Digital Pathology Approaches in Melanoma Care

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Overview

- Summary of Bibliographic Report
- Introduction and Context
- Main Objectives
- Implemented Methods
- Metrics for Quality Checking

Summary of Bibliographic Report

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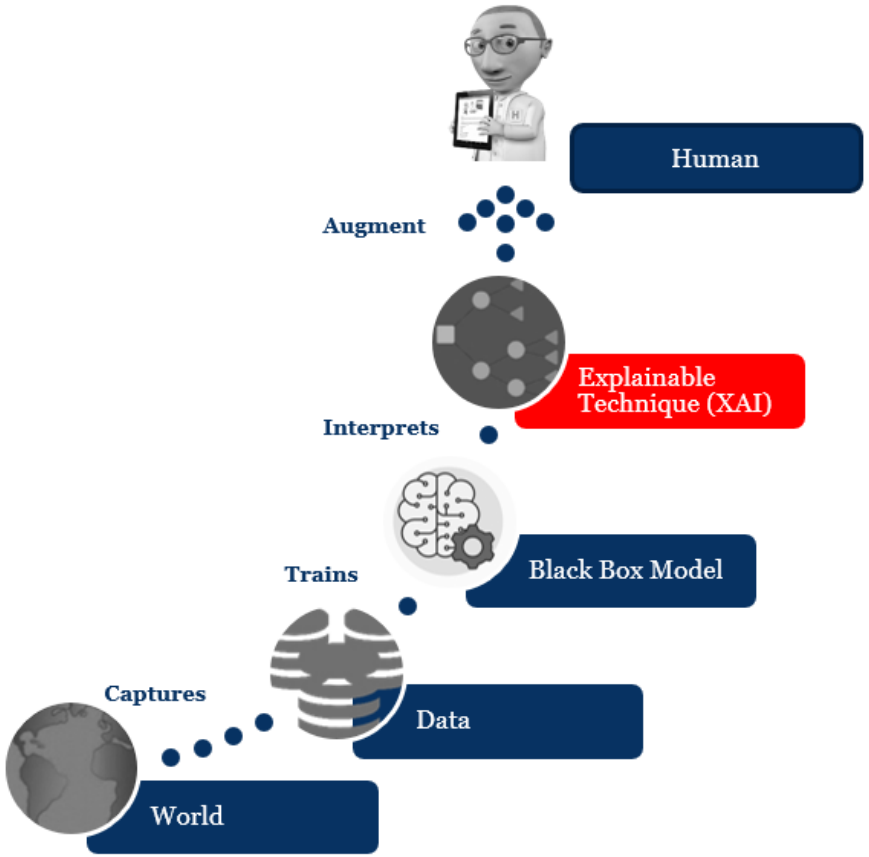
Summary of Bibliographic Report



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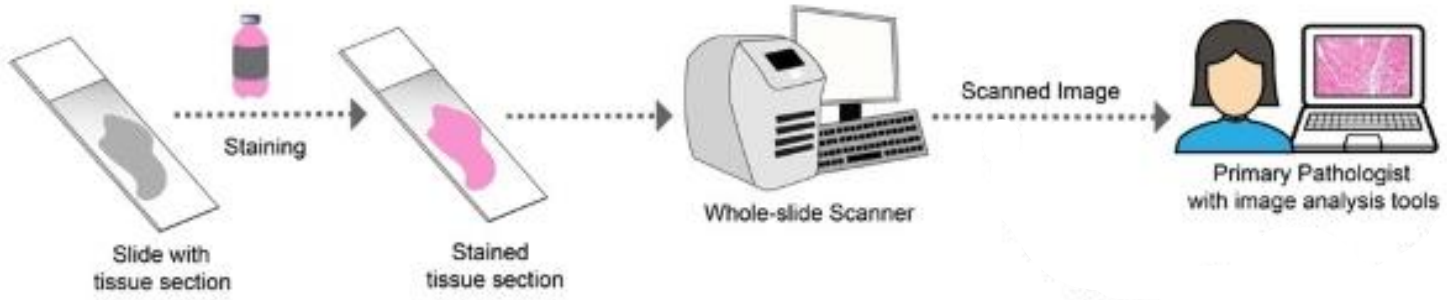
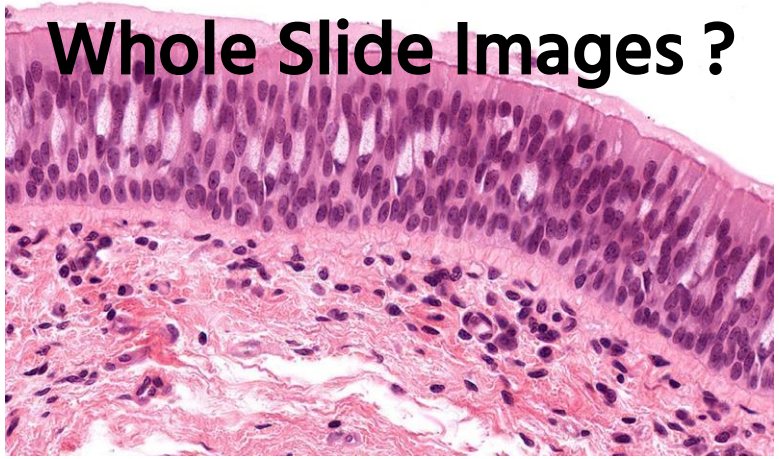
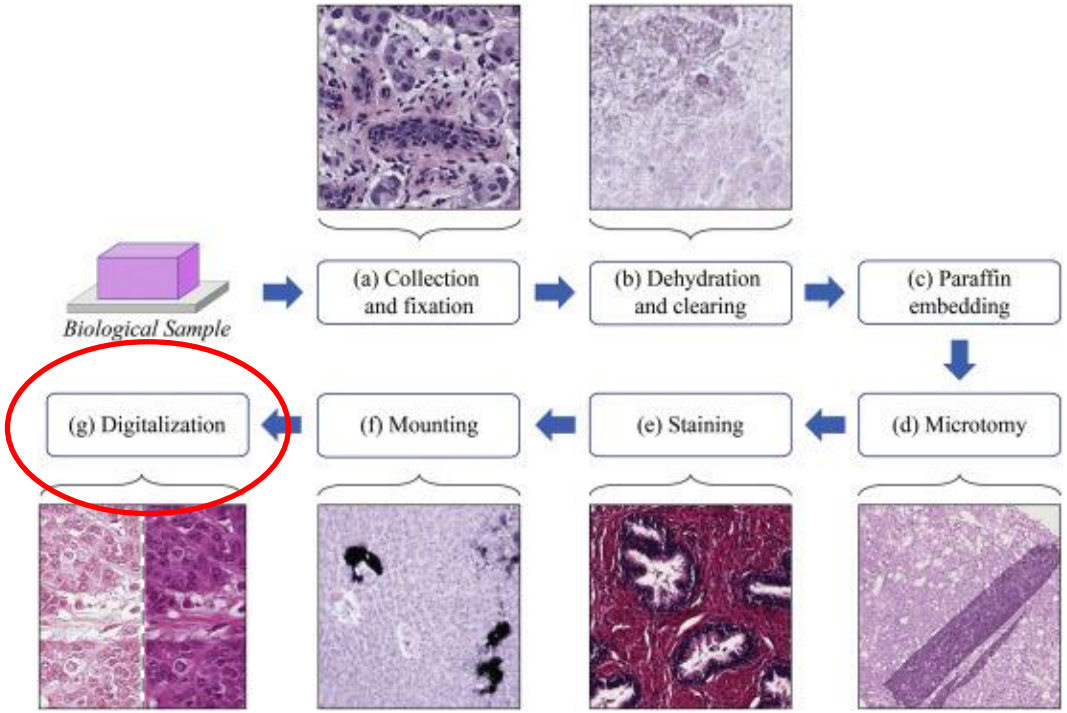
Introduction and Context

Introduction and Context



What are
Whole Slide Images ?





