IEEE University of Porto - Student Branch

IEEE Robotics & Automation Society University of Porto

MATLAB | IMAGE ANALYSIS

IEEE UP Student Branch

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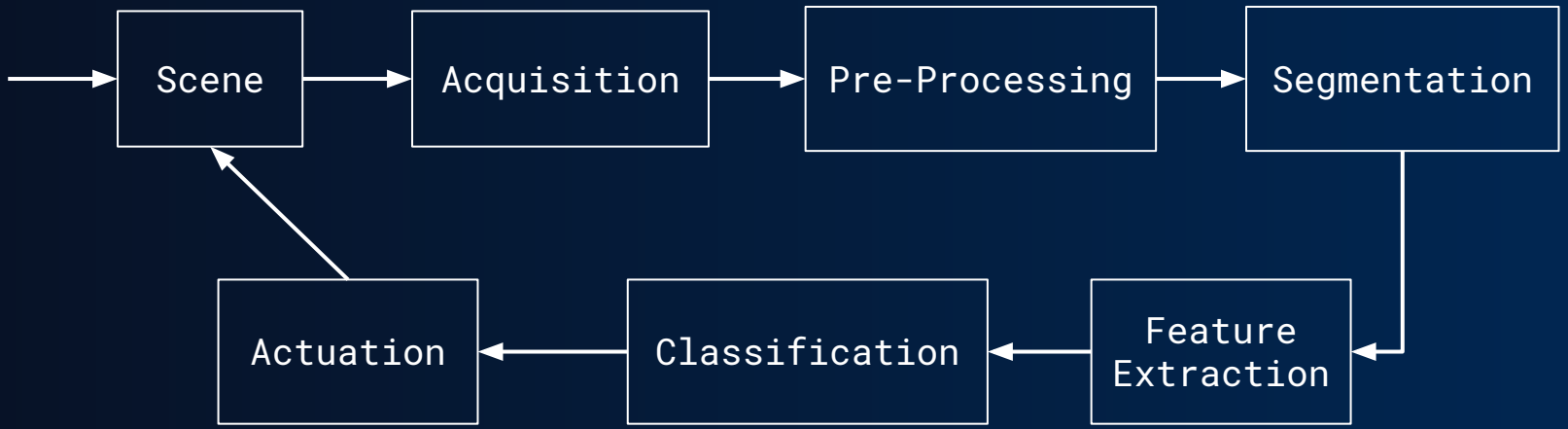
- INTRO TO IMAGE ANALYSIS
- THE 4 STAGES OF IMAGE ANALYSIS
- EXERCISES

https://paginas.fe.up.pt/~up201505595/WSMatlab/wsmatlab.html

COMPUTER VISION

VS

MACHINE VISION


Scene
Acquisition
Pre-Processing
Segmentation
Feature Extraction
Classification
Actuation

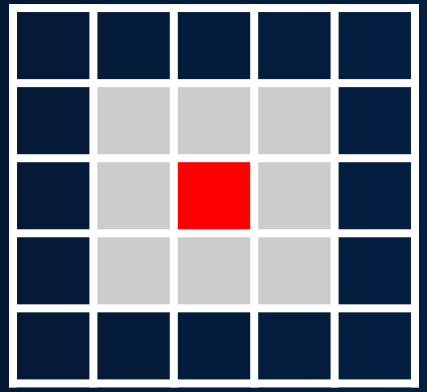
BEFORE WE BEGIN

- **Basic Functions**
  - imread()
  - imshow()
  - im2double()
  - imtool()
  - imhist()

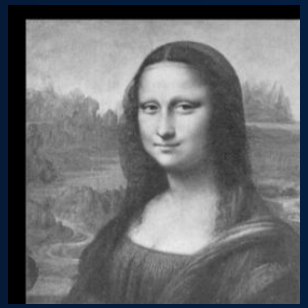
- **RGB and HSV**
  - rgb2hsv()
  - hsv2rgb()

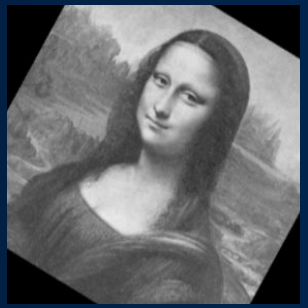
PRE - PROCESSING

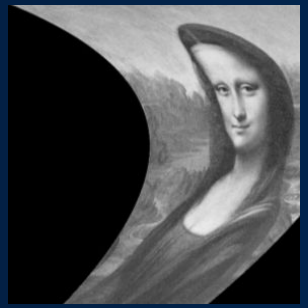
- Improvement of image data through noise reduction, removal of image artifacts or enhancement of relevant features
  - point
  - local
  - global



GEOMETRICAL TRANSFORMATIONS



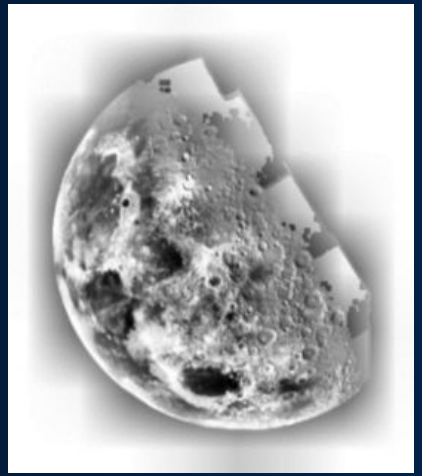




HISTOGRAM MODIFICATION

Original

HE



AHE

CLAHE

ARITHMETIC OPERATIONS

Take note. This might save you a few hours of work

FILTERS

- `imfilter()`
- `fspecial()`
- *And that's all you need to know*

MATHEMATICAL MORPHOLOGY

- strel()
- imerode()
- imdilate()
- imclose()
- imopen()
- bwhitmiss()
- bwareaopen()

SEGMENTATION

- **Segmentation divides an image into its constituent regions or objects**

AND WHAT IS A GOOD SEGMENTATION?

Depends of your objective

SIMILARITY SEGMENTATION

- thresholding or histogram-based
- clustering
- region

OR

DIFFERENCE SEGMENTATION

- edge-based
- point, line, edge and corner detection

** We'll focus on thresholding-based methods*

FEATURE EXTRACTION

First you label it. Then...

... REGIONPROPS TAKES CARE OF THE REST

QUESTIONS?