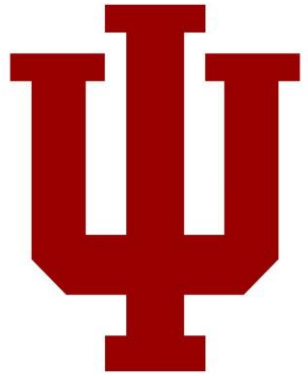


Calculating Tumor and Necrotic Radius From Images

Furkan Kurtoglu

@FkurtogluSysBio

Image Processing

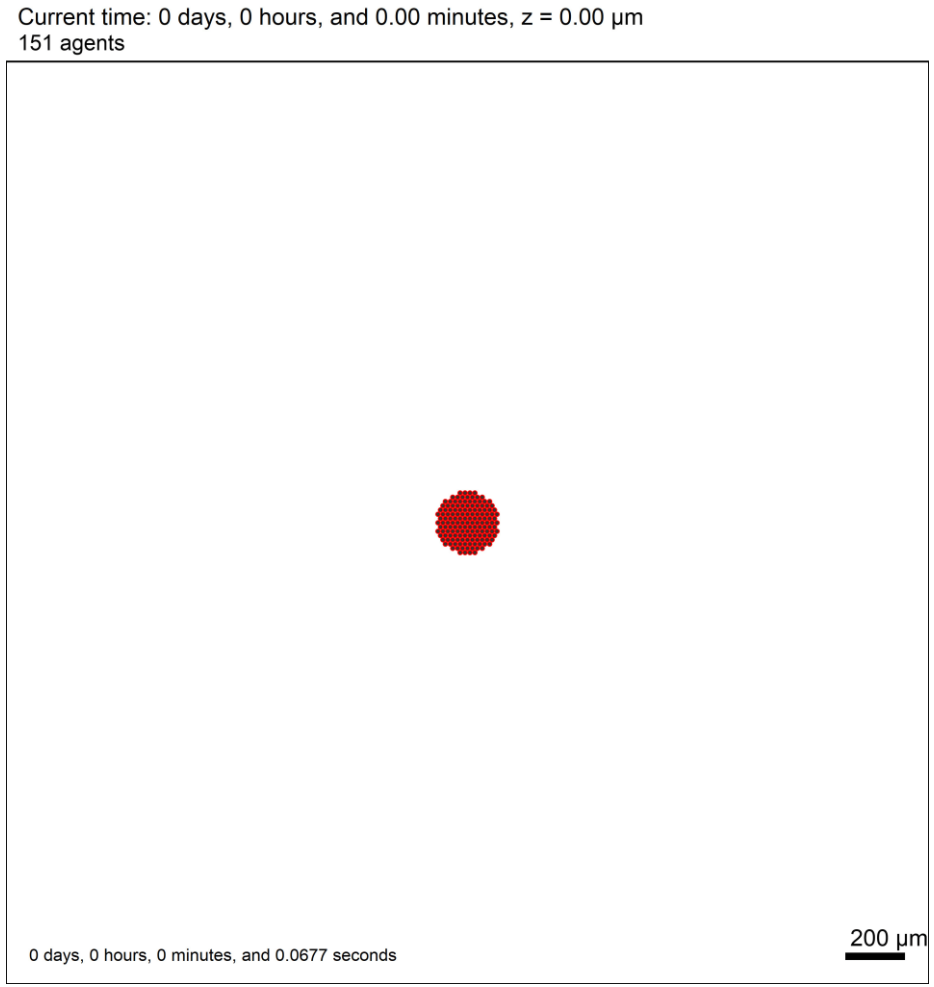
5/1/2019

Outline

- Introduction
  - Biological Background (Very Short)
  - Problem Definition
- Methods
  - Work Flow
- Results
  - Demo
- Future Works

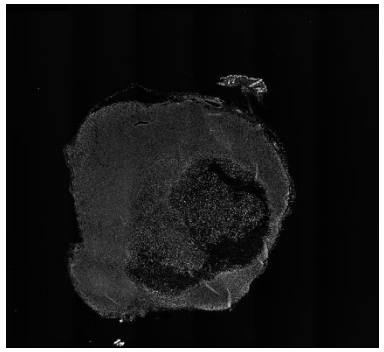
Introduction - Biological Background

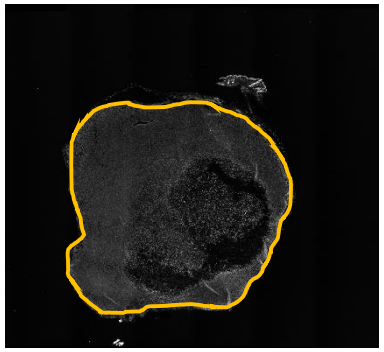
- Tumor radius is increasing by time because it’s growing.
- Cells in tumor uses oxygen to grow.
- However, tumor is killing vasculature which supplies oxygen to the environment.
- Therefore, in the middle of tumor, oxygen is depleted by tumor cells.
- Hence, the middle cells are dying due to lack of oxygen.