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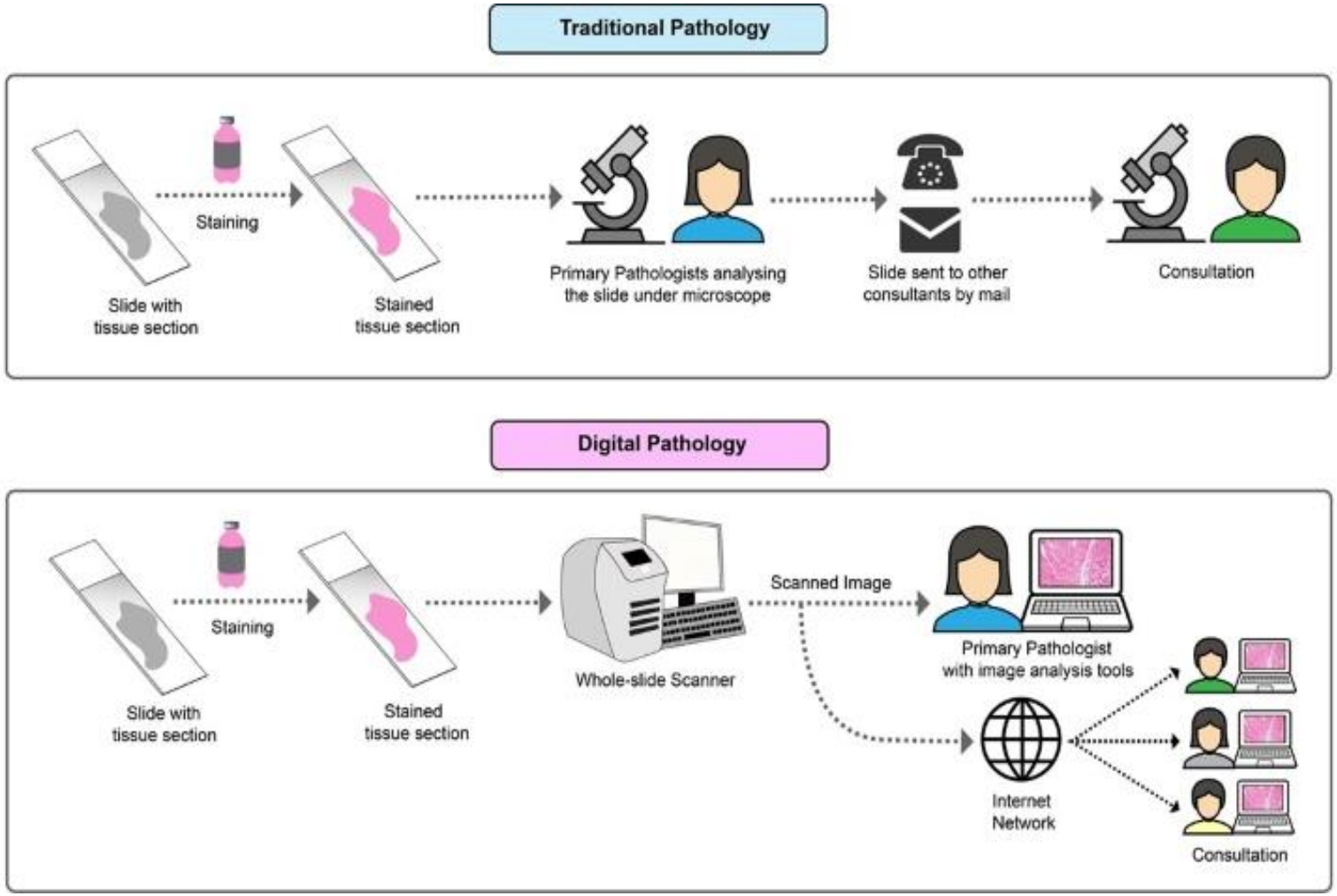

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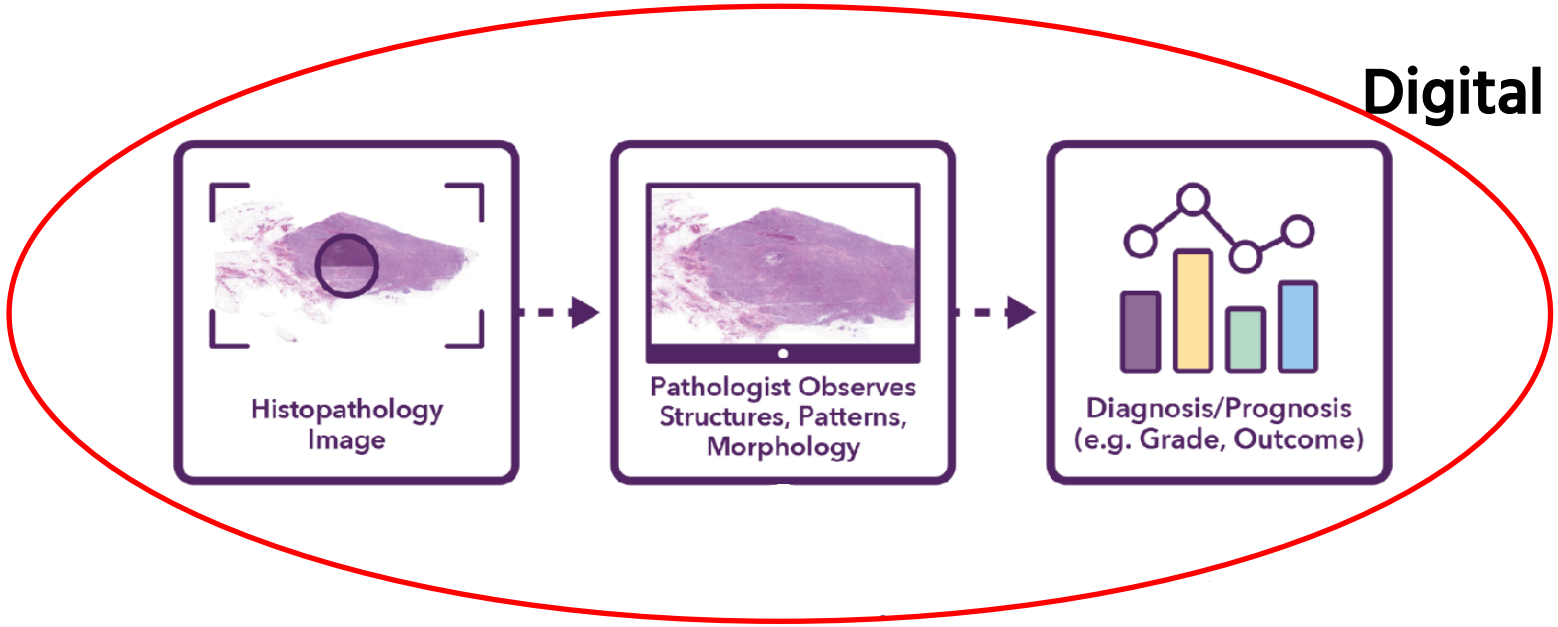
Introduction and Context (1)

