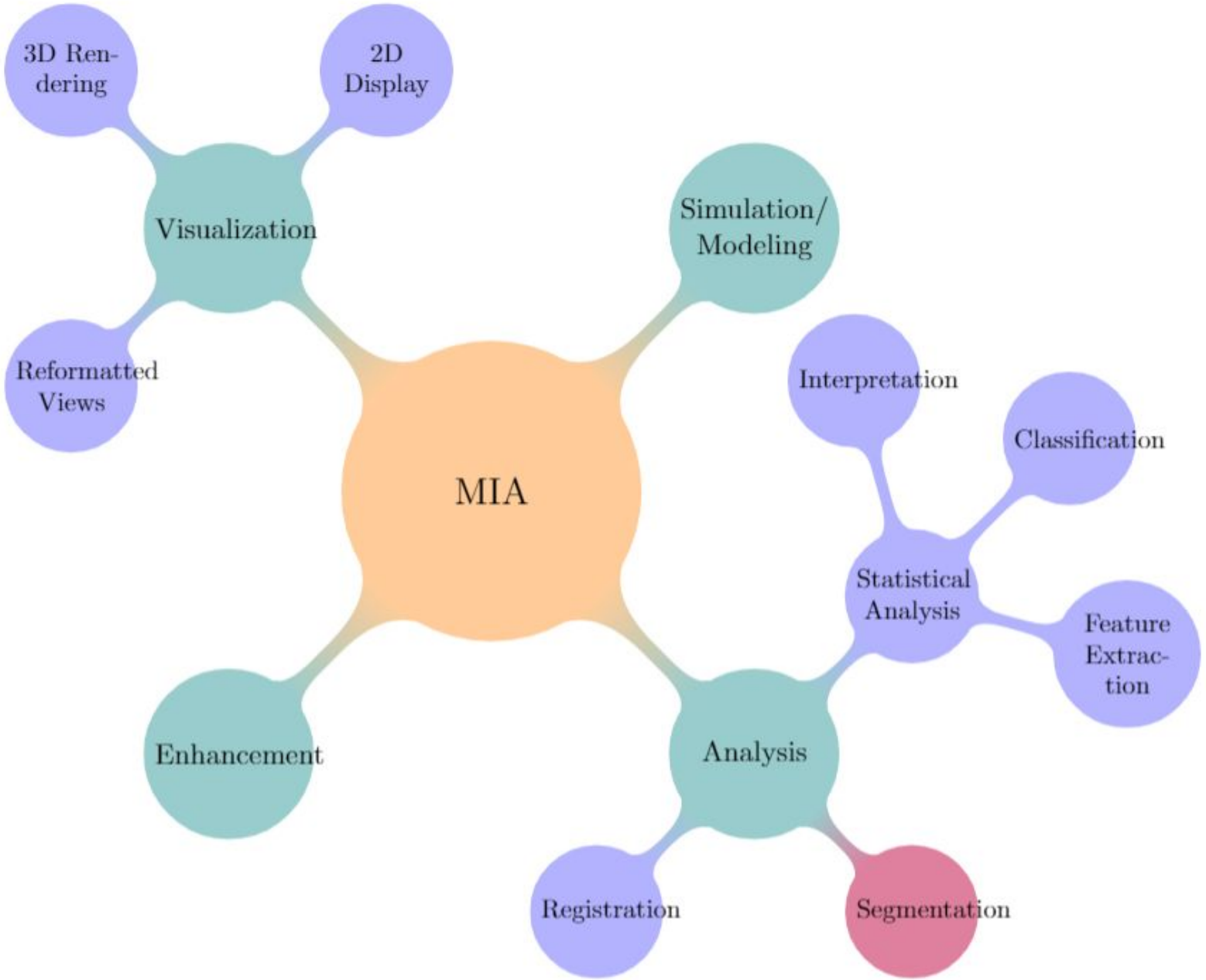
System VnV Plan

Ao Dong
Oct 2019



Major functions of MIA

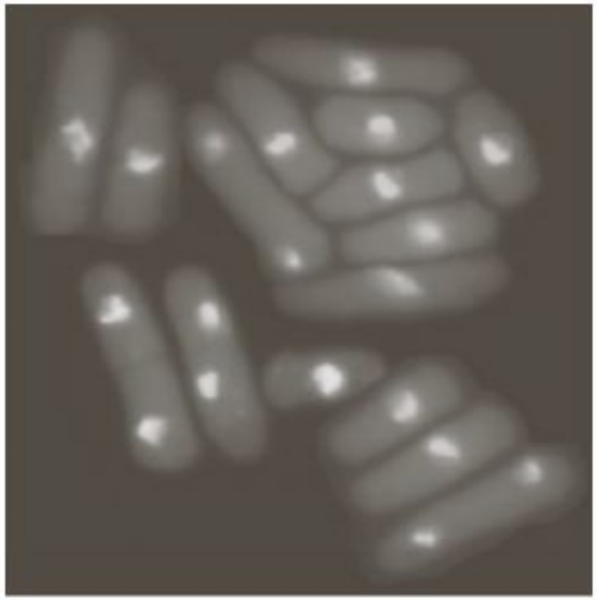
Generation	Category		
	Region-based	Boundary Following	Pixel Classification
1^{st}	• Region growing	• Edge tracing (heuristic)	• Intensity threshold
2^{nd}	• Deformable models • Graph search	• Minimal path • Target tracking • Graph search • Neural networks • Multiresolution	• Statistical pattern recognition • C-means clustering • Neural networks • Multiresolution
3^{rd}	• Shape models • Appearance models • Rule-based • Coupled surfaces		• Atlas-based • Rule-based

Segmentation Methods Withey and Koles (2007)

Single vs Multiple Threshold

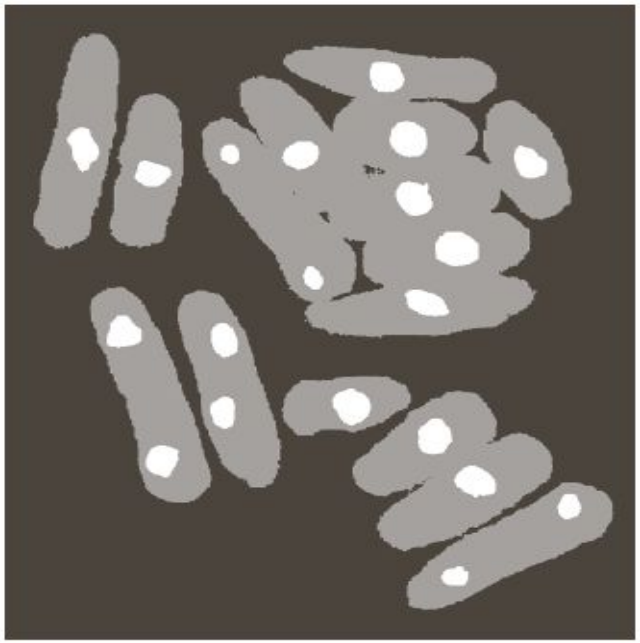
$G_{X \times Y}$, such that for pixel at each (x, y),

$$g(x,y) = \begin{cases} 255, & if\ f(x,y) > k^\star \\ 0, & if\ f(x,y) \leq k^\star \end{cases}$$



$G_{X \times Y}$, such that for pixel at each (x, y),

$$g(x,y) = \begin{cases} 255, & if\ f(x,y) > k_2^\star \\ 128, & if\ k_1^\star < f(x,y) \leq k_2^\star \\ 0, & if\ f(x,y) \leq k_1^\star \end{cases}$$



Tests for functional requirements

R1: MIA shall verify that the input data are valid. A valid input image must be 2D 12-bit or 16-bit grayscale DICOM image. An error message shall be displayed if input data are invalid.

R2: MIA shall guarantee that the output file is the same pixel size as the input file.

R3: MIA shall provide correct calculate according to Instance Models according to the user's choice of which method to use, single or multiple global thresholds. MIA shall also display the correct optimal threshold value(s) $k^\star$ or $k_1^\star$ and $k_2^\star$ accordingly.

R4: MIA shall verify that the output image must be 2D 8-bit grayscale image and the pixel format must be the byte image, where the feature value must be the gray intensity value stored as an 8-bit integer giving a range of possible values from 0 to 255.

R5: MIA shall output segmentation image.

Tests for functional requirements

R	Test	Test cases
R1	5.1.1 Input verification	1. Invalid filename extensions 2. Invalid file format 3. Valid input file
R3	5.1.2 Calculation	1. Display single threshold value 2. Display double threshold values
R5	5.1.3 Output	1. Existence of output file
R2, R4	5.1.4 Output verification	1. Valid file format of output file 2. Correctness of output file