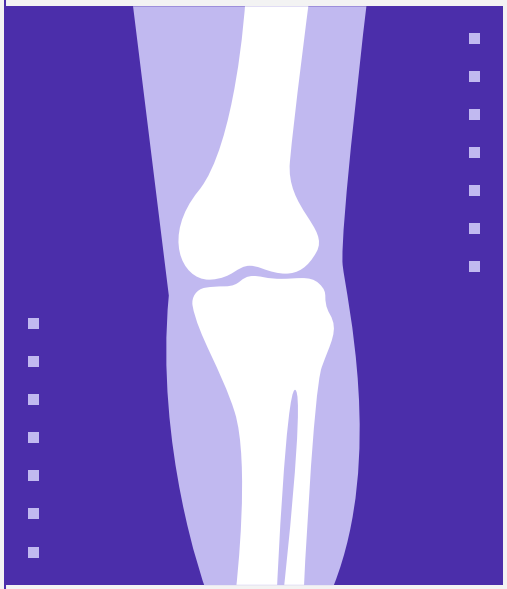
MIDTERM



BONES DETECTION

Image Processing

Jacopo Caratti and Cyrill Rohrbach

TABLE OF CONTENTS

1 PROBLEMATIC

SOURCE

Segment bones in the given hand radiography images

MAGIC

OUTPUT

DATASET

Red line

Obtain a single line as segment

Hand contour

Don’t segment hand, only bones

Noise

Noise can be missclassified as edges

SOURCE

CHALLENGES

OUTPUT

2

IDEA

Binarization

Remove hand contour

Sharpen

Enhance edges

Blur

Remove noise

Enhance contrast

Some bones cannot easily be detected

Edge detection

Get the edges of the bones

Canny

Edge detector

IDEA

- Gaussian filter
- Sobel filter
- Non-maximum suppression
- Double thresholding
- Hysteresis thresholding

Ca

Edge det

IDEA

suppression

ding

holding

Preprocessing

Butterworth High Pass Filter

Increase Contrast and tweak brightness

Otsu Binarization

Segmentation for homogenous bones

Butterworth High Pass

- Remove harsh border around the hand
  - Transform image into frequency spectrum
  - Apply some filter on the spectrum
  - Retransfrom into image

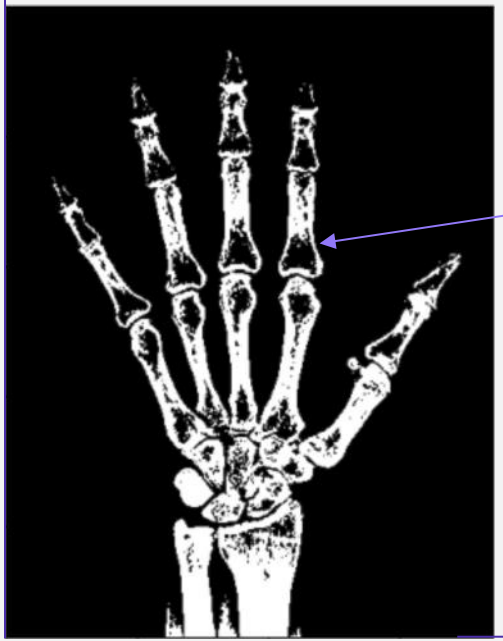
Contrast and Brightness

- Change contrast, brightness and darkness of the image to get rid of the flesh

Otsu Binarization

- Get rid of some more flesh

Segmentation and Filling

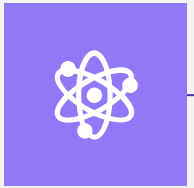


- Get rid of the black spots within the bones

Next steps

1

Figure out the final version of the preprocessing



Preprocessing

2

Adapt hyper parameters automatically for each image

Hyperparameters

3

Test the algorithm against the whole dataset

Testing

Thank you for the attention!

Please clap and don’t ask difficult questions

RESOURCES

IMAGES

- Provided radiography dataset

SLIDES

- This presentation template was created by Slidesgo, including icons by Flaticon, infographics & images by Freepik

INFORMATION

- Lecture slides
- Geeksforgeeks
- Wikipedia
- Opencv documentation
- A Comparison of X-Ray Image Segmentation Techniques