

# Digitally Segmenting Immune Cells on Clinical (Breast Cancer) Images using Machine Learning

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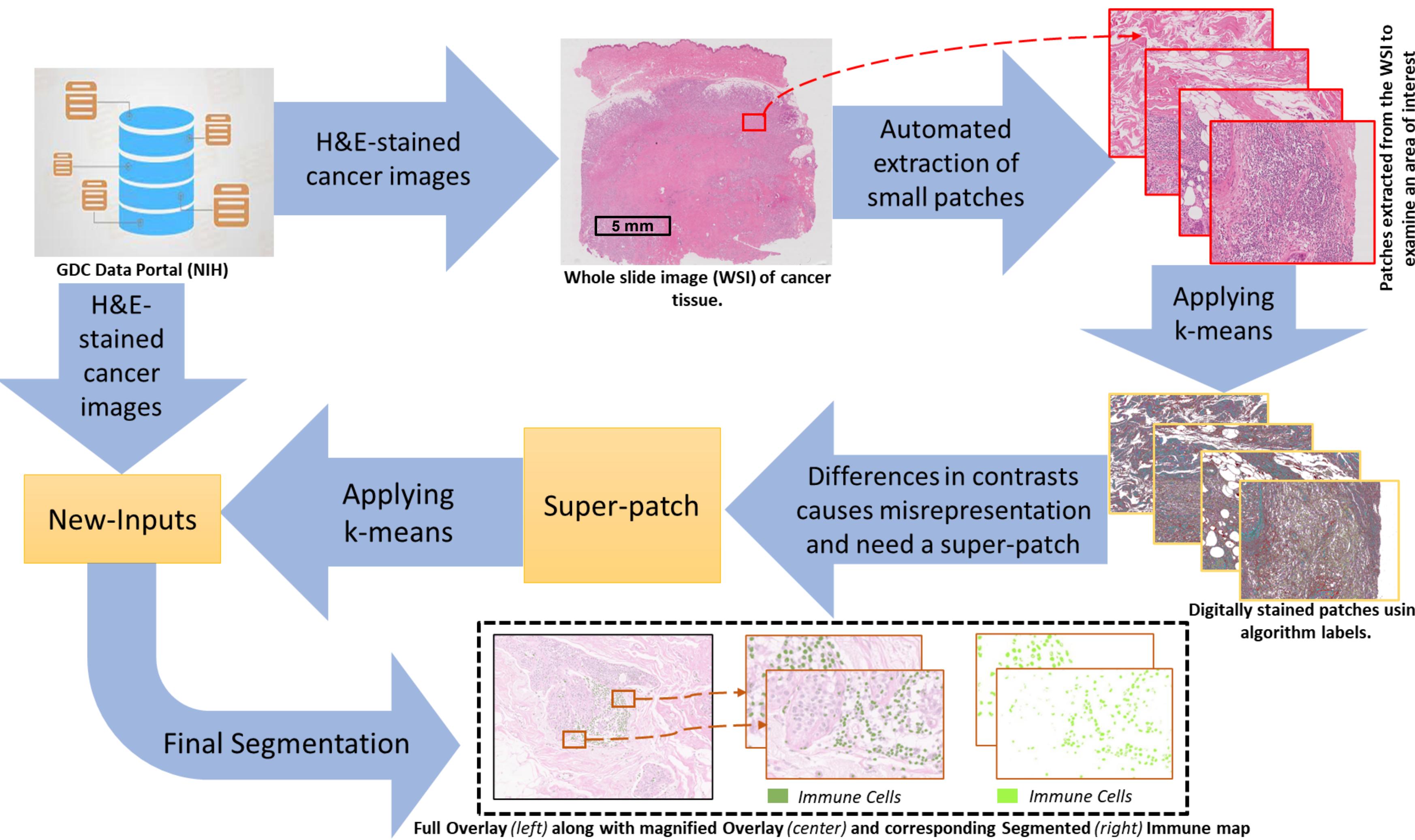
MITTAL LAB



