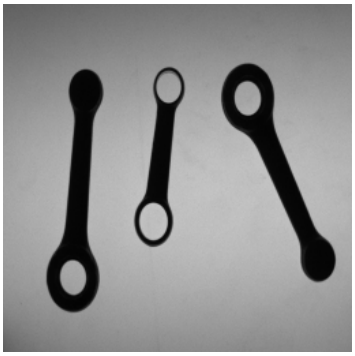

Figure 1.11: Input Image

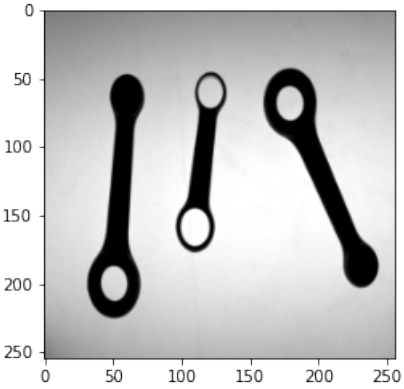

Figure 1.12: output linear stretched image

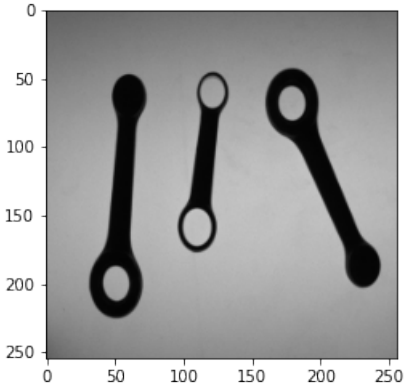

Figure 1.13: output filtered image

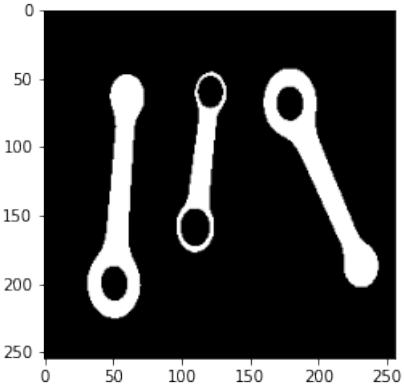

Figure 1.14: output binarized image

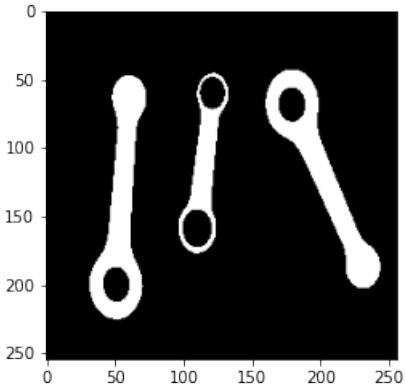

Figure 1.15: output binarized clean image

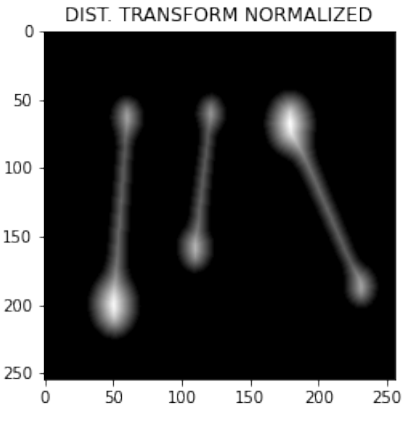

Figure 1.16: output distance transform normalized image

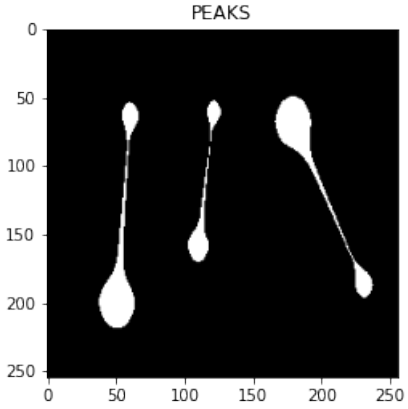

Figure 1.17: output thresholded image

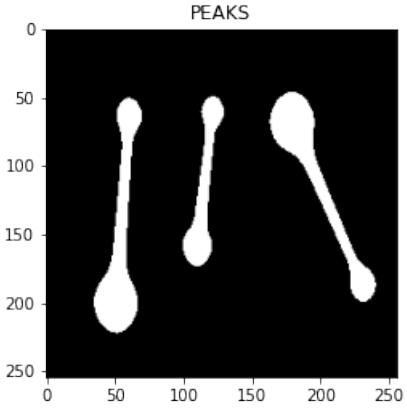

Figure 1.18: output watershed image

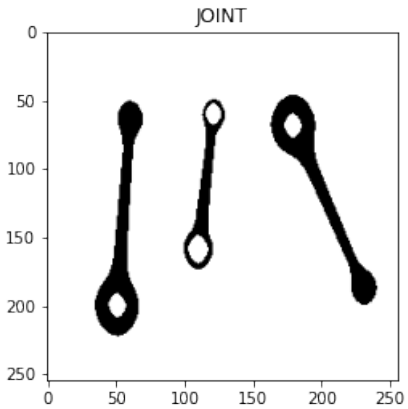

Figure 1.19: output before labeling image

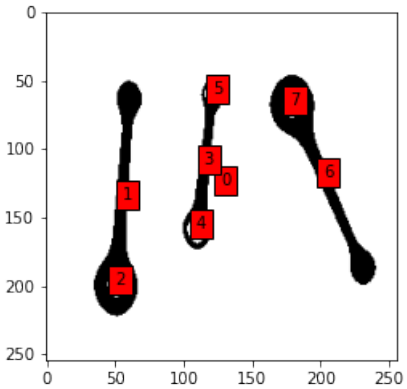

Figure 1.20: output final image

1.0.3 Image TESI12

Figure 1.21: Input Image

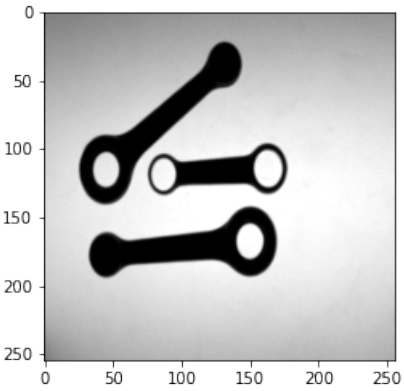

Figure 1.22: output linear stretched image

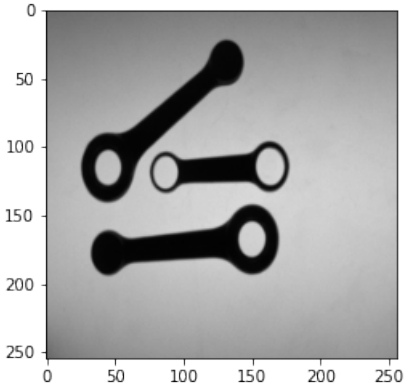

Figure 1.23: output filtered image

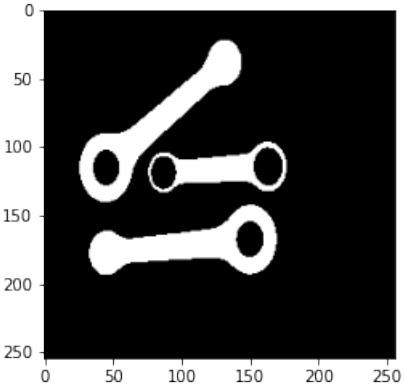

Figure 1.24: output binarized image

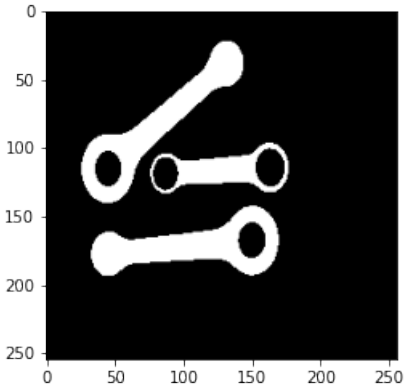

Figure 1.25: output binarized clean image

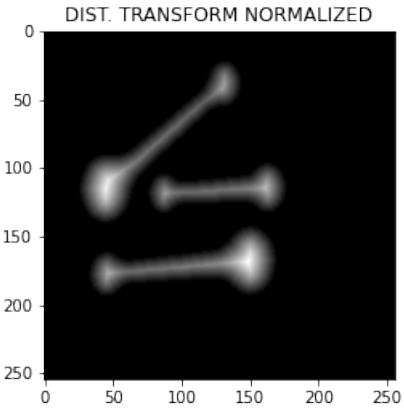

Figure 1.26: output distance transform normalized image

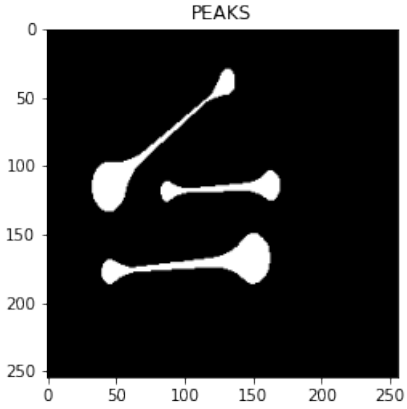

Figure 1.27: output thresholded image

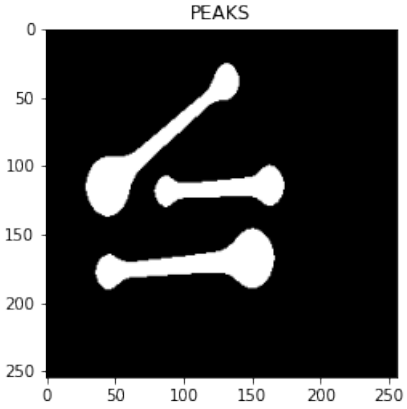