Digital Pathology Approach



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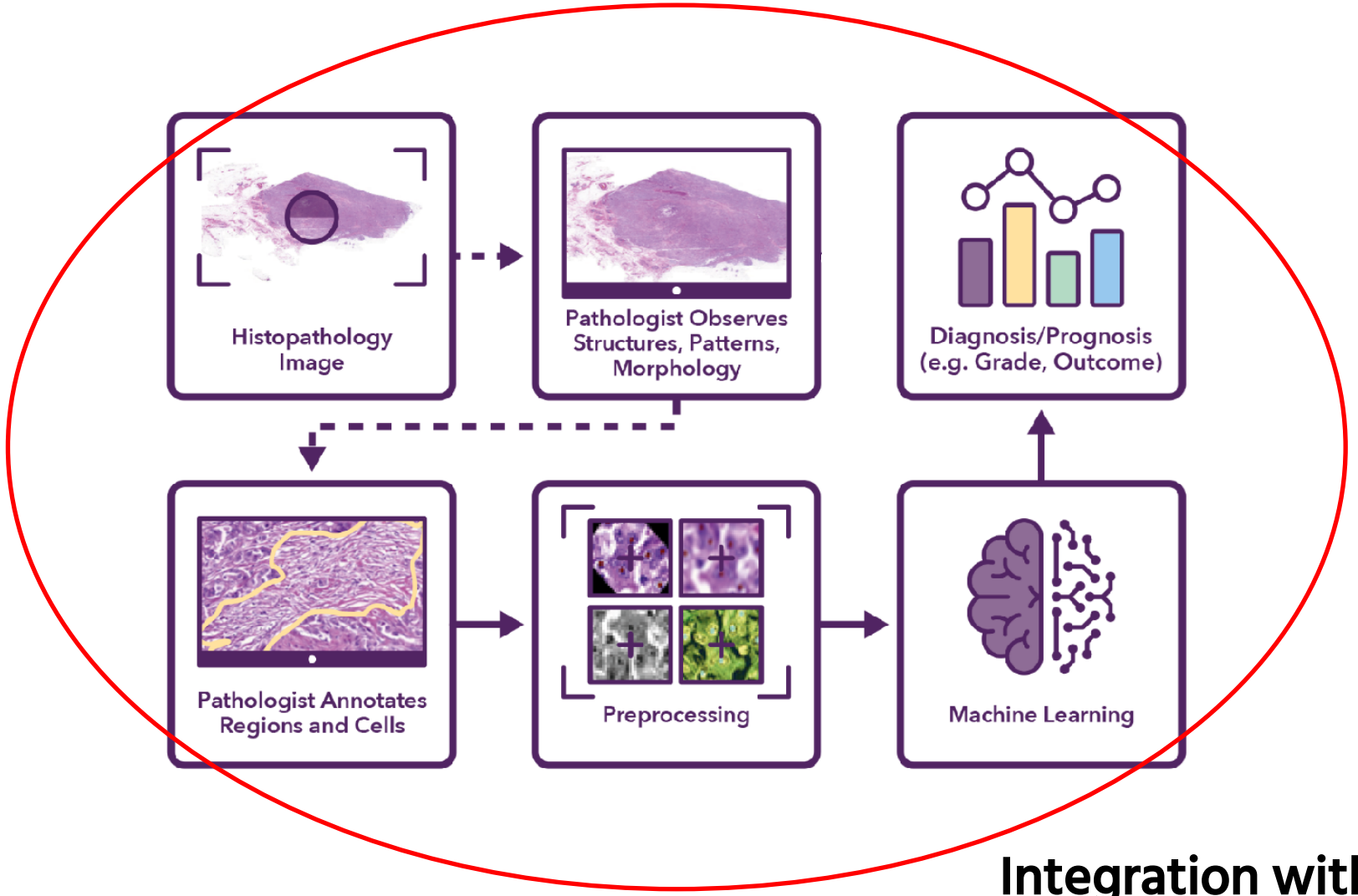

Integration with Machine Learning

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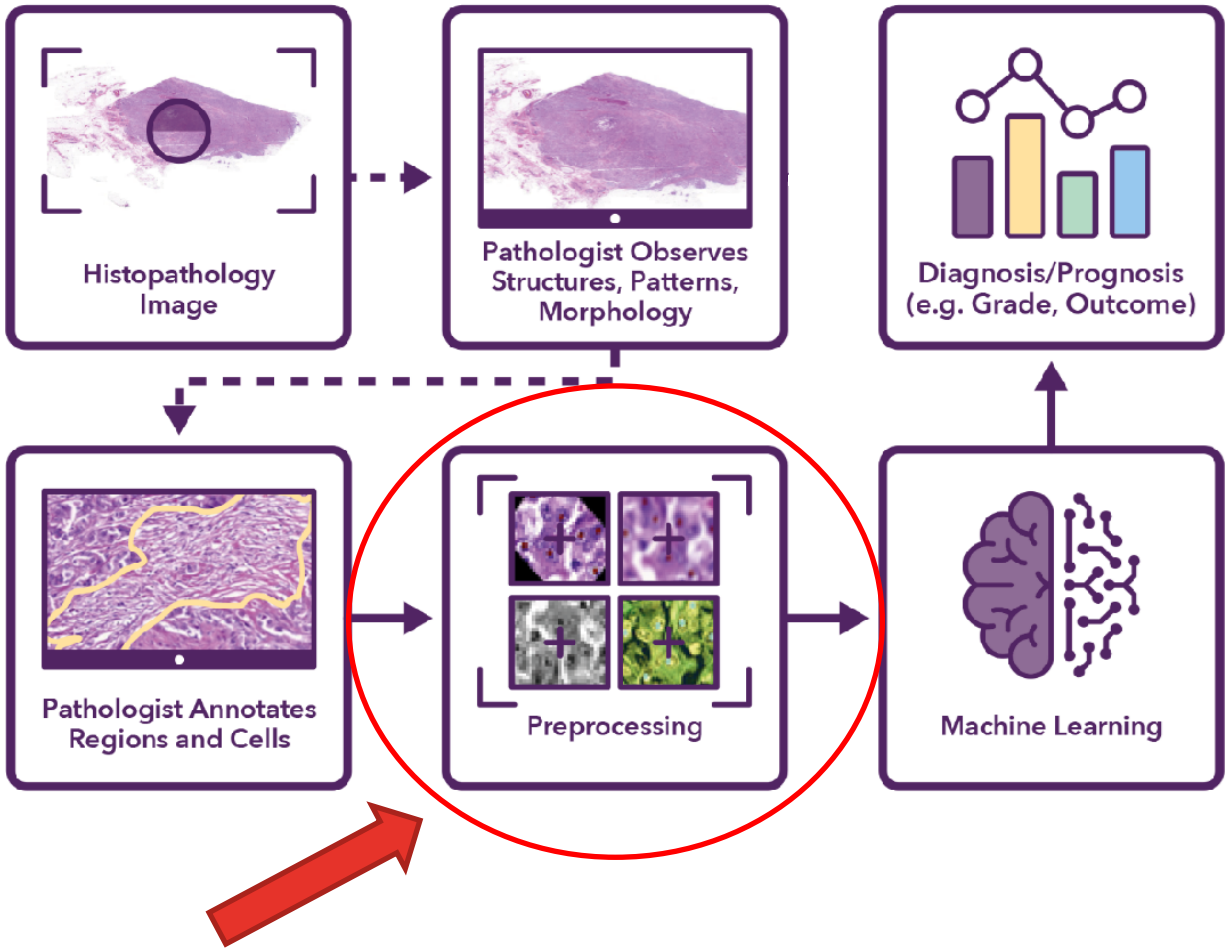