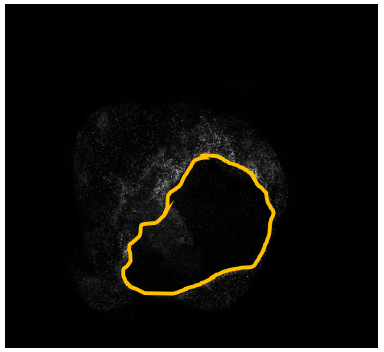
Introduction - Problem Definition

- Simulating by time and producing simulation results
- Calculating Tumor Radius and Necrotic Radius from simulation images for each time step.
- This results will be used to calibrate our Model Parameters to be consisted with experimental results.

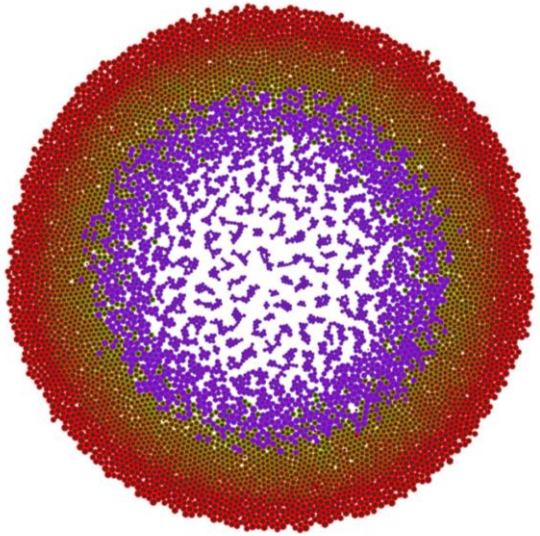


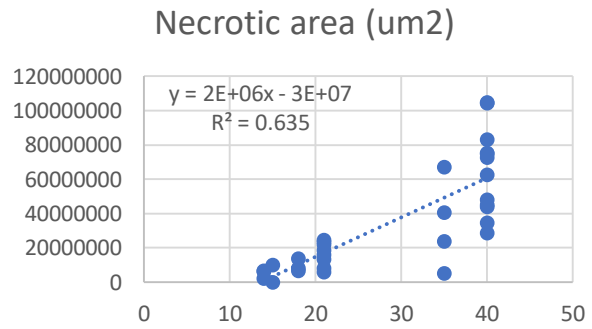