Figure 1.28: output watershed image

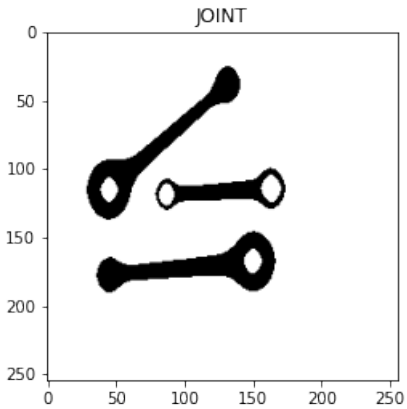

Figure 1.29: output before labeling image

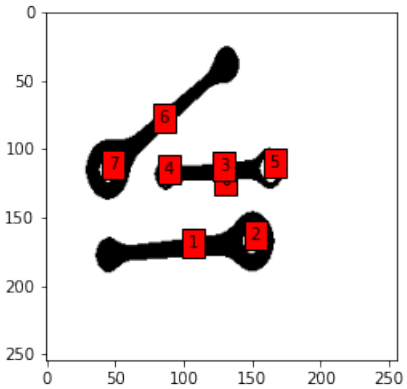

Figure 1.30: output final image

1.0.4 Image TESI21

Figure 1.31: Input Image

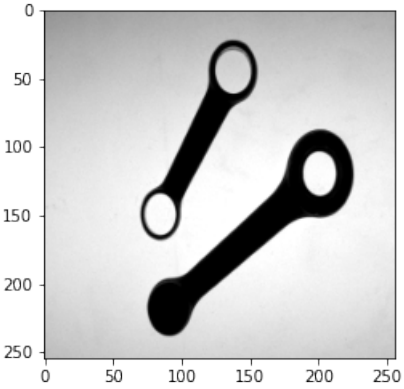

Figure 1.32: output linear stretched image

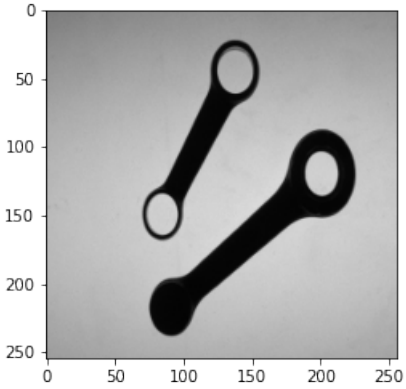

Figure 1.33: output filtered image

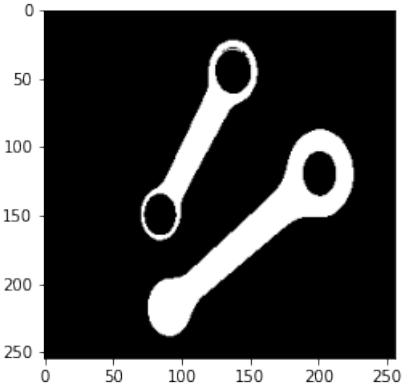

Figure 1.34: output binarized image

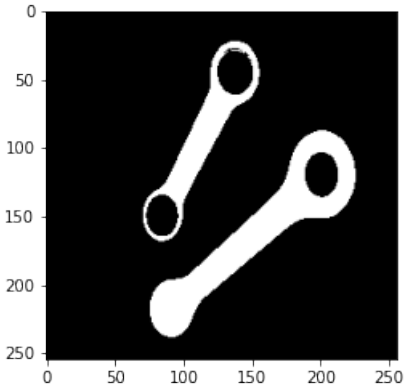

Figure 1.35: output binarized clean image

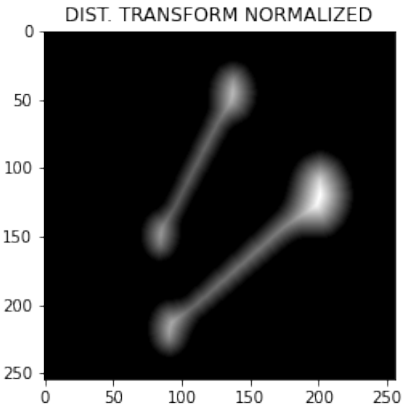

Figure 1.36: output distance transform normalized image

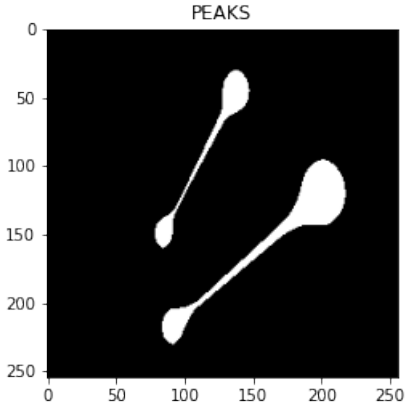

Figure 1.37: output thresholded image

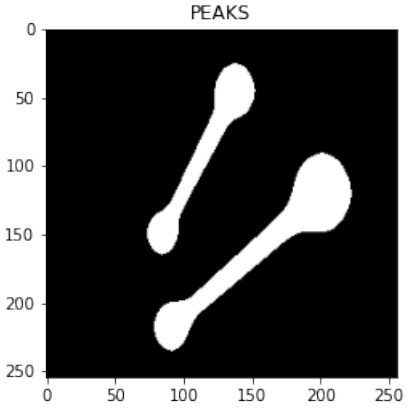

Figure 1.38: output watershed image

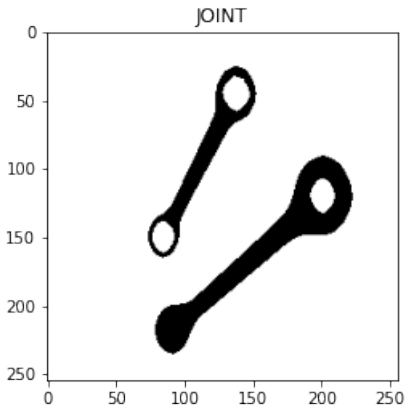

Figure 1.39: output before labeling image

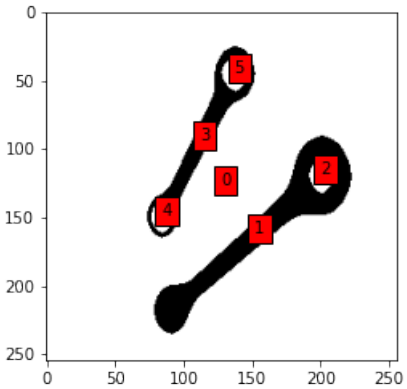

Figure 1.40: output final image

1.0.5 Image TESI31

Figure 1.41: Input Image

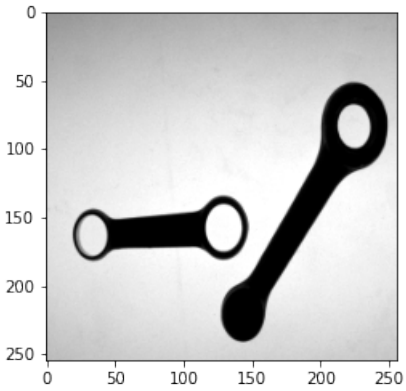

Figure 1.42: output linear stretched image

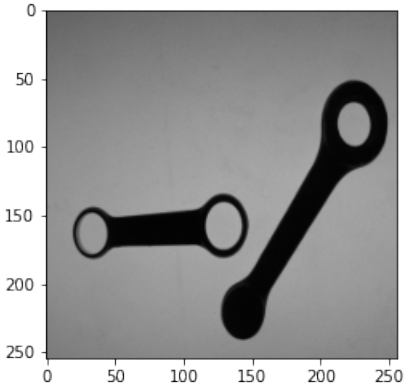

Figure 1.43: output filtered image

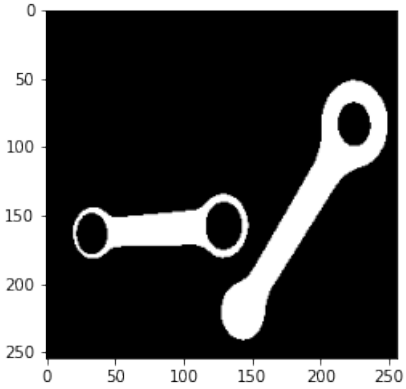

Figure 1.44: output binarized image

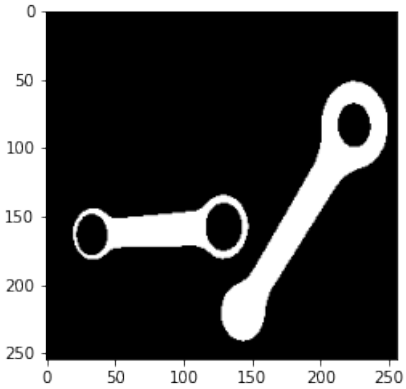

Figure 1.45: output binarized clean image

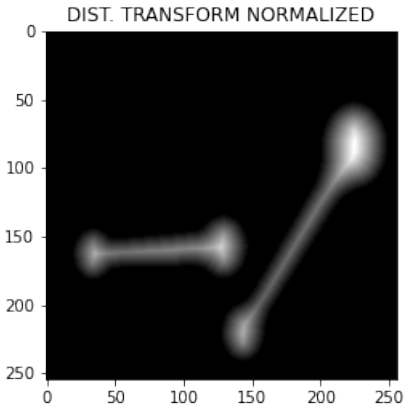