## Background

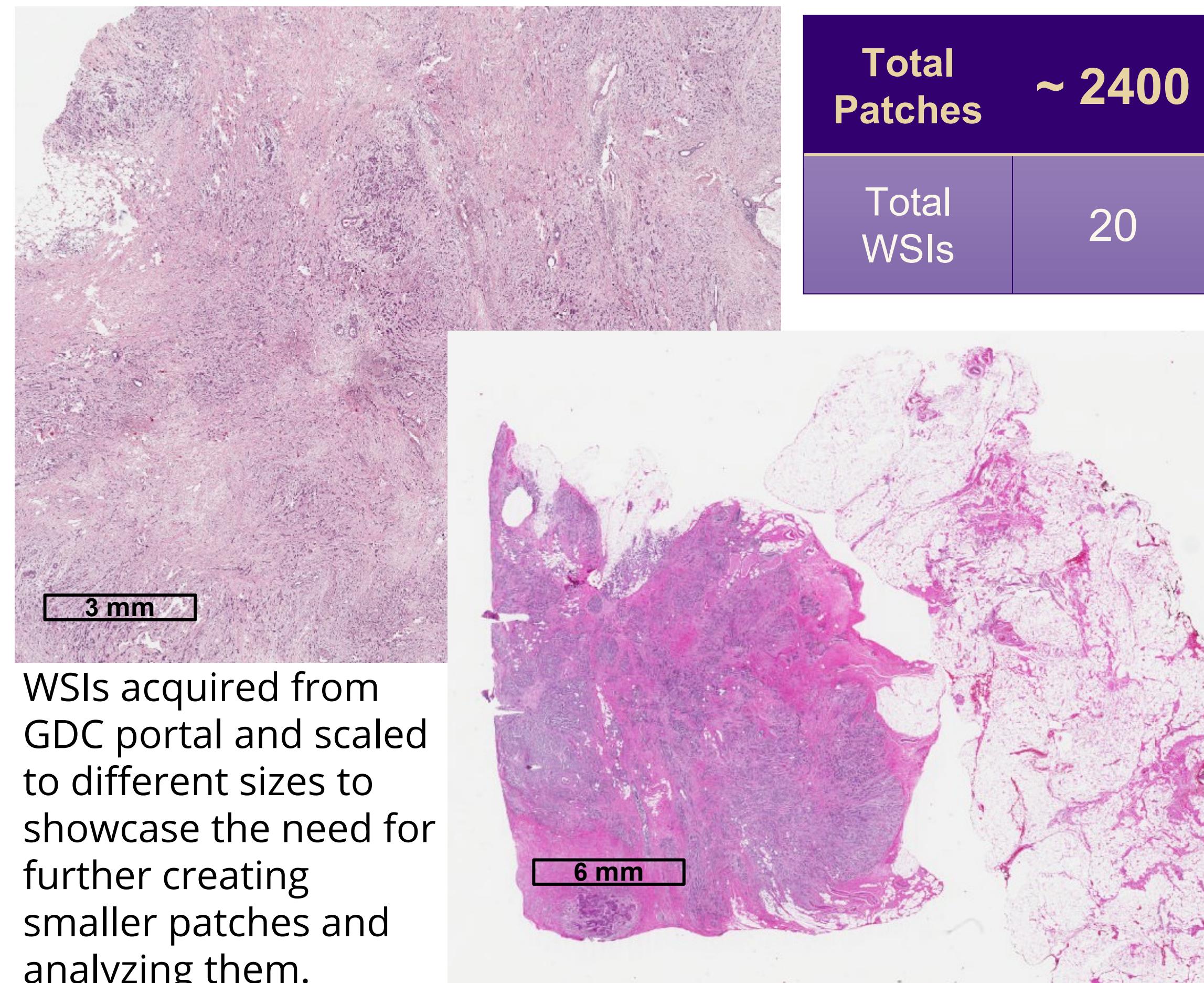
- Cancer is one of the most predominant causes of deaths in the world where breast cancer alone accounts for 42,500 deaths each year in United States.
- Cancer diagnosis and treatment for a long time have adopted an approach “one size fits all” despite varying tumor microenvironments.
- In recent times there has been a much-needed transition towards a personalized care for every patient with the advent and use of cancer biomarkers and immune cell is one of the most important ones.
- The knowledge in cancer research show that intact immune responses are required for preventing and inhibiting tumor development.