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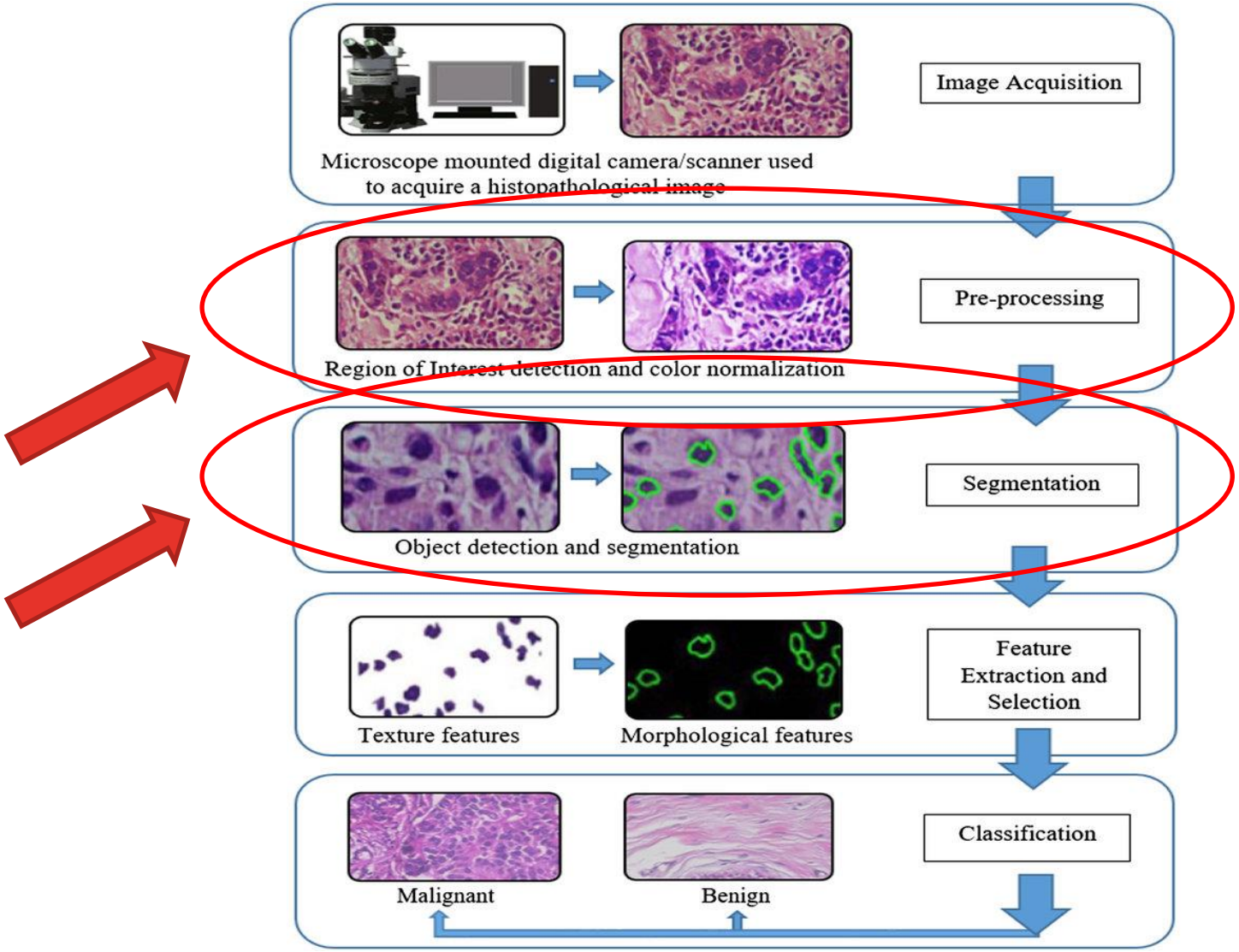

Main Objectives

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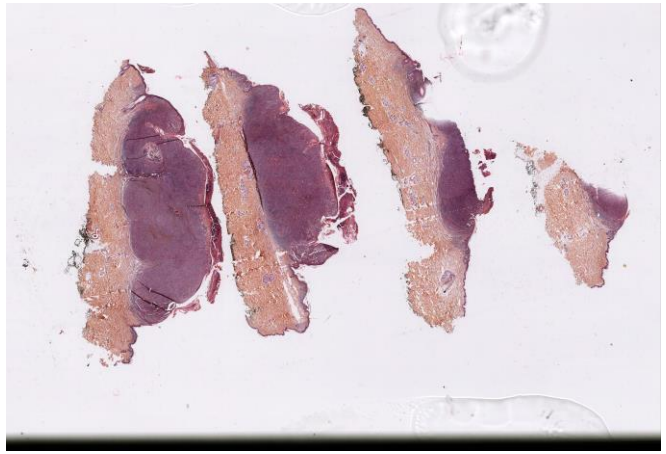
- Improve Image Quality
- Remove Artifacts
- Patch Selection

Image ready for **Training Data** and **Learning Algorithm**

Implemented Methods

Implemented Methods - Filters



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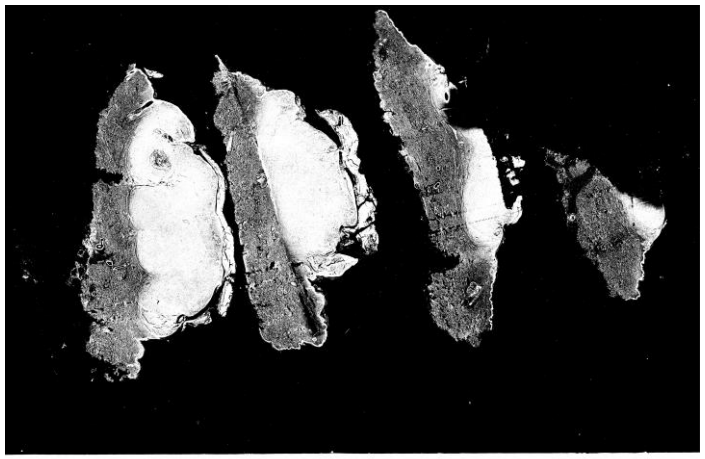
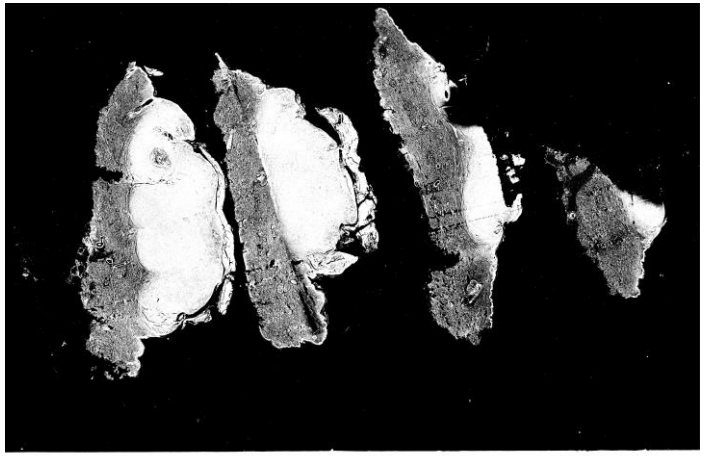
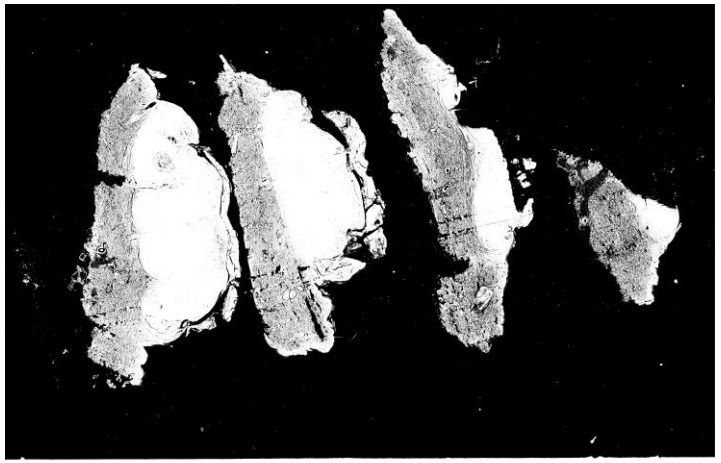