Figure 1.46: output distance transform normalized image

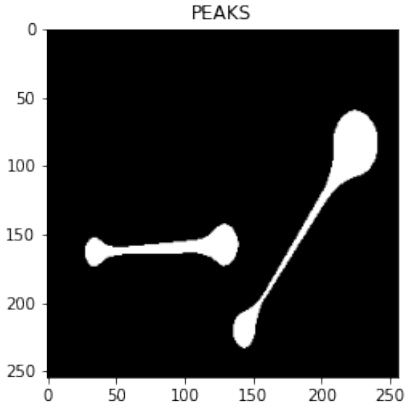

Figure 1.47: output thresholded image

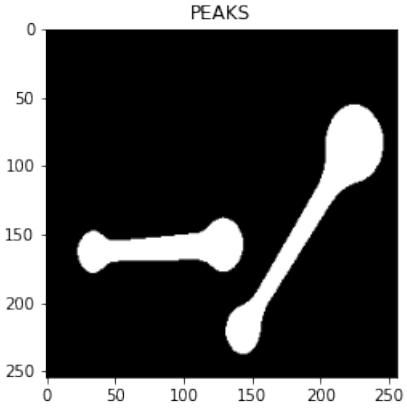

Figure 1.48: output watershed image

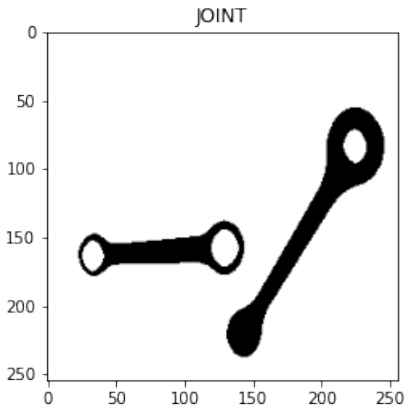

Figure 1.49: output before labeling image

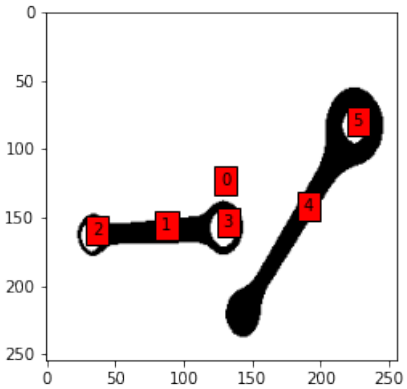

Figure 1.50: output final image

1.0.6 Image TESI33

Figure 1.51: Input Image

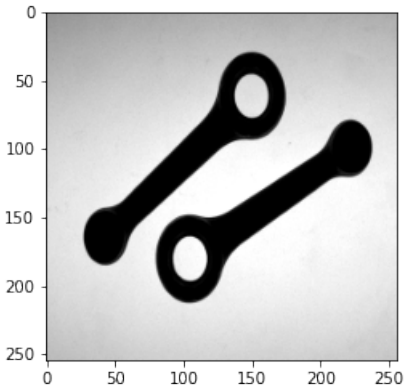

Figure 1.52: output linear stretched image

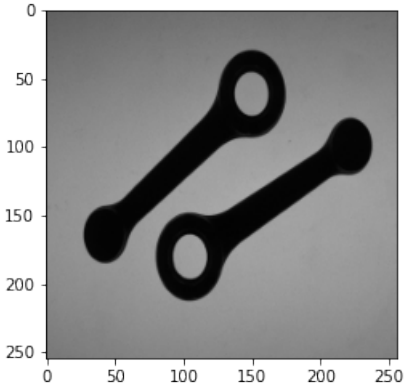

Figure 1.53: output filtered image

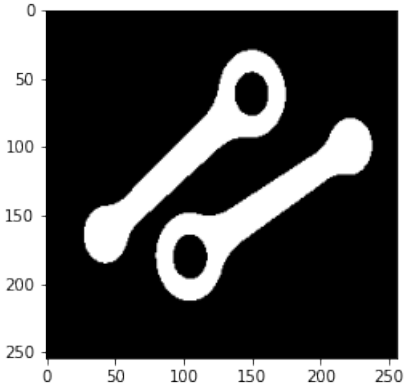

Figure 1.54: output binarized image

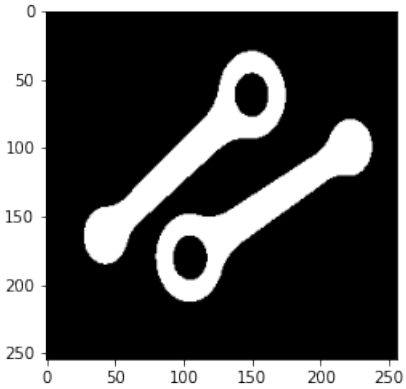

Figure 1.55: output binarized clean image

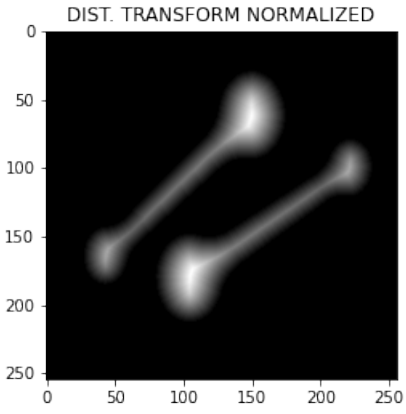

Figure 1.56: output distance transform normalized image

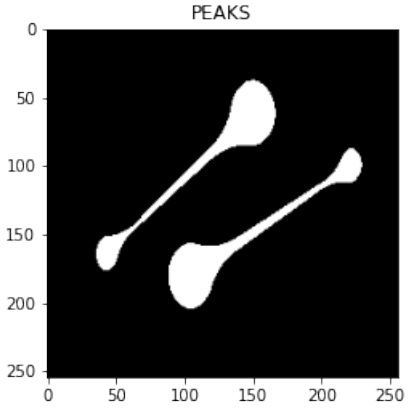

Figure 1.57: output thresholded image

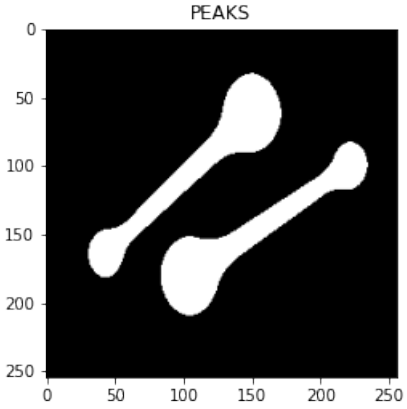

Figure 1.58: output watershed image

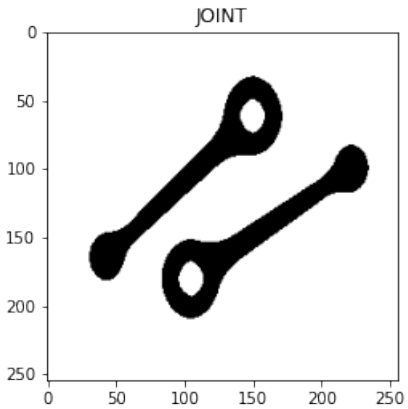

Figure 1.59: output before labeling image

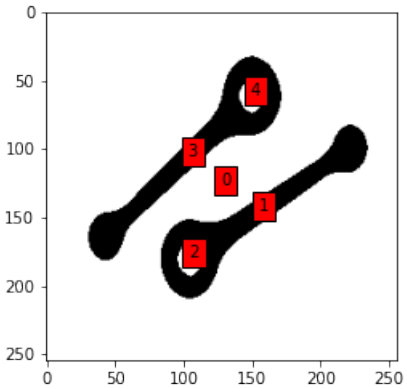

Figure 1.60: output final image

1.0.7 Image TESI44 with WASHER

Figure 1.61: Input Image

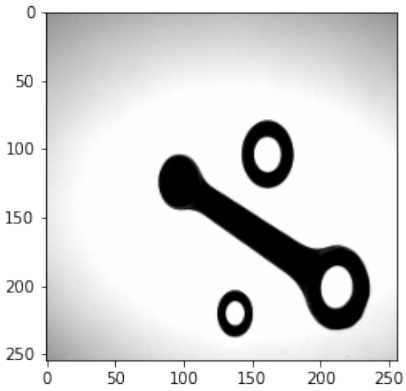

Figure 1.62: output linear stretched image

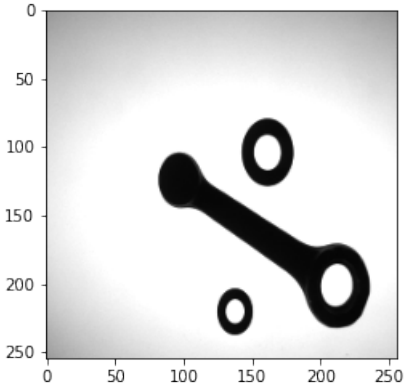

Figure 1.63: output filtered image

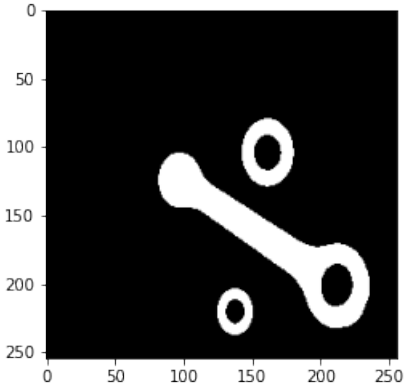

