

Neural Networks for 3D Breast Cancer Detection

Neural Networks

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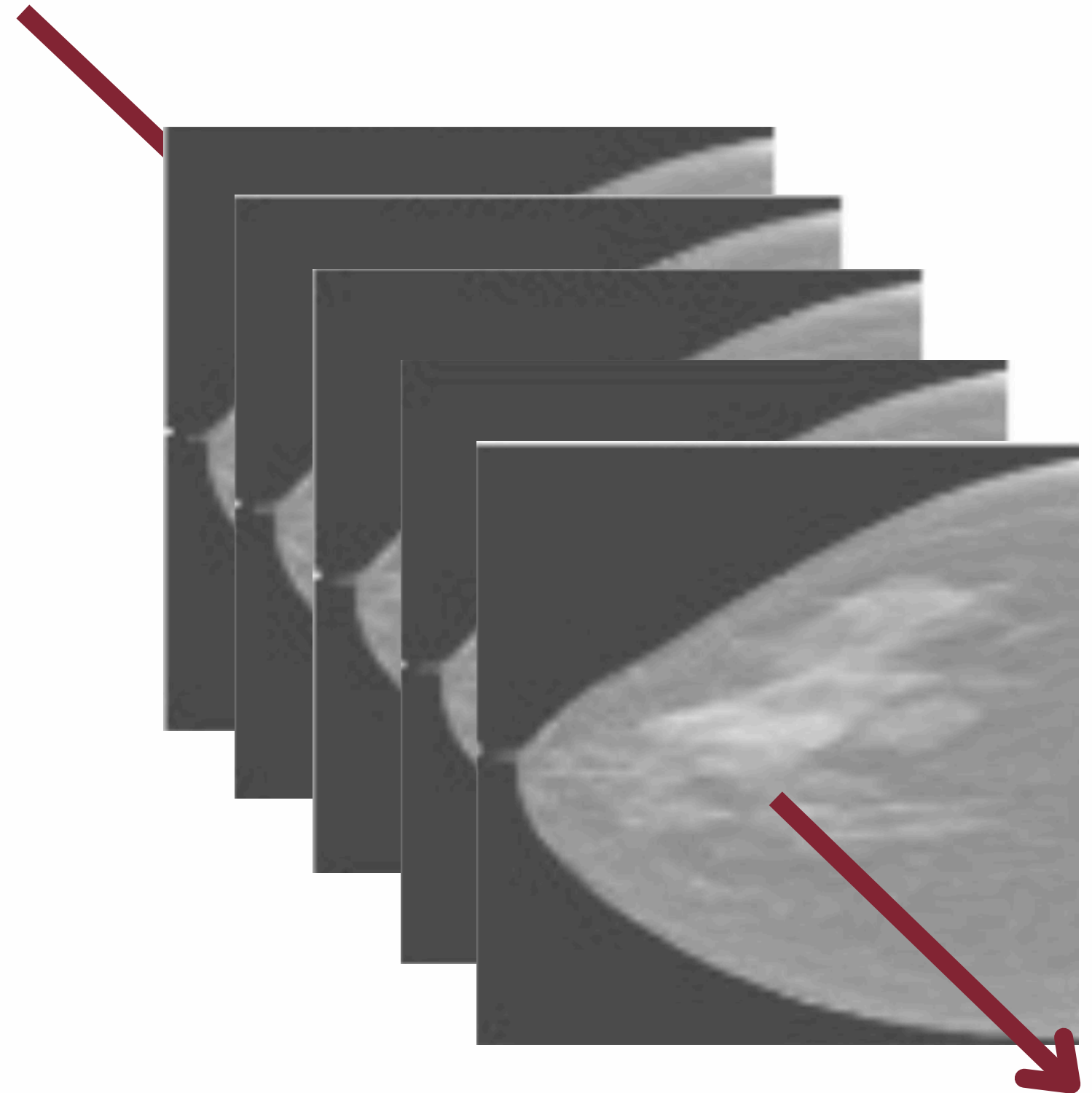
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Overview

- Motivation and Aim
- Dataset
- Methodology
 - Baseline
 - Feature Fusion
 - Hypercomplex
 - SIFT-DBT
- Results
 - Training Statistics
 - Gradient and Attention-Map
Augmentation Visualization
- Conclusion

Motivation and aim

- Classify 3D mammography slices also known as digital breast tomosynthesis (DBT)
- Relies on a particular machine that takes multiple X-ray images at various angle, stacks them together creating 3D representations