Basic Threshold

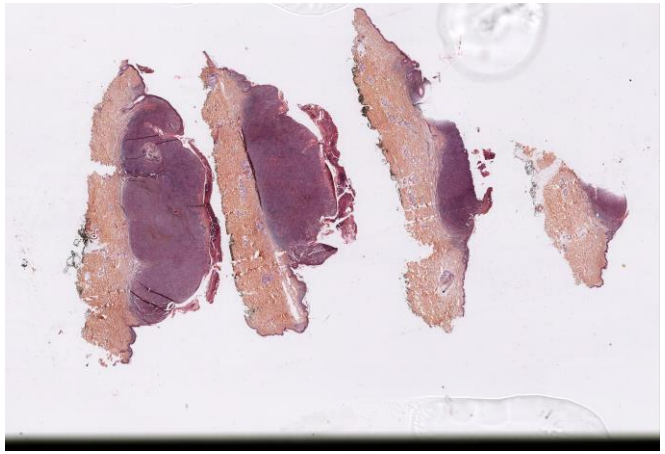


Otsu Threshold



Hysteresis Threshold

Implemented Methods - Filters



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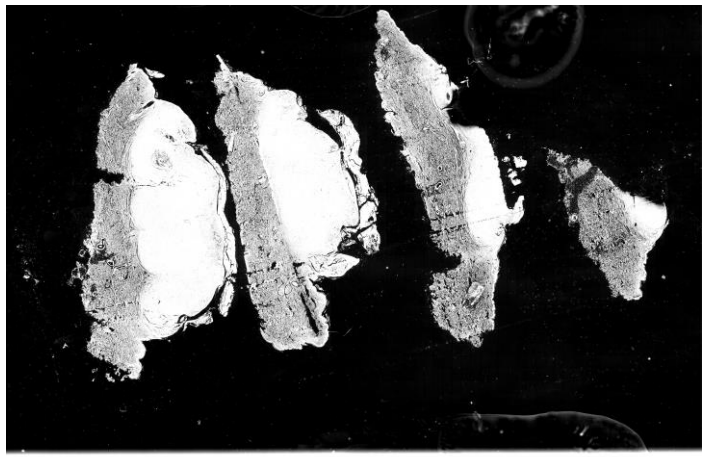
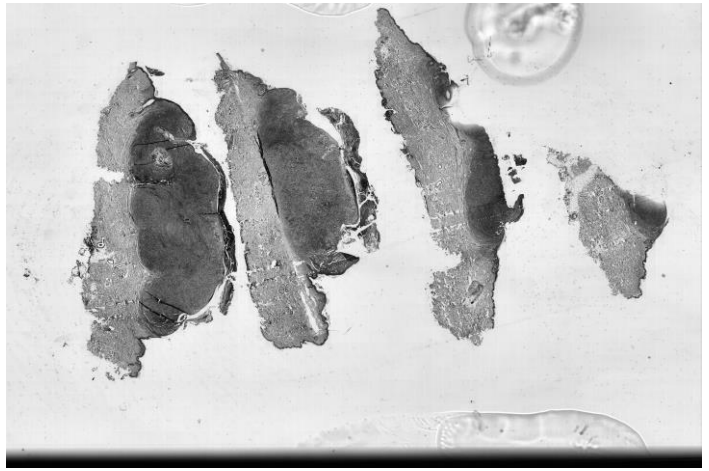
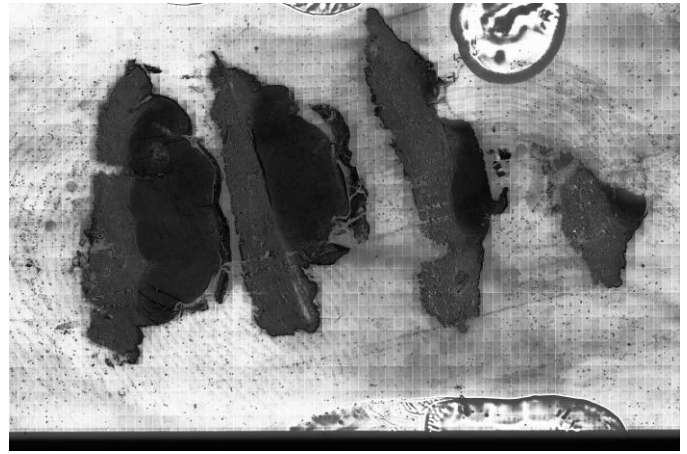