Figure 1.64: output binarized image

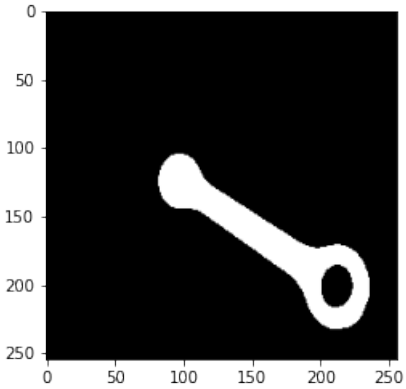

Figure 1.65: output binarized clean image

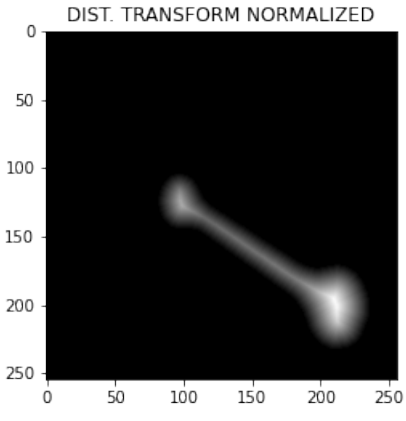

Figure 1.66: output distance transform normalized image

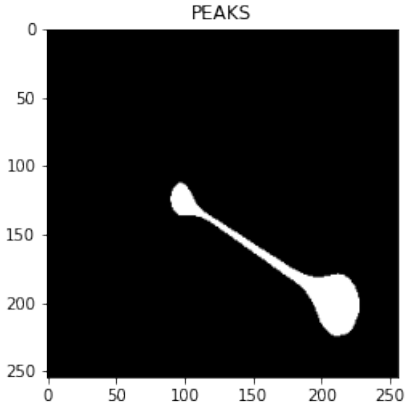

Figure 1.67: output thresholded image

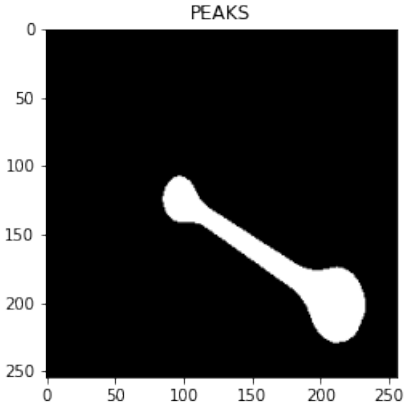

Figure 1.68: output watershed image

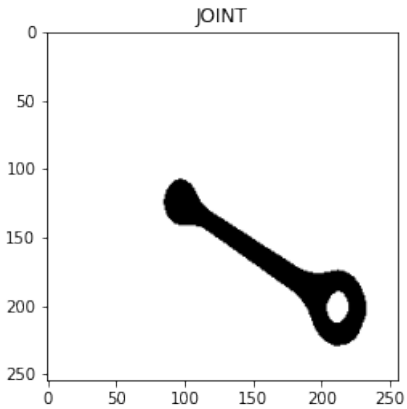

Figure 1.69: output before labeling image

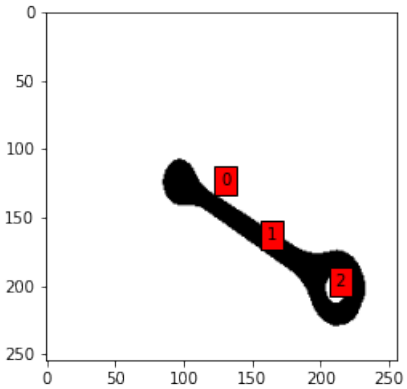

Figure 1.70: output final image

1.0.8 Image TESI47 with WASHER

Figure 1.71: Input Image

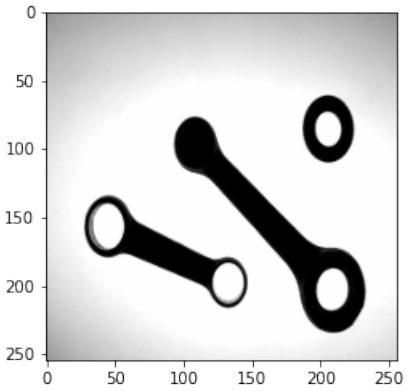

Figure 1.72: output linear stretched image

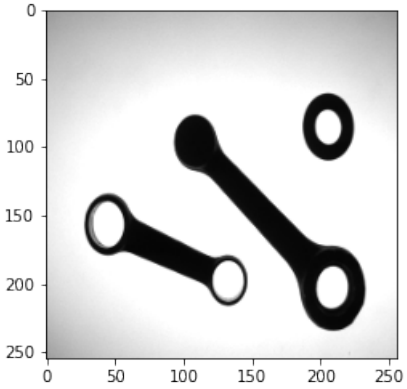

Figure 1.73: output filtered image

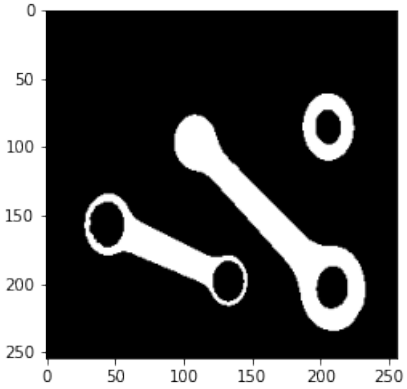

Figure 1.74: output binarized image

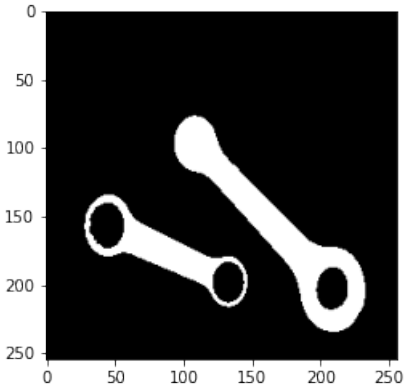

Figure 1.75: output binarized clean image

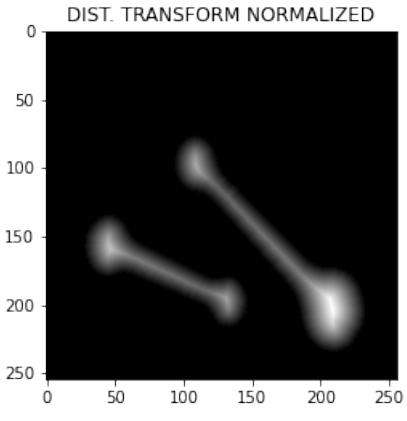

Figure 1.76: output distance transform normalized image

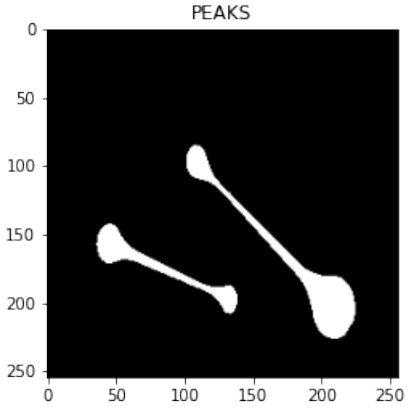

Figure 1.77: output thresholded image

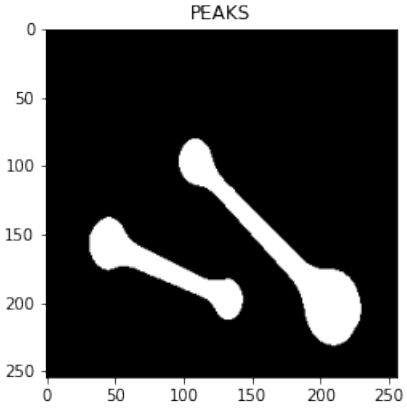

Figure 1.78: output watershed image

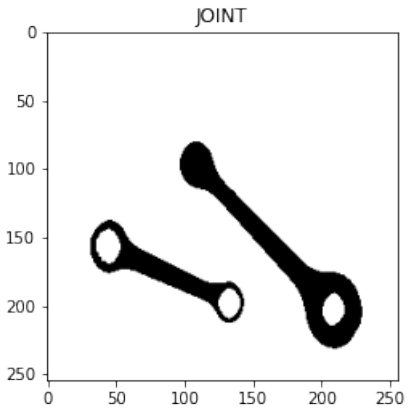

Figure 1.79: output before labeling image

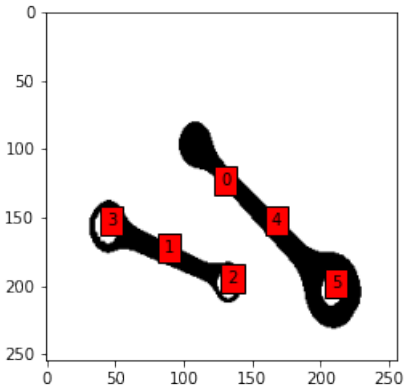

Figure 1.80: output final image

1.0.9 Image TESI48 with SCREW