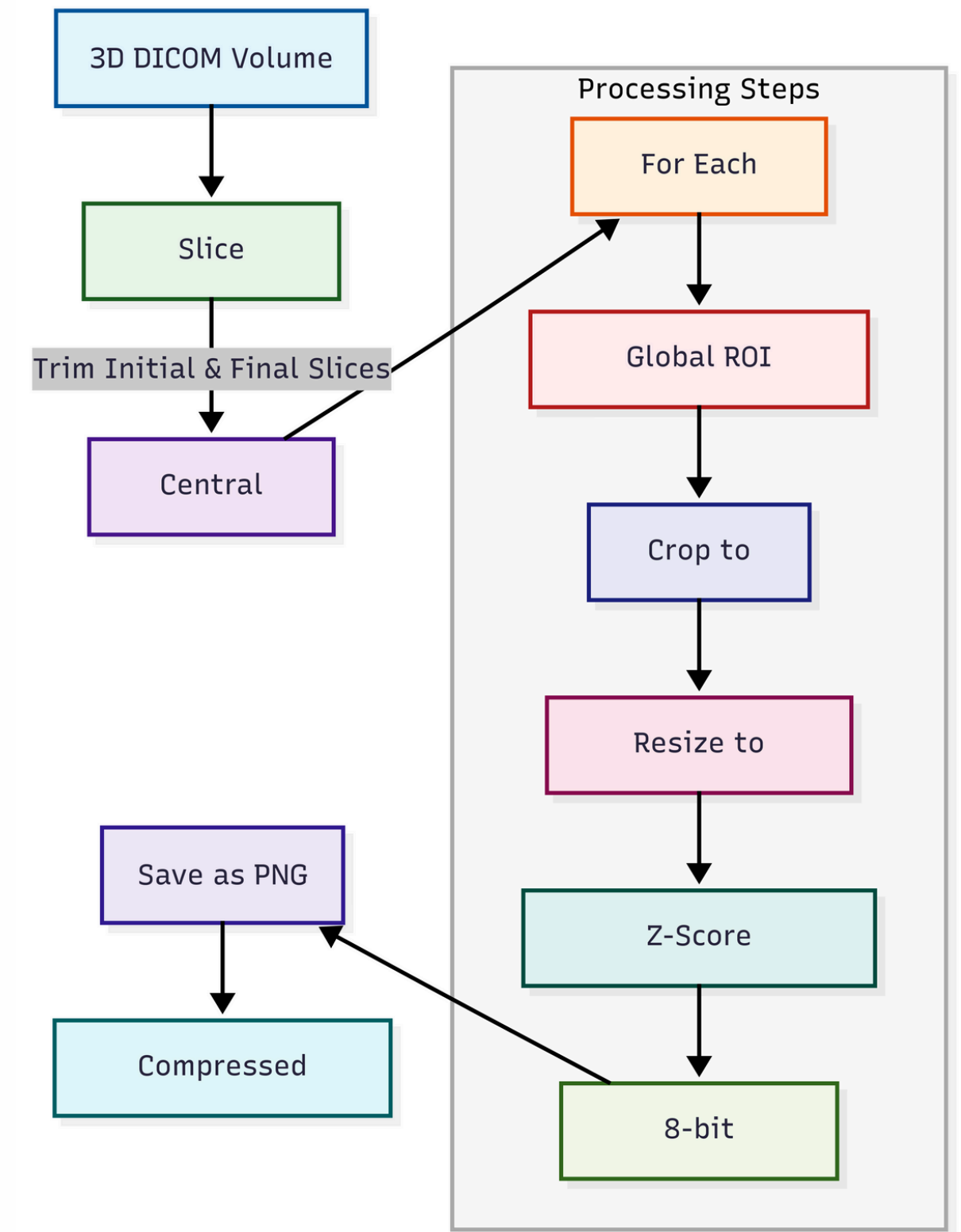
Dataset

Breast-Cancer-Screening-DBT

- 1.62TB
- DICOM Images
- Each sample ~20-200MB

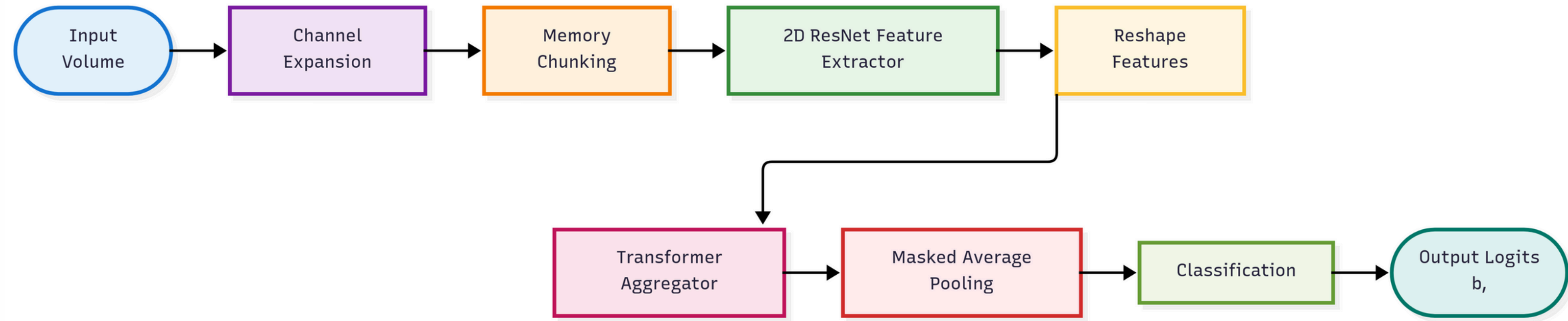
Preprocessing

- Extract a subset
- Remove initial and final slices
- Downsample remaining slices