Tumor area



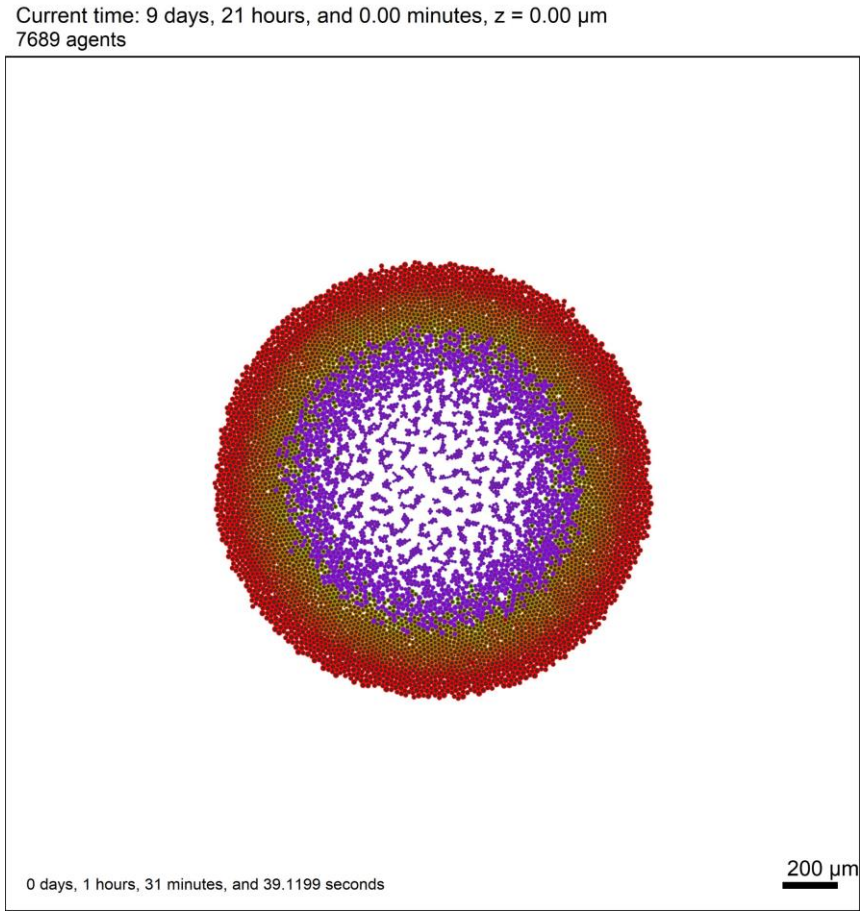
Necrotic area

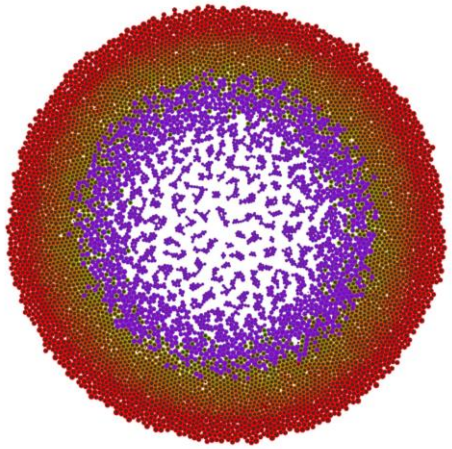




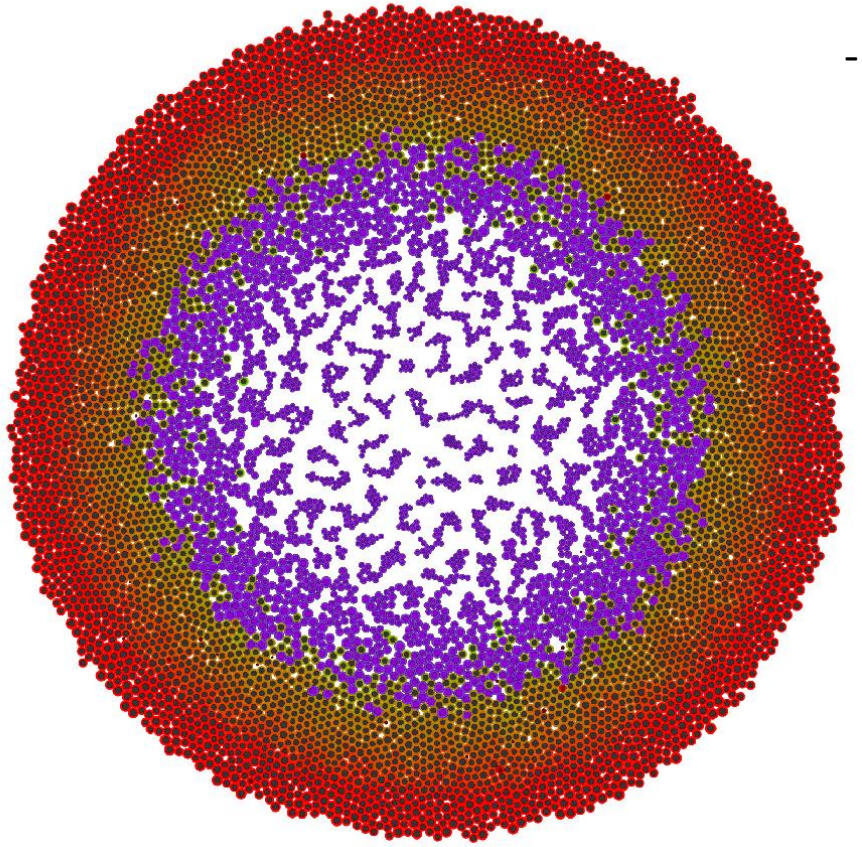
Methods - Work Flow