Figure 1.81: Input Image

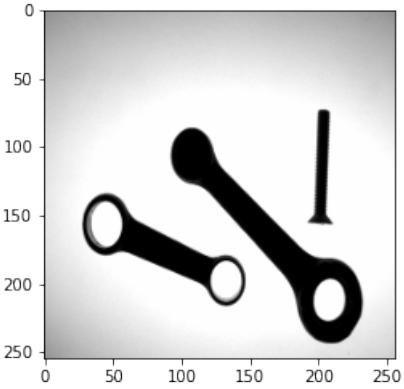

Figure 1.82: output linear stretched image

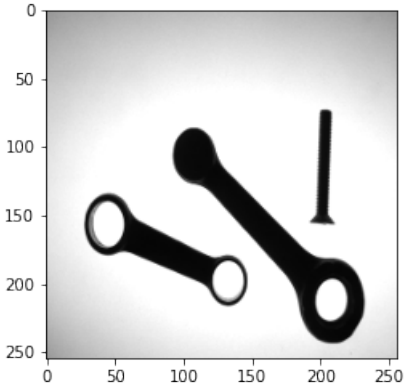

Figure 1.83: output filtered image

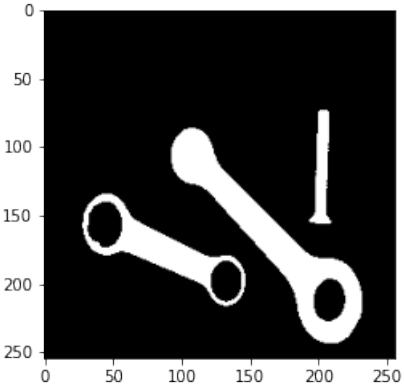

Figure 1.84: output binarized image

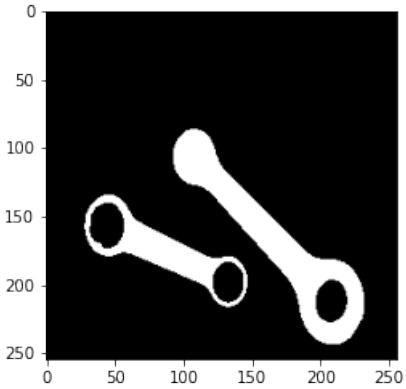

Figure 1.85: output binarized clean image

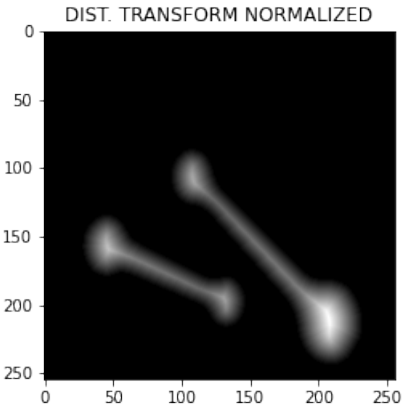

Figure 1.86: output distance transform normalized image

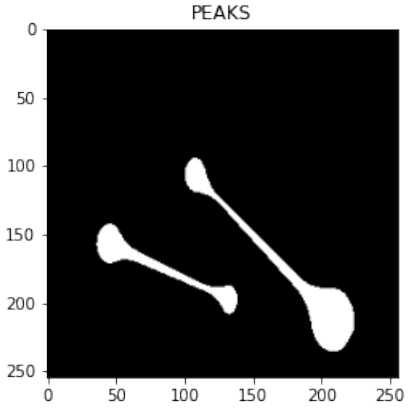

Figure 1.87: output thresholded image

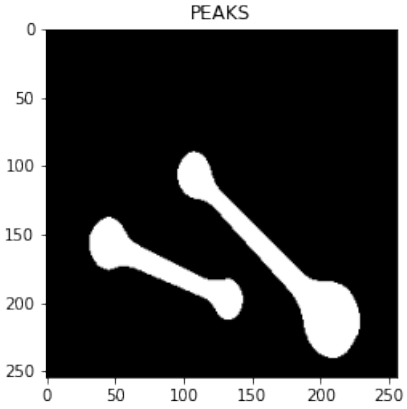

Figure 1.88: output watershed image

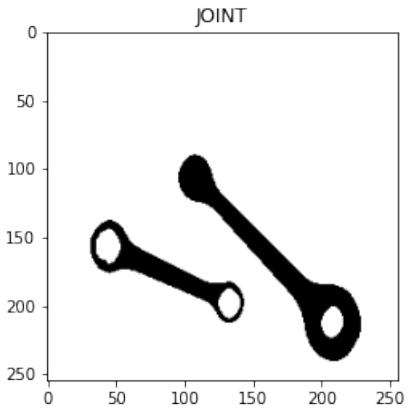

Figure 1.89: output before labeling image

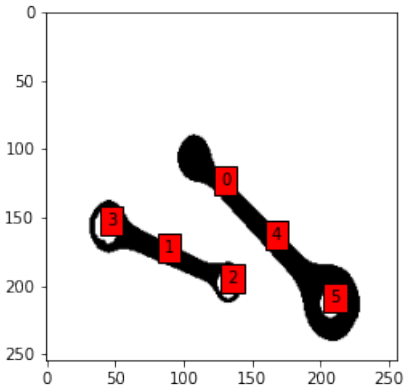

Figure 1.90: output final image

1.0.10 Image TESI49 with SCREW and WASHER

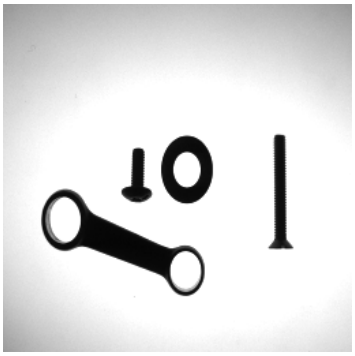

Figure 1.91: Input Image

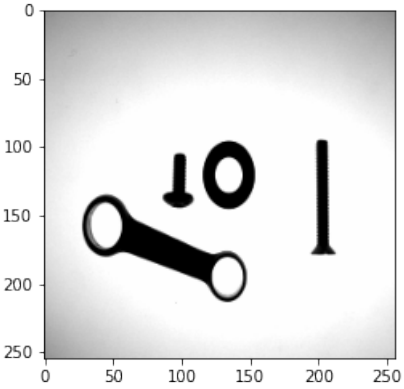

Figure 1.92: output linear stretched image

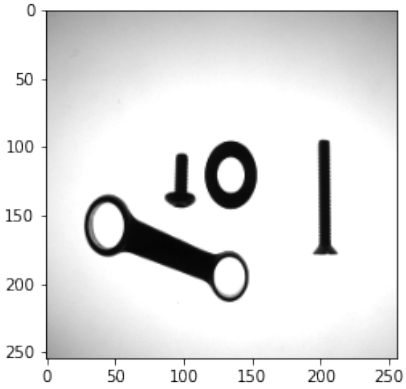

Figure 1.93: output filtered image

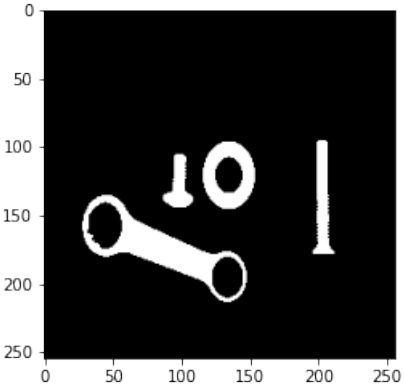

Figure 1.94: output binarized image

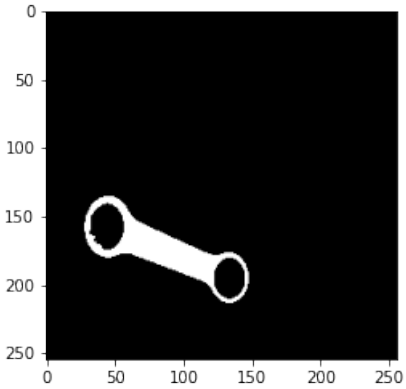

Figure 1.95: output binarized clean image

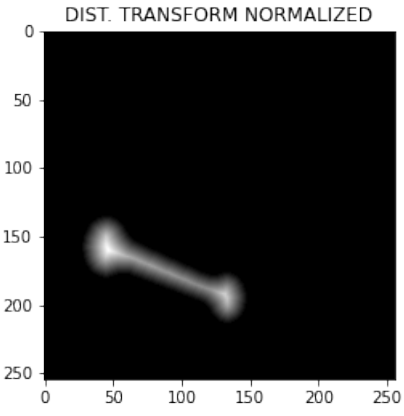

Figure 1.96: output distance transform normalized image

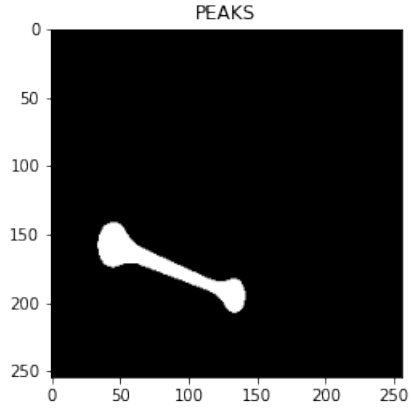

Figure 1.97: output thresholded image

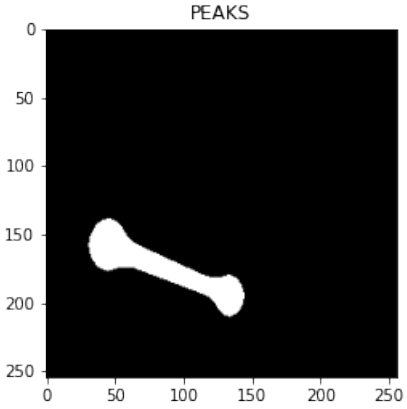