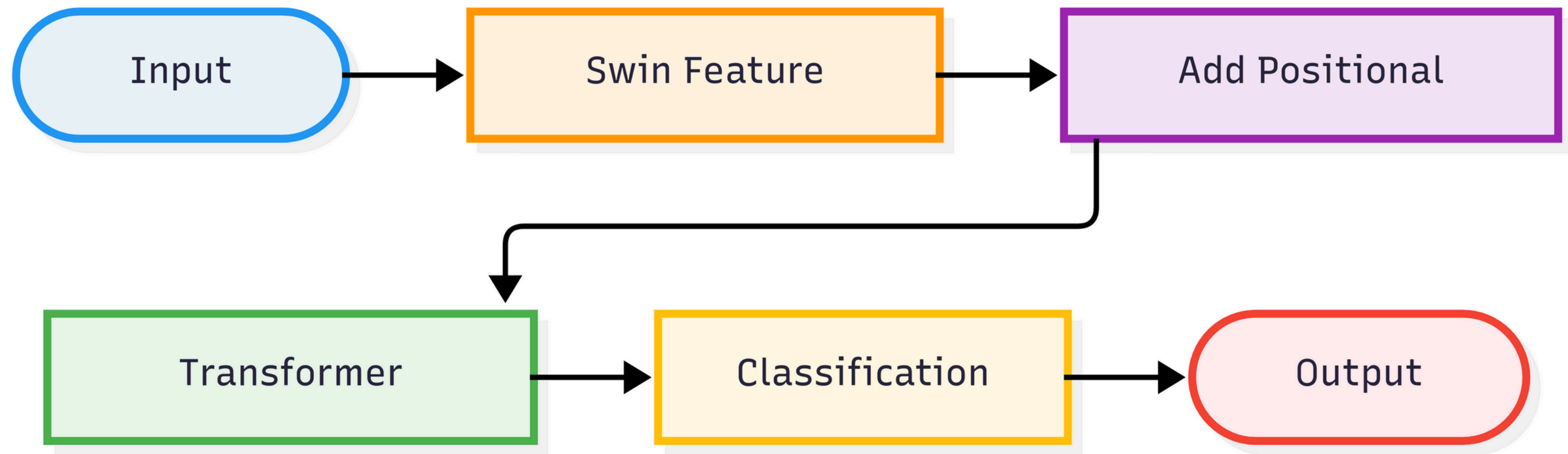
Methodology

ResNet3D



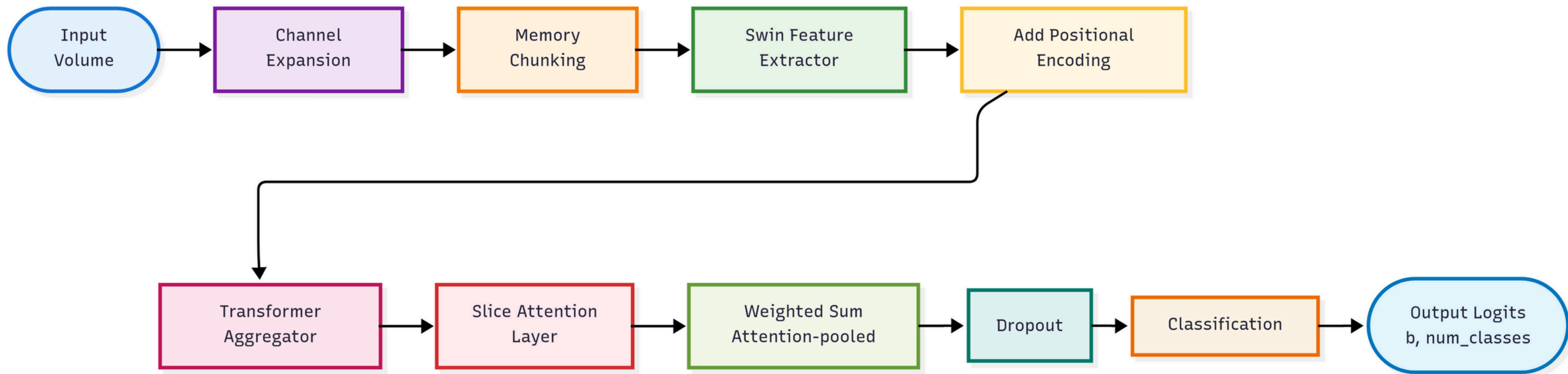
Methodology

SwinT