Methods - Croping

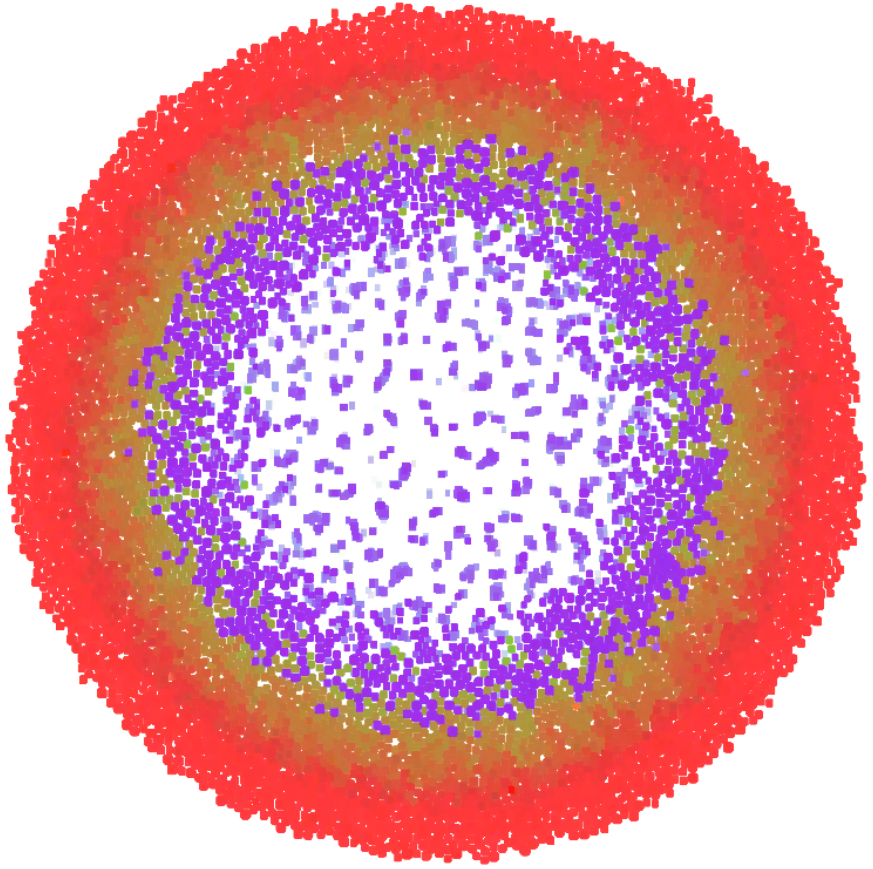




Methods - Closing

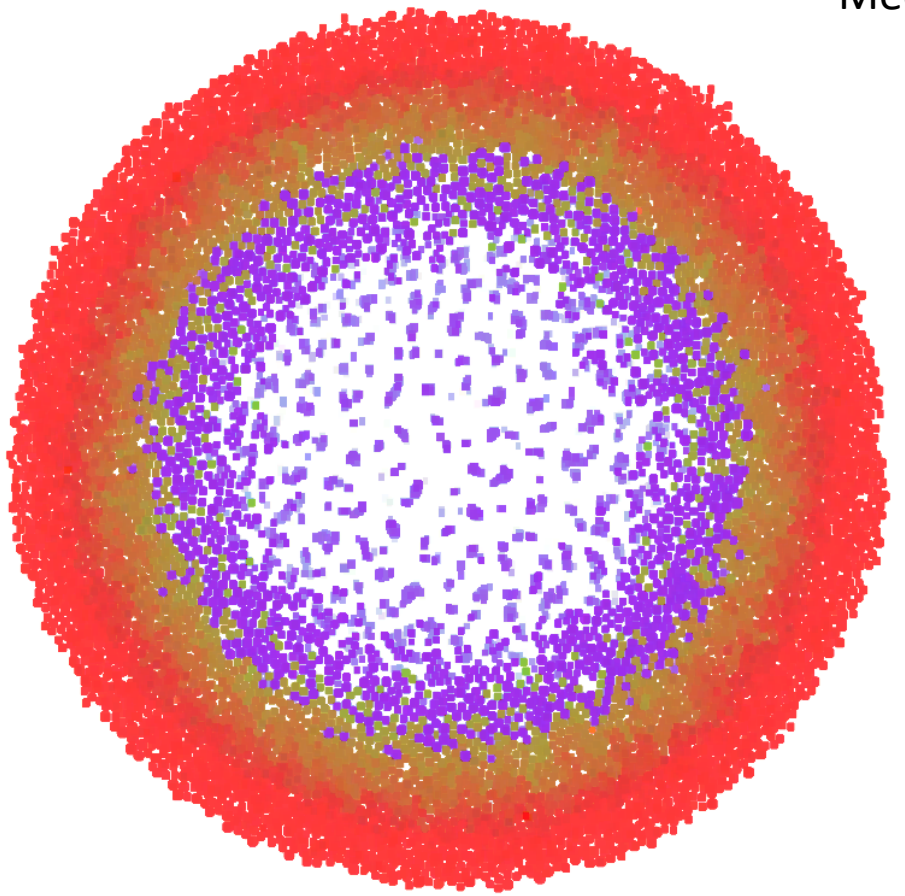


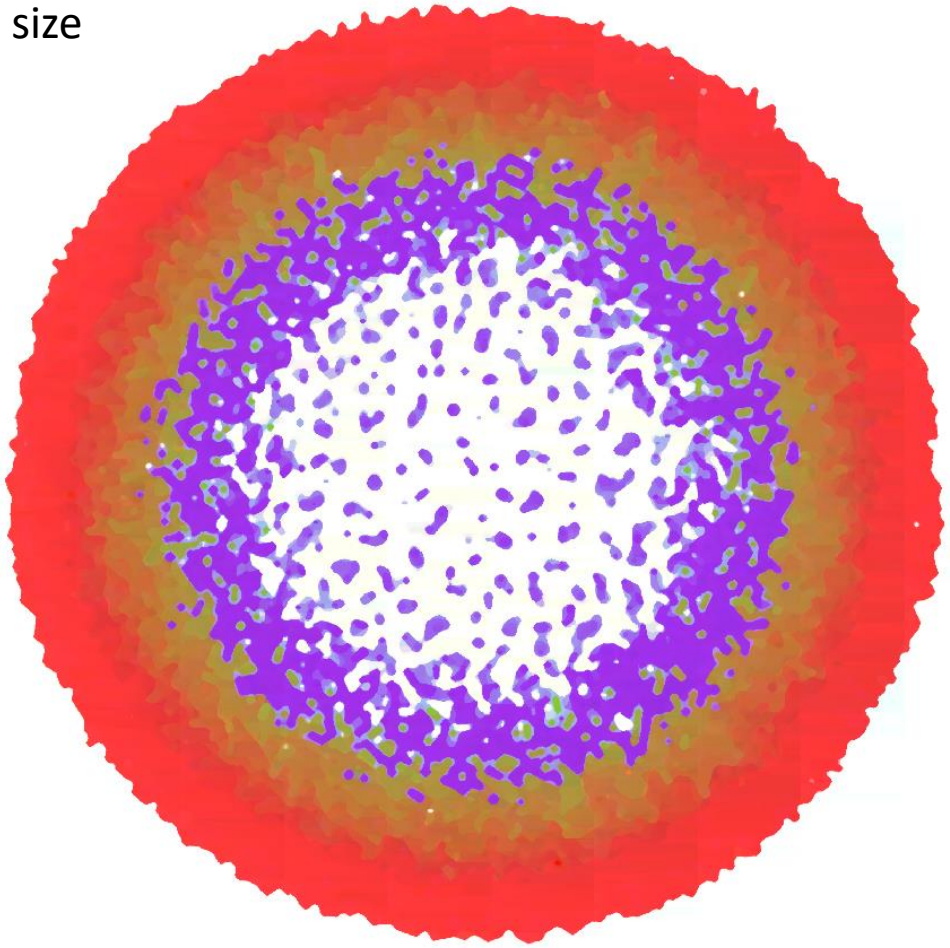
Closing
- With Kernel (12,12)