Figure 1.98: output watershed image

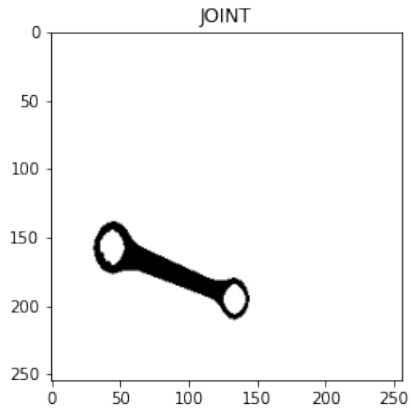

Figure 1.99: output before labeling image

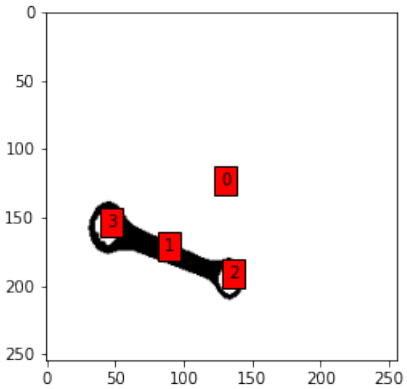

Figure 1.100: output final image

Chapter 2

Images with Connected Components

2.0.1 Image TESI50

Figure 2.1: Input Image

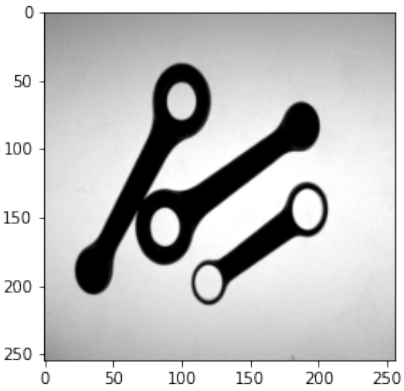

Figure 2.2: output linear stretched image

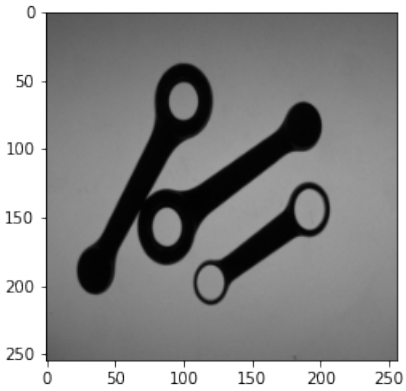

Figure 2.3: output filtered image

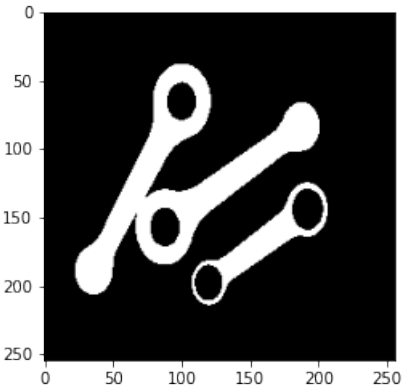

Figure 2.4: output binarized image

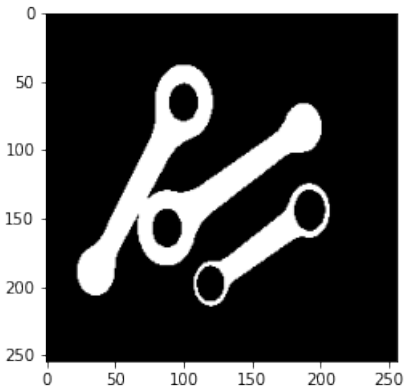

Figure 2.5: output binarized clean image

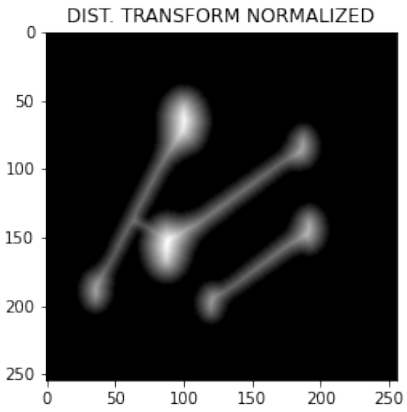

Figure 2.6: output distance transform normalized image

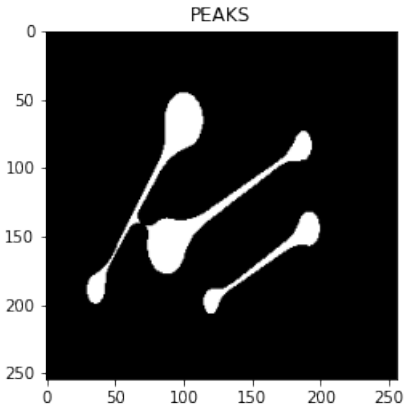

Figure 2.7: output thresholded image

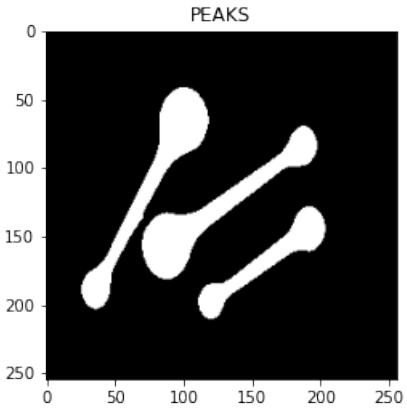

Figure 2.8: output watershed image

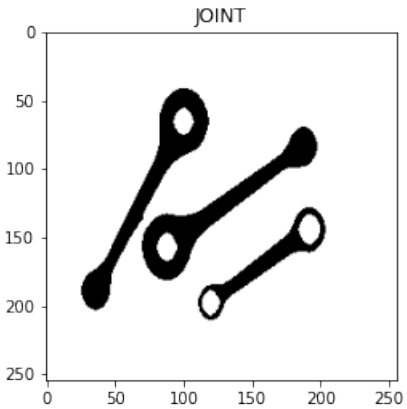

Figure 2.9: output before labeling image

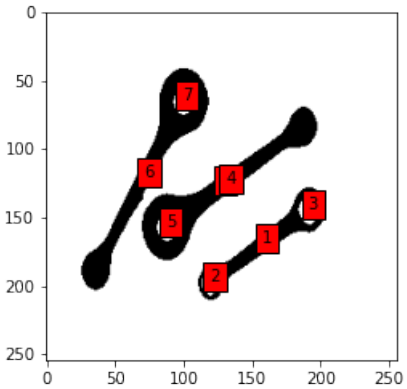

Figure 2.10: output final image

2.0.2 Image TESI51

Figure 2.11: Input Image

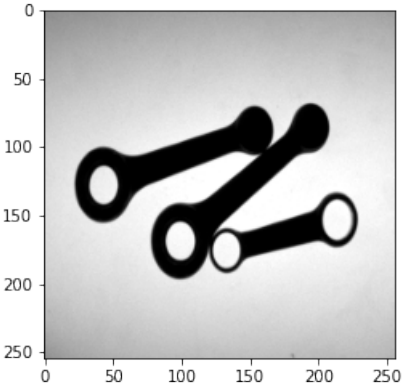

Figure 2.12: output linear stretched image

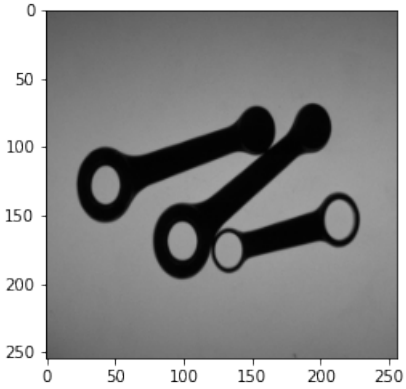

Figure 2.13: output filtered image

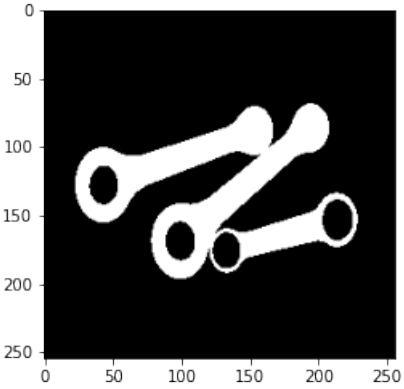

Figure 2.14: output binarized image

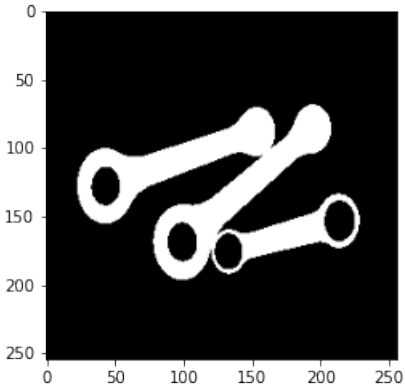

Figure 2.15: output binarized clean image