## Methodology using Clustering Algorithm and Digital Pipeline for Image Segmentation

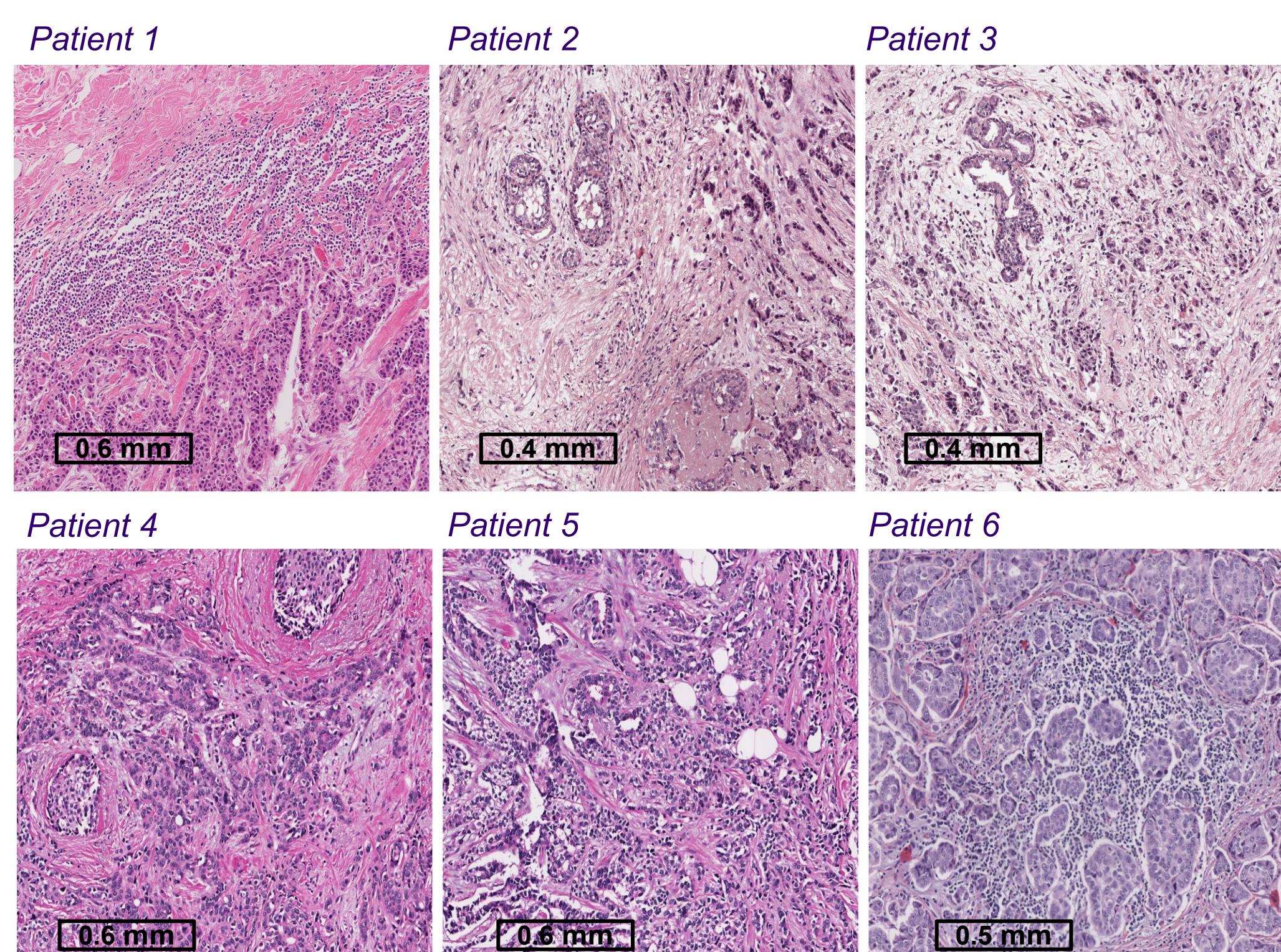


## Data

The whole slide images (WSIs) containing cancer tissues were obtained from Genomic Data Commons (GDC).