Contrast Stretching

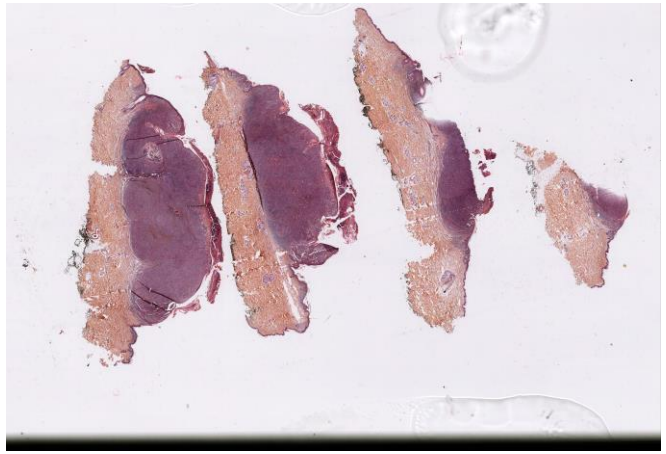


CLAHE



Histogram Equalization

Implemented Methods - Filters



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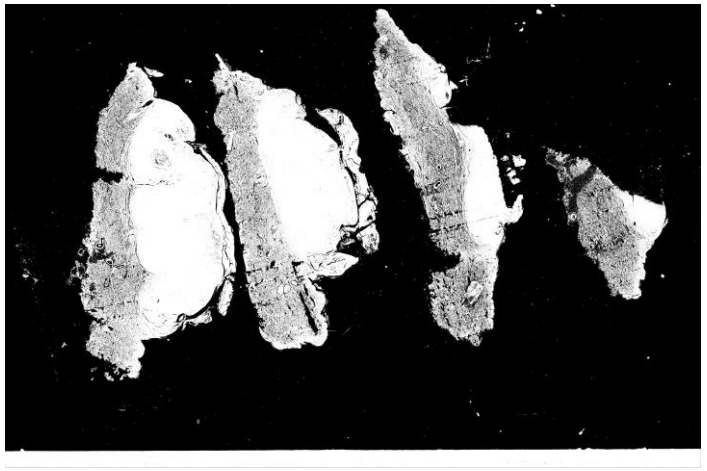
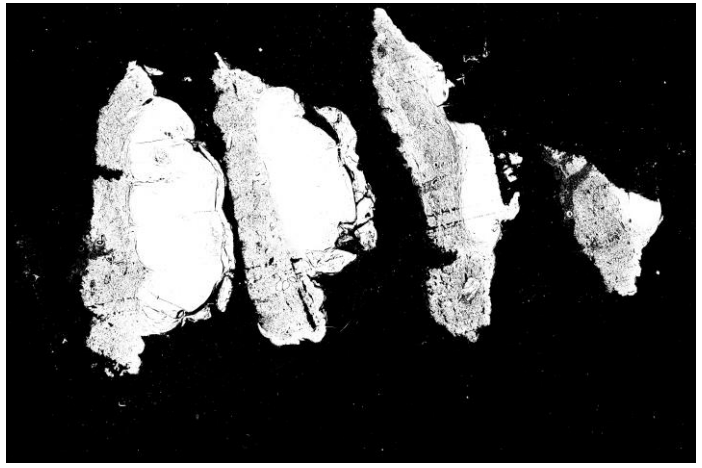
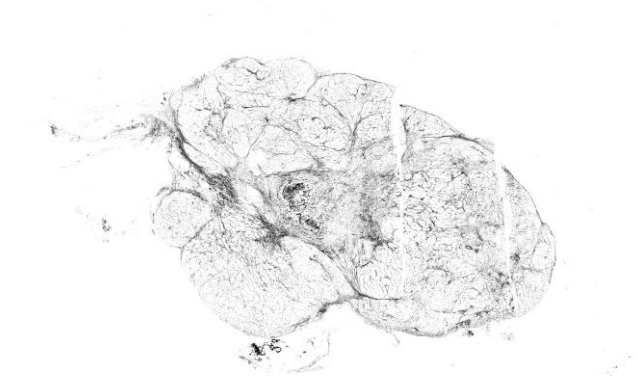


Green Channel Filter

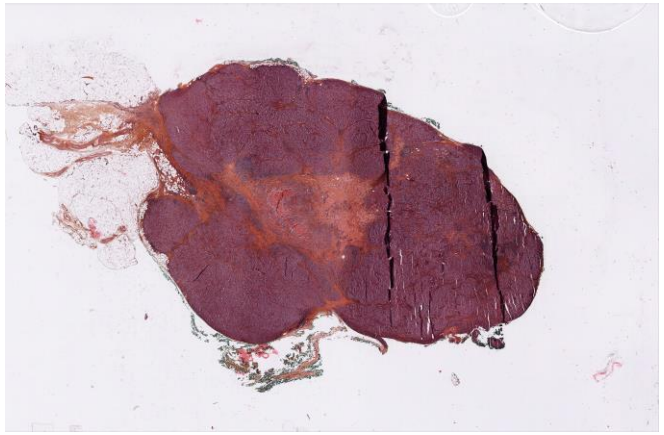


Grays Filter

Implemented Methods - Filters



Red Pen Filter



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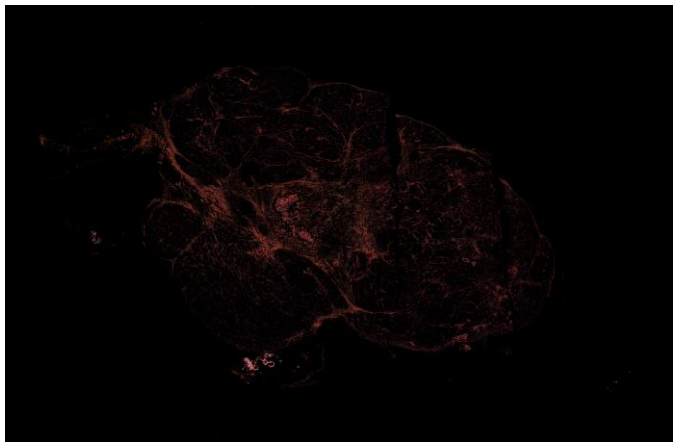
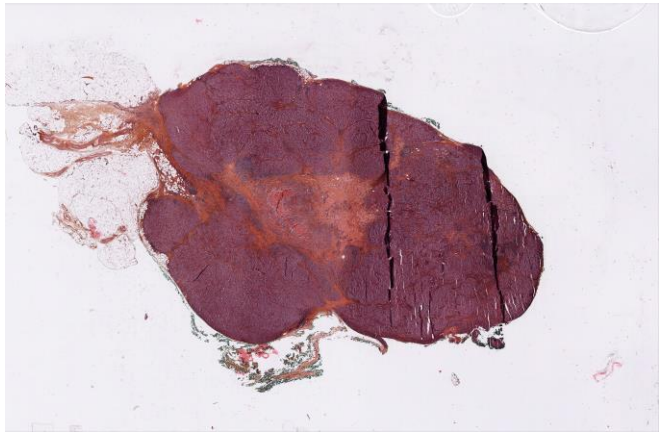