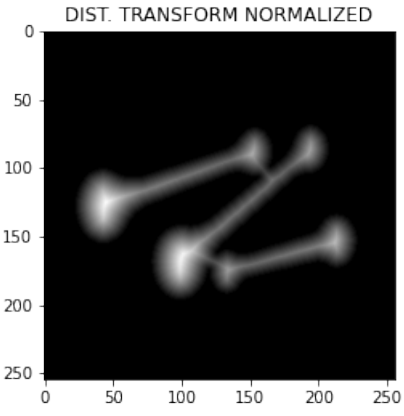

Figure 2.16: output distance transform normalized image

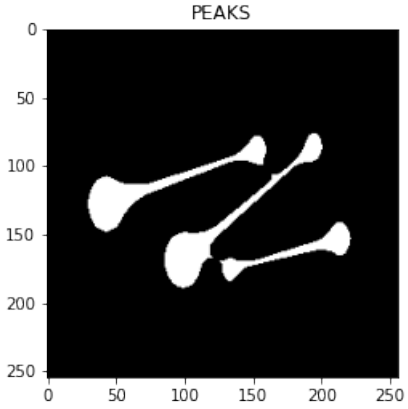

Figure 2.17: output thresholded image

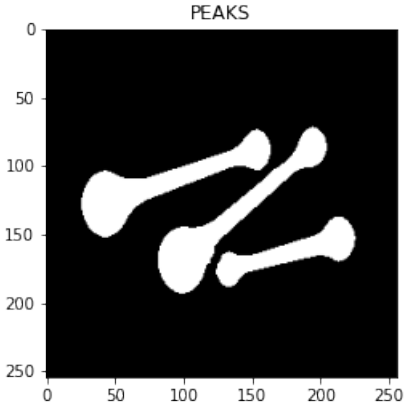

Figure 2.18: output watershed image

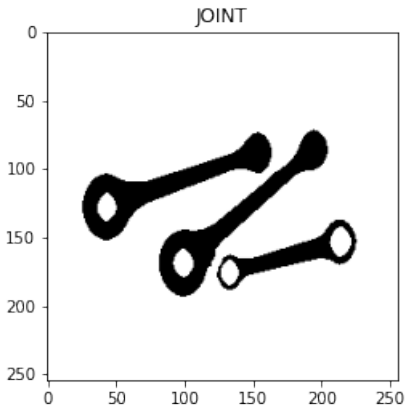

Figure 2.19: output before labeling image

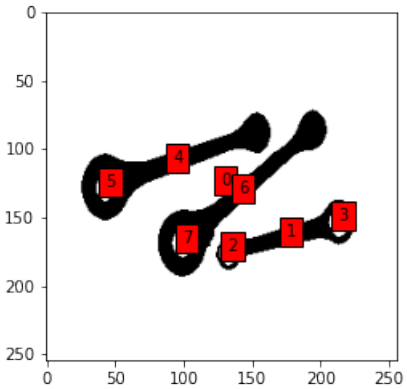

Figure 2.20: output final image

Chapter 3

Images with Powders

3.0.1 Image TESI90

Figure 3.1: Input Image

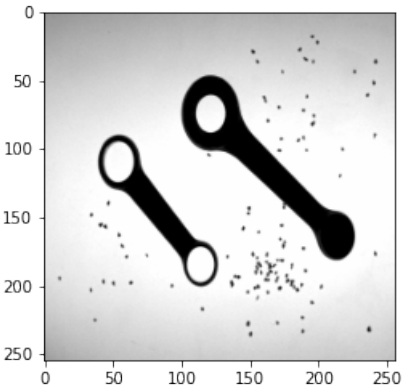

Figure 3.2: output linear stretched image

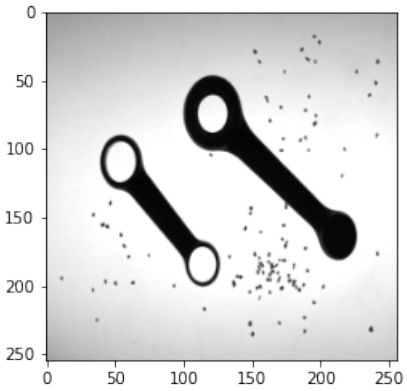

Figure 3.3: output filtered image

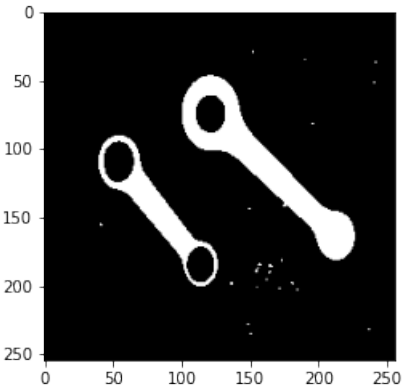

Figure 3.4: output binarized image

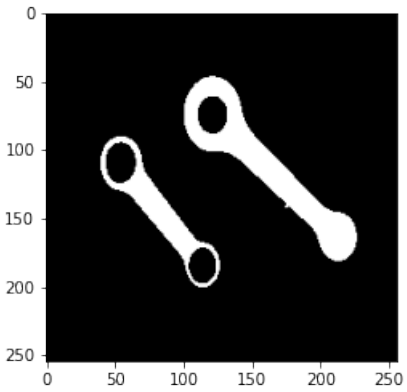

Figure 3.5: output binarized clean image

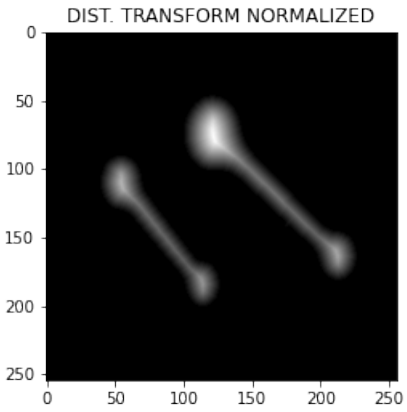

Figure 3.6: output distance transform normalized image

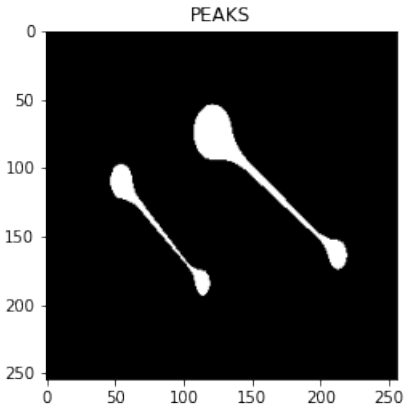

Figure 3.7: output thresholded image

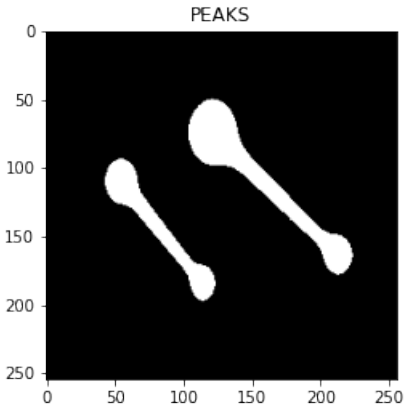

Figure 3.8: output watershed image

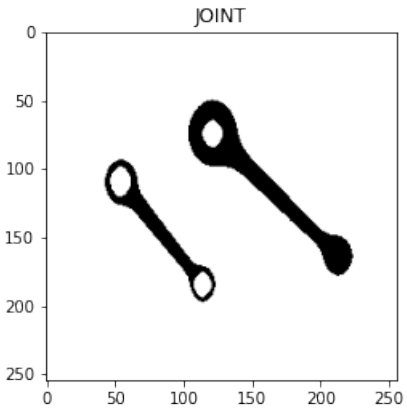

Figure 3.9: output before labeling image

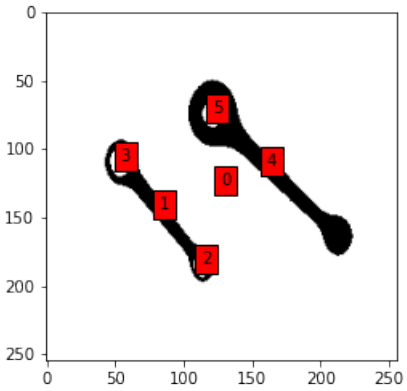

Figure 3.10: output final image

3.0.2 Image TESI92

Figure 3.11: Input Image

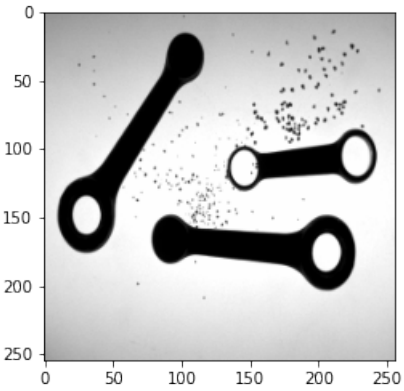

Figure 3.12: output linear stretched image

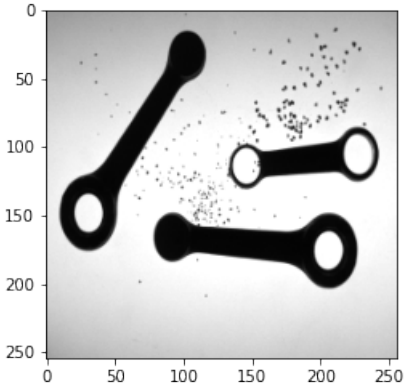