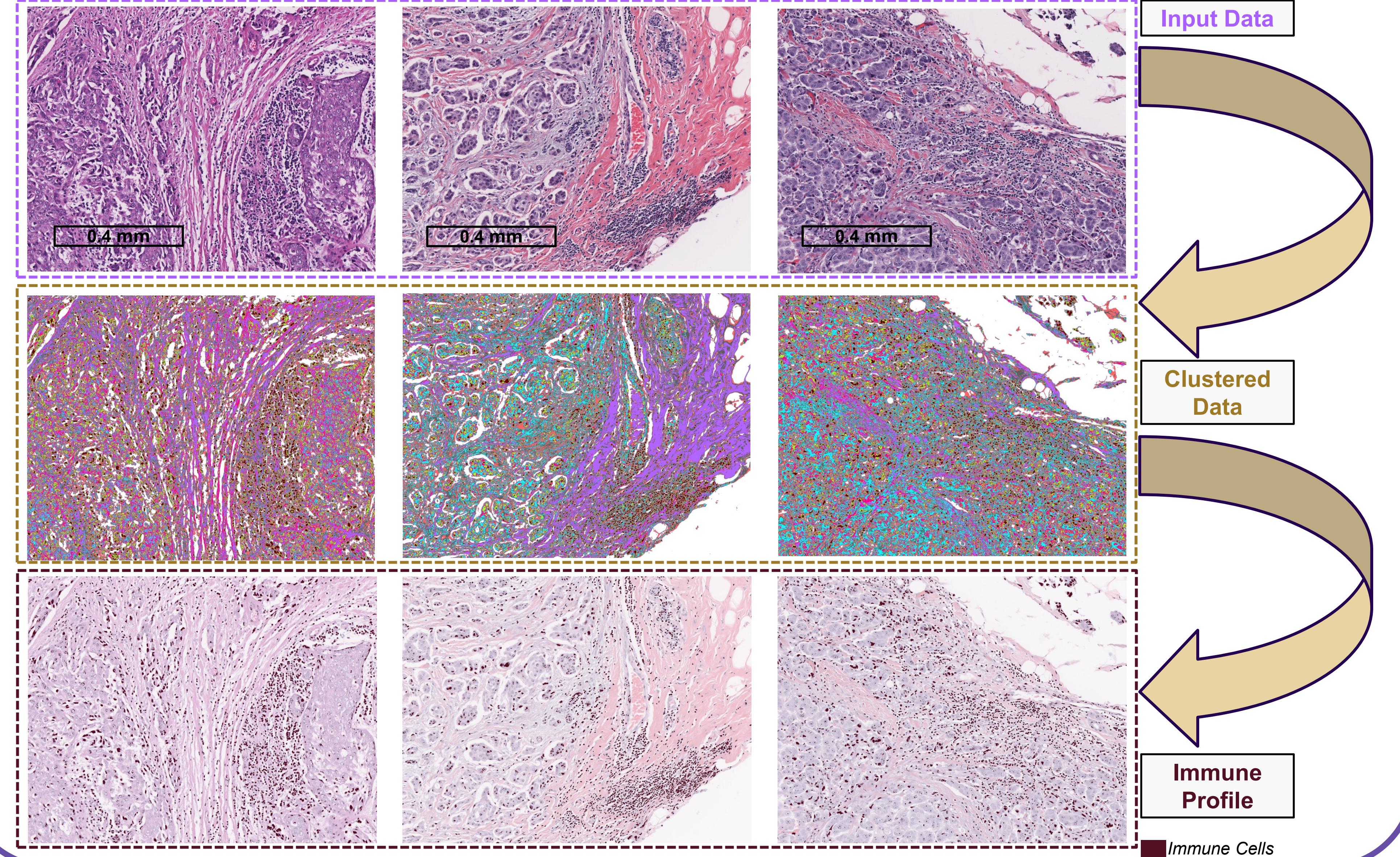


## Super-Patch



- Super-patch is used for obtaining the centroid values for the clustering algorithm.
- This super patch consists of 6 patches from different WSIs with varying levels of contrasts captures patient heterogeneity in data.

## Results



## Conclusion and Future Work

- IMPACT:** The digital pipeline showed accurate results for about 70% of the patches generated from the WSIs. This open-source pipeline under further and continuous development can be accessed on GitHub.
- ONGOING:** In order to improve the accuracy and performance of the model even further, we are currently applying textural post processing techniques.
- FUTURE WORK:** Implement supervised learning for further segmentation of the immune map.



GitHub

## Author Contributions

- V.S.** Performed hyperparameter tuning and literature review.
- V.S and Z.C.** Written the code for implementation of the digital pipeline.
- Y.H and R.L.** Rendered different versions of model on different patches for testing the accuracy and performances of the model.