Red Pen Mask

Image with no Red Pen

Implemented Methods - Filters



Original Image

Green Pen Filter

Green Pen Mask

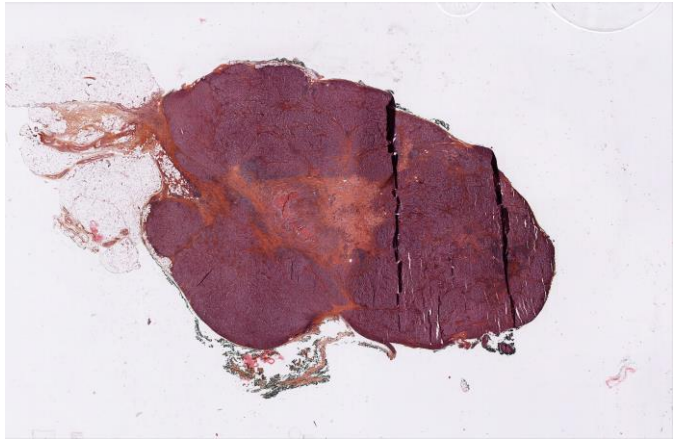


Image with no Green Pen

Implemented Methods - Filters

Original Image

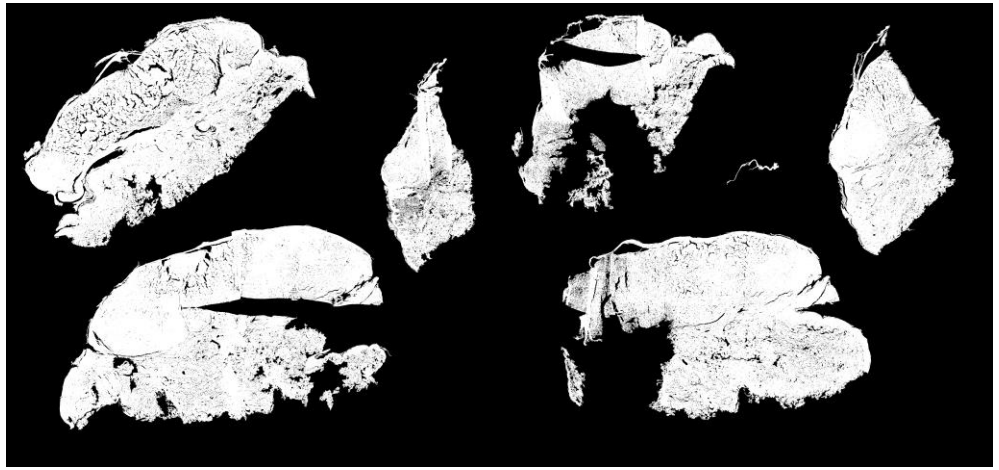
Blue Pen Filter

Blue Pen Mask

Image with no Blue Pen

Implemented Methods - Morphology

Remove Small Objects

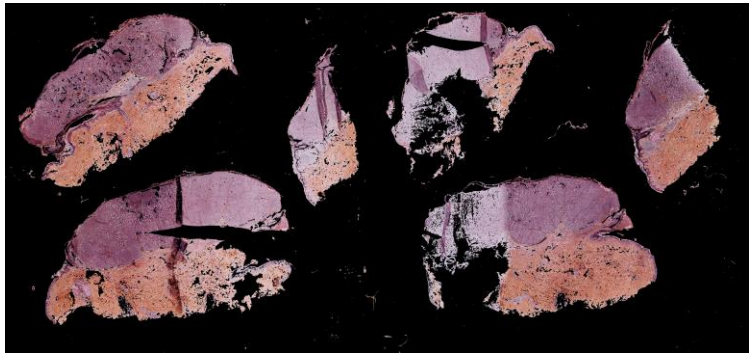


Implemented Methods - Entropy

Entropy Filter

Original Image

Inverse Entropy Mask



Entropy Mask

Implemented Methods – Combining Filter

Original Image

No Green Channel

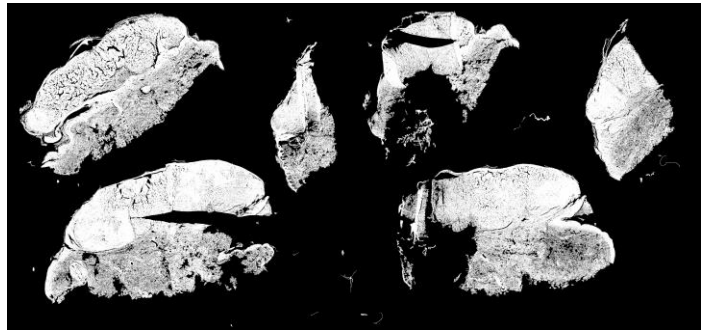
No Grays

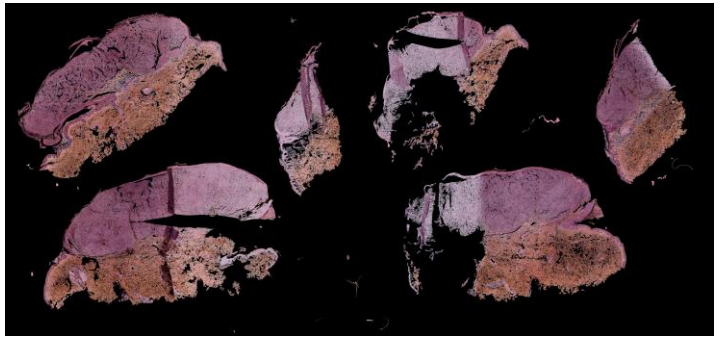
No Red Pen

No Green Pen

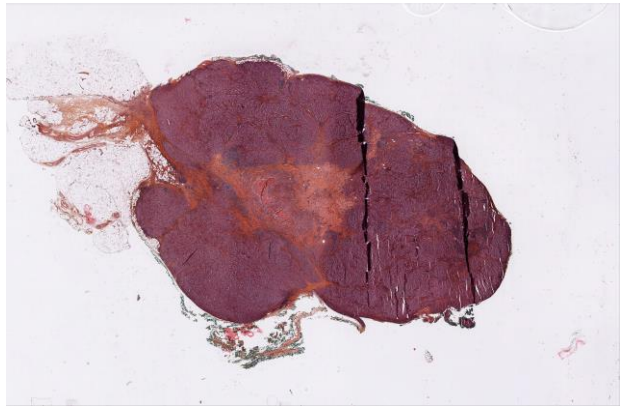
No Blue Pen

Remove Small Objects



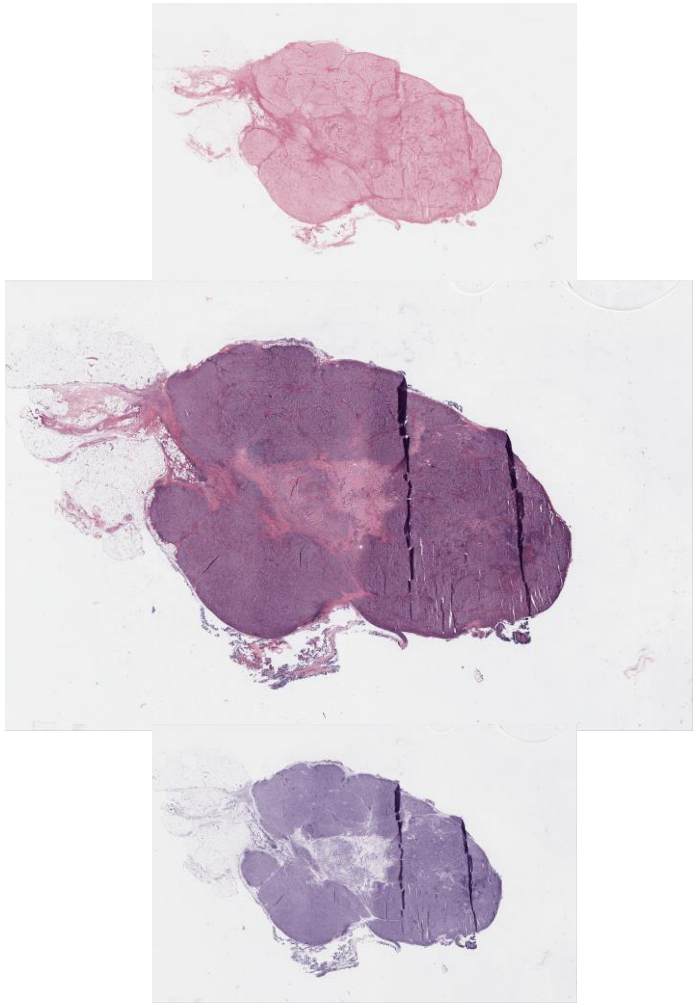


Implemented Methods – Normalization

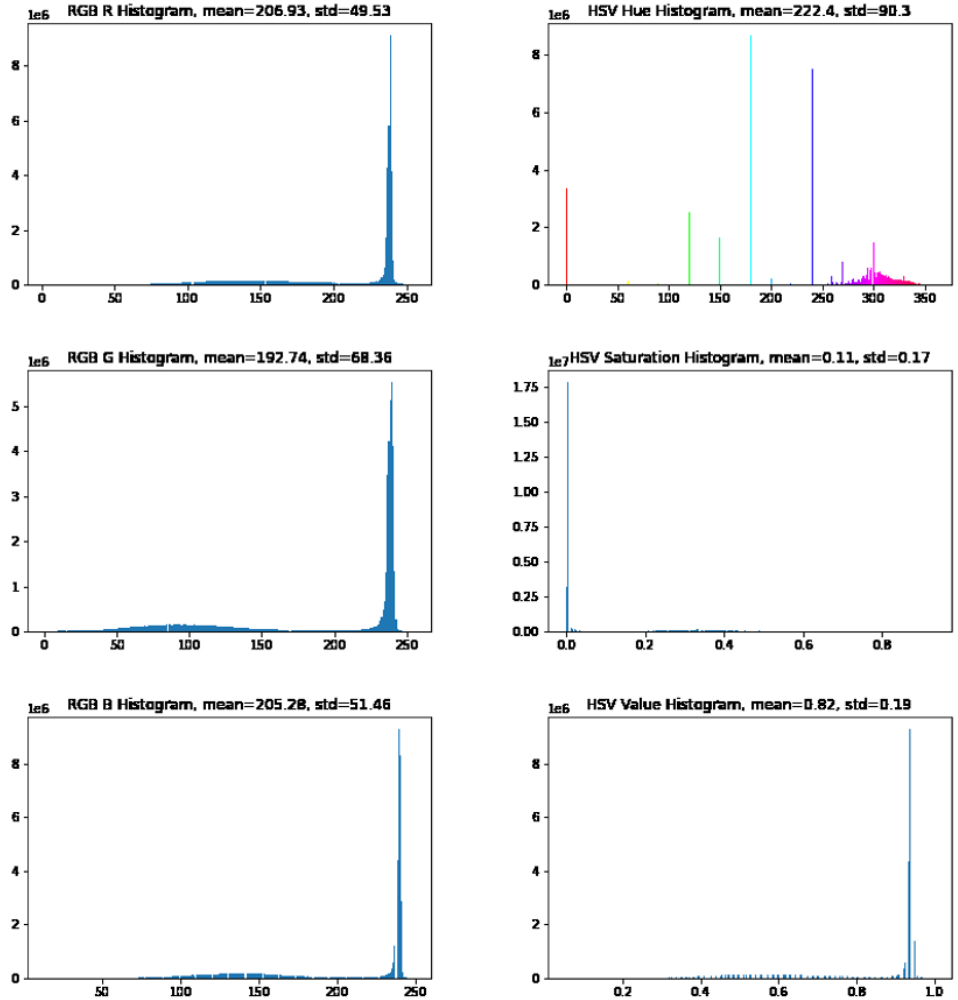


Original Image

Normalization