Figure 3.13: output filtered image

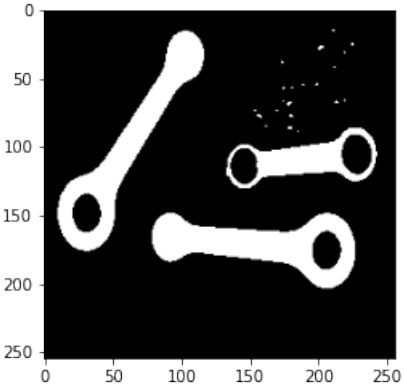

Figure 3.14: output binarized image

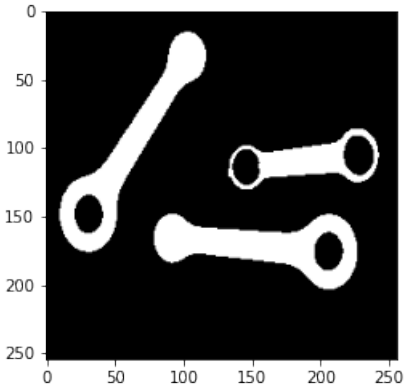

Figure 3.15: output binarized clean image

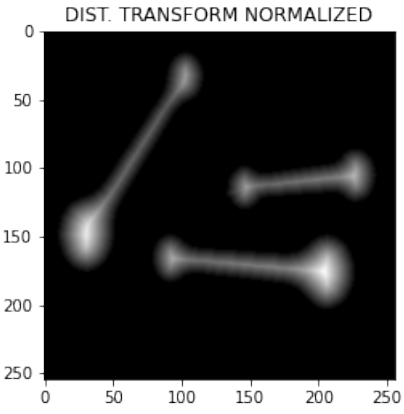

Figure 3.16: output distance transform normalized image

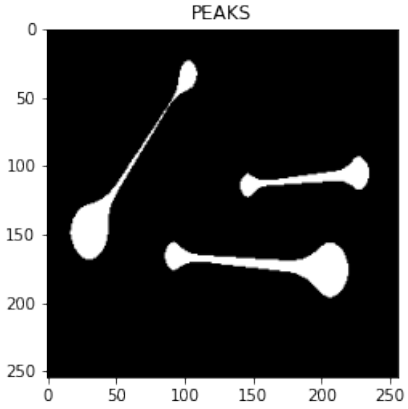

Figure 3.17: output thresholded image

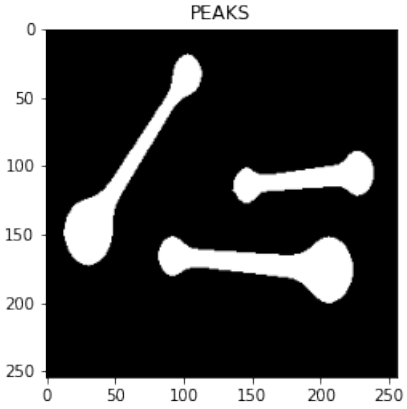

Figure 3.18: output watershed image

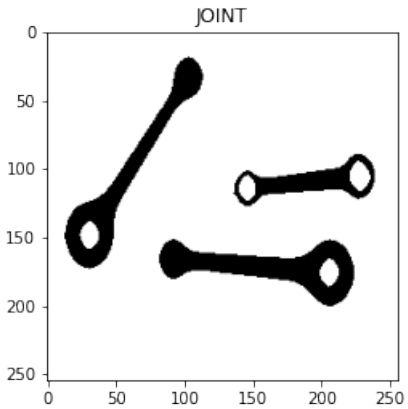

Figure 3.19: output before labeling image

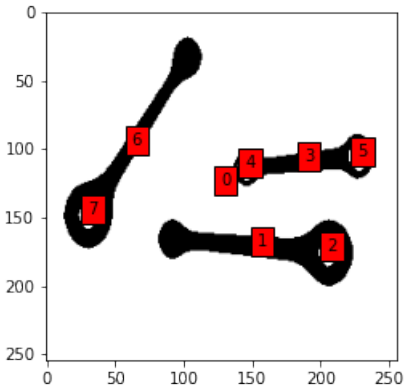

Figure 3.20: output final image

3.0.3 Image TESI98

Figure 3.21: Input Image

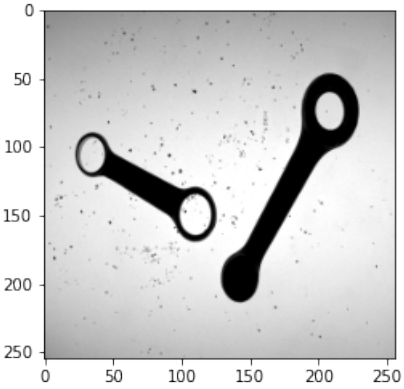

Figure 3.22: output linear stretched image

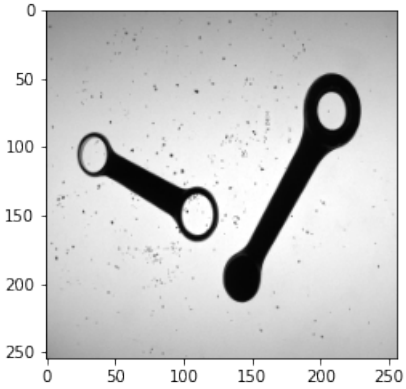

Figure 3.23: output filtered image

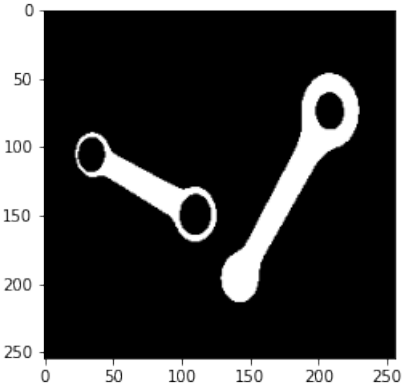

Figure 3.24: output binarized image

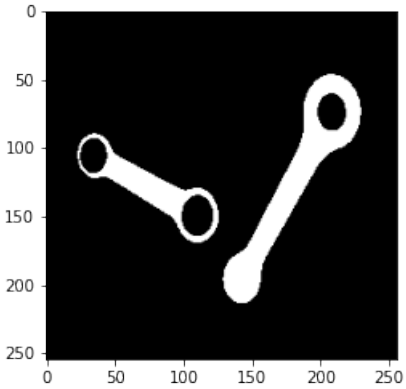

Figure 3.25: output binarized clean image

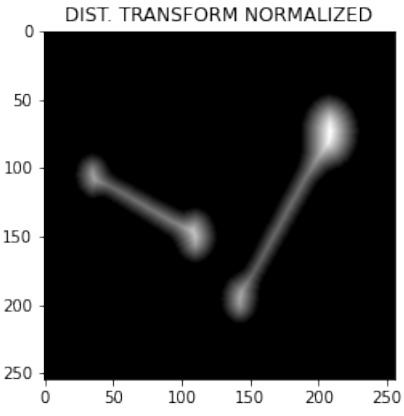

Figure 3.26: output distance transform normalized image

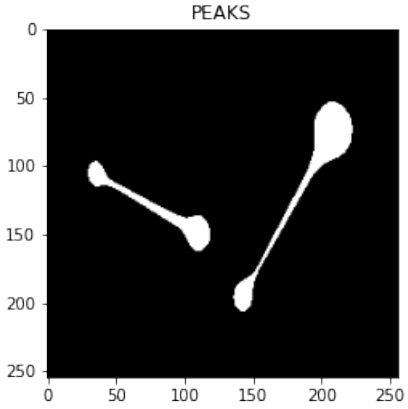

Figure 3.27: output thresholded image

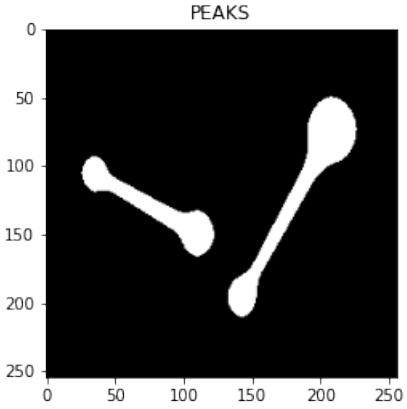

Figure 3.28: output watershed image

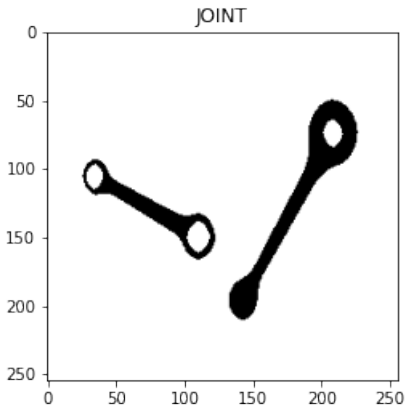

Figure 3.29: output before labeling image

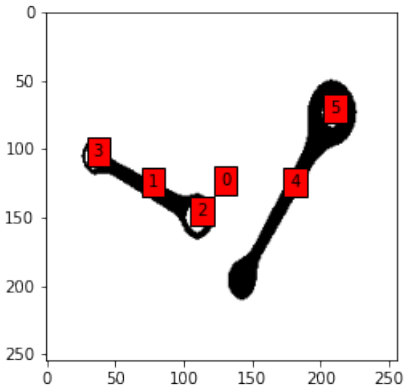

Figure 3.30: output final image