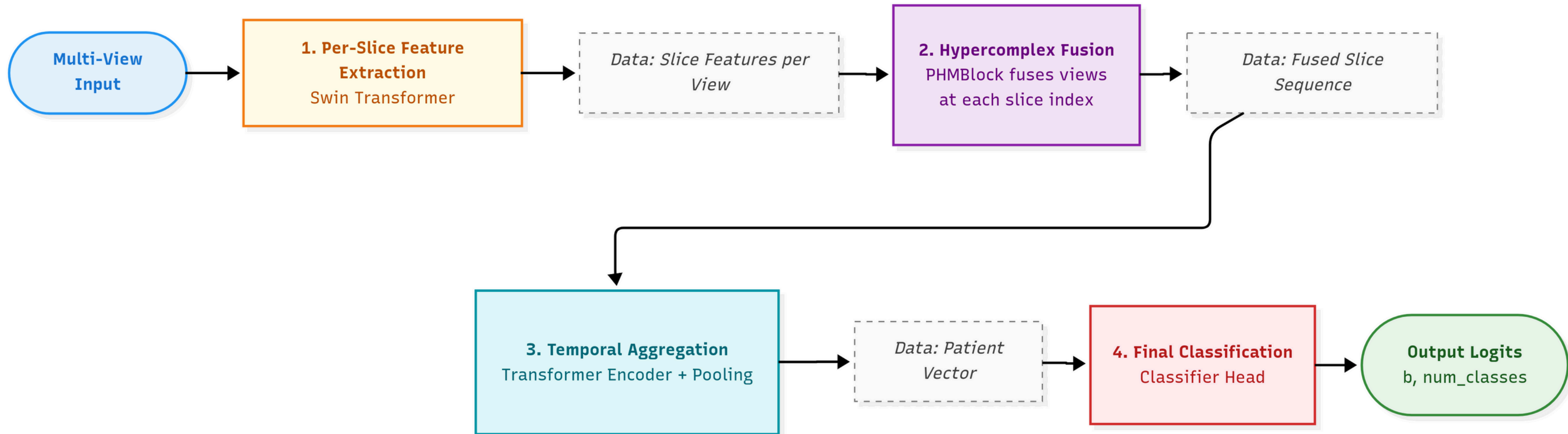
Methodology

SwinT with Attention



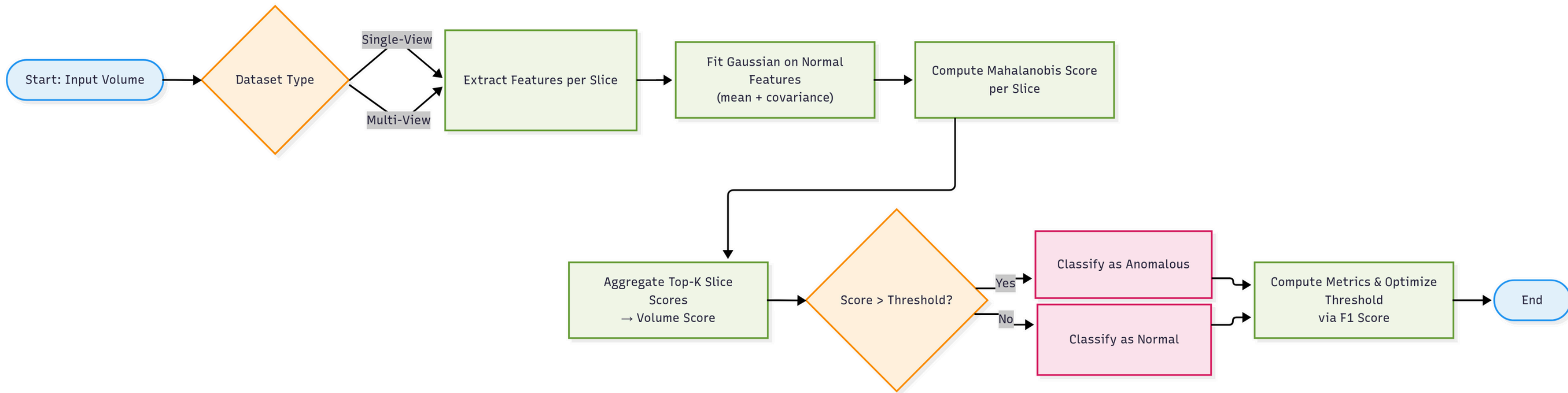
Methodology

Hypercomplex