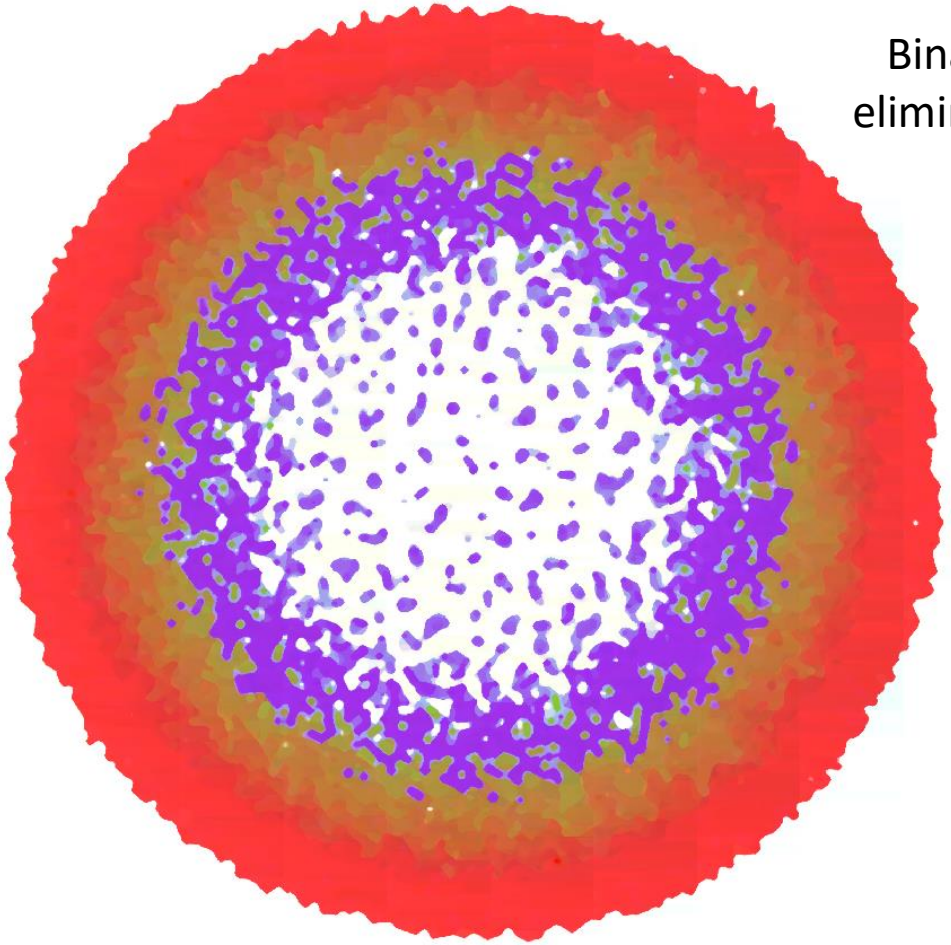
Methods - Blurring

Median Blur with 15 pixel size

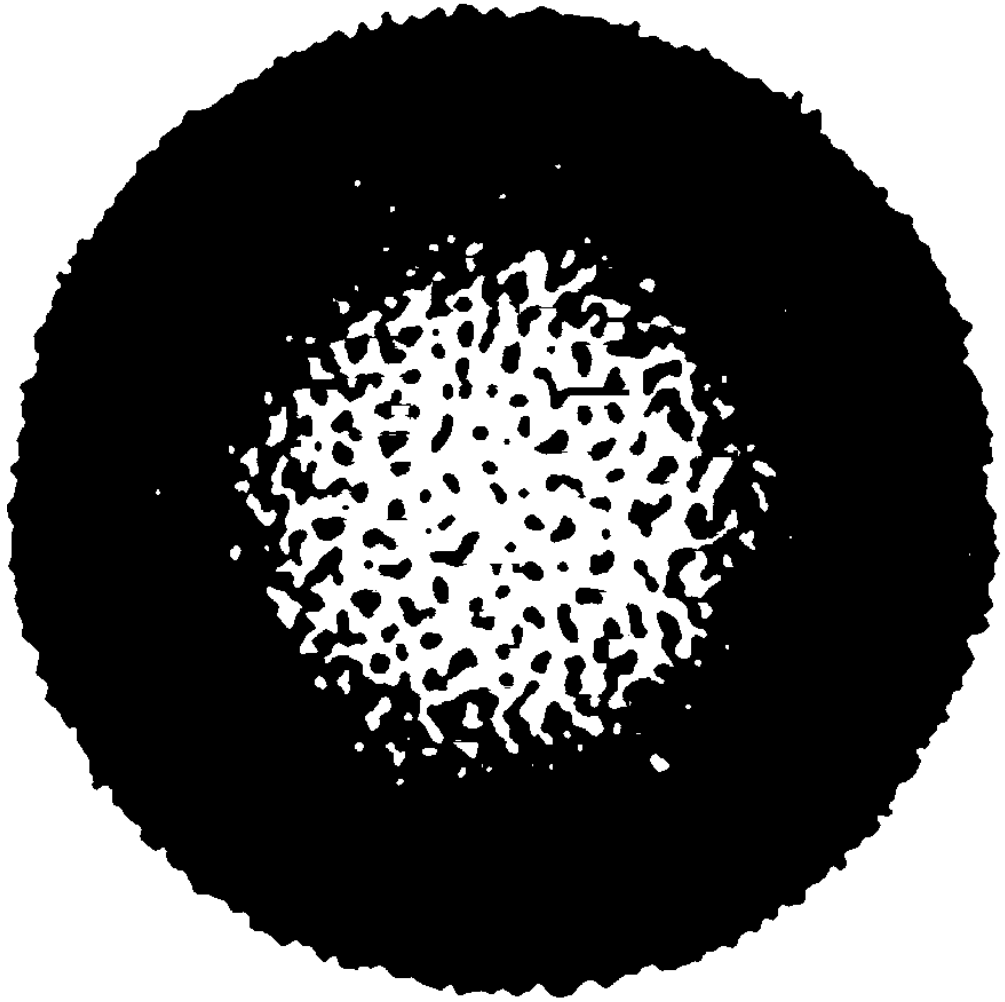




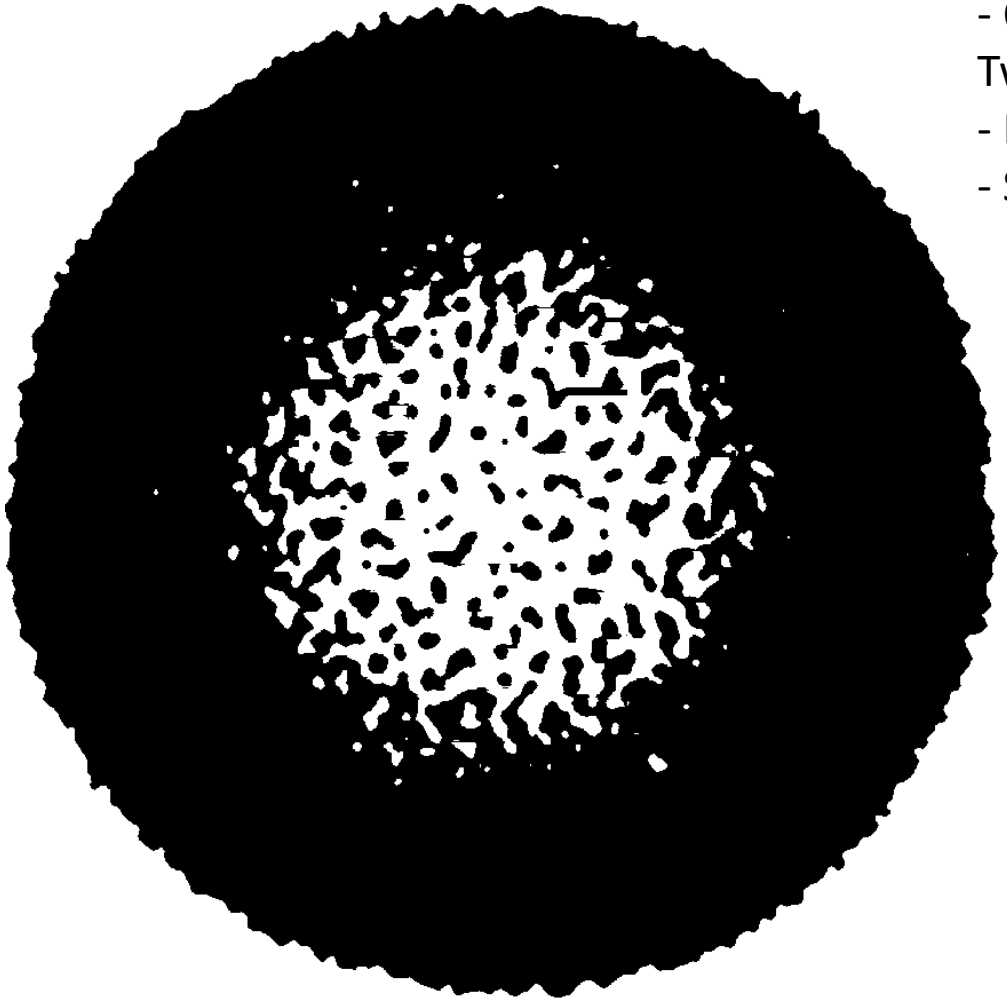
Methods – Binary Thresholding



Binary Thresholding to eliminate background and binary labeling

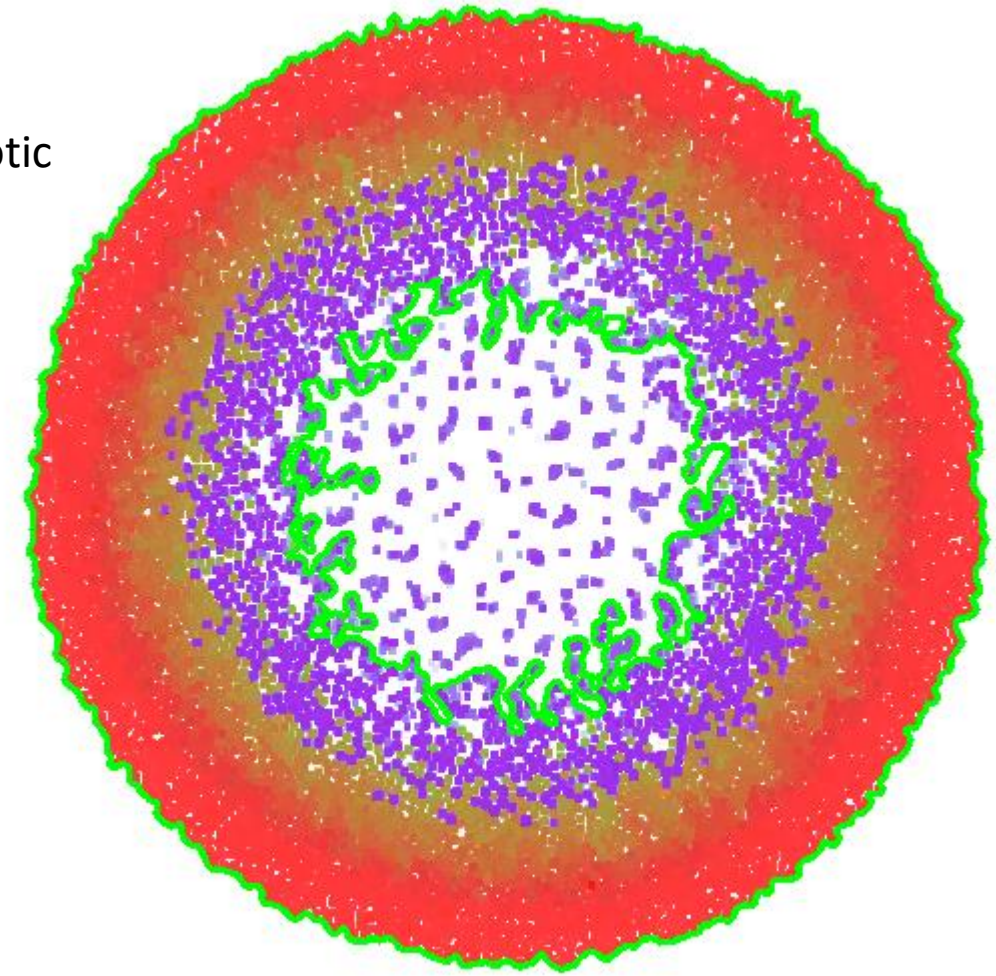


Methods – Finding Contours and Drawing Contours