Implemented Methods – Normalization



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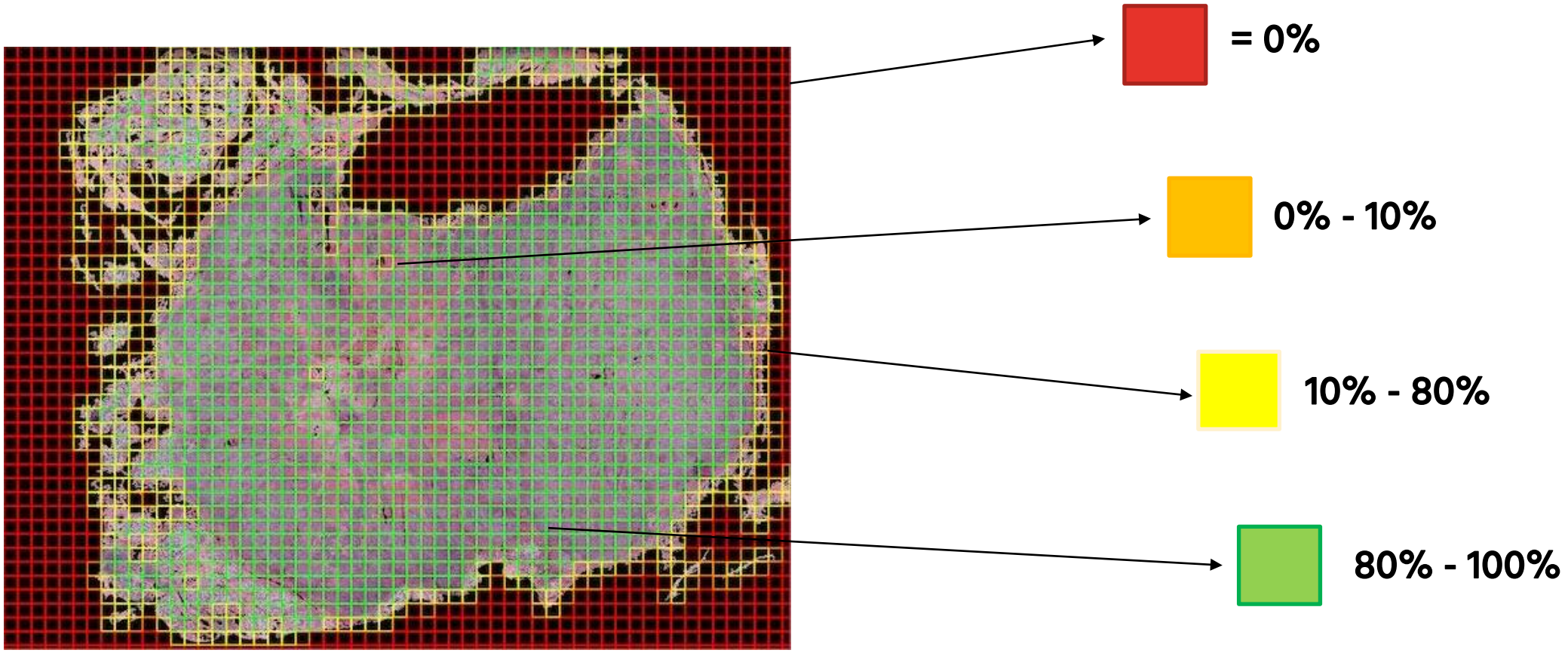
Implemented Methods - Tiles



Metrics for Quality Checking

Metrics for Quality Checking

- $PSNR = 10 \cdot \log_{10}\left(\frac{MAX_I^2}{MSE}\right)$
- $\mathrm{SSIM}(\mathbf{x},\mathbf{y}) = \frac{(2\mu_x\mu_y + C_1)(2\sigma_{xy} + C_2)}{\left(\mu_x^2 + \mu_y^2 + C_1\right)\left(\sigma_x^2 + \sigma_y^2 + C_2\right)}.$
- $MSE = \frac{1}{m\,n}\sum_{i=0}^{m-1}\sum_{j=0}^{n-1}[I(i,j) - K(i,j)]^2$
- $\mathrm{MDSI} = \left[\frac{1}{N}\sum_{i=1}^{N}\left|\widehat{\mathrm{GCS}}_i^{1/4} - \left(\frac{1}{N}\sum_{i=1}^{N}\widehat{\mathrm{GCS}}_i^{1/4}\right)\right|\right]^{1/4}$
- $\mathrm{FSIM}_C = \frac{\sum_{\mathbf{x}\in\Omega} S_L(\mathbf{x}) \cdot [S_C(\mathbf{x})]^{\lambda} \cdot PC_m(\mathbf{x})}{\sum_{\mathbf{x}\in\Omega} PC_m(\mathbf{x})}$

Thank you for your attention!

References

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