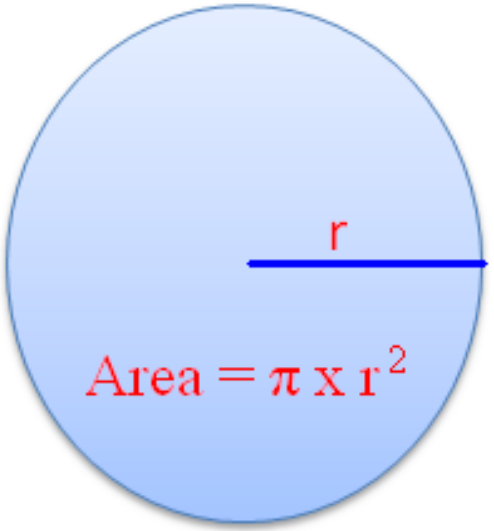
If One Contour:
- Only tumor radius

Two Contour
- Big Contour is Tumor
- Small Contour is Necrotic



Methods – Radius Calculation

- It is assumed that tumor grow in circular shape
- Area to Radius



Results - Demo

- Lets Do a Demo

Future Works

- Each pixel is one micron
  - That can be changed in future
  - There is a measure bar at the bottom.
  - OCR to get number and calculate the tumor accordingly
- Cell types between tumor gap and edge of tumor
  - It could be find these cells with HUE color space and selection of color with a saturation and value.
  - Or Clustering algorithm can be used to determine different type of cells.

Thank you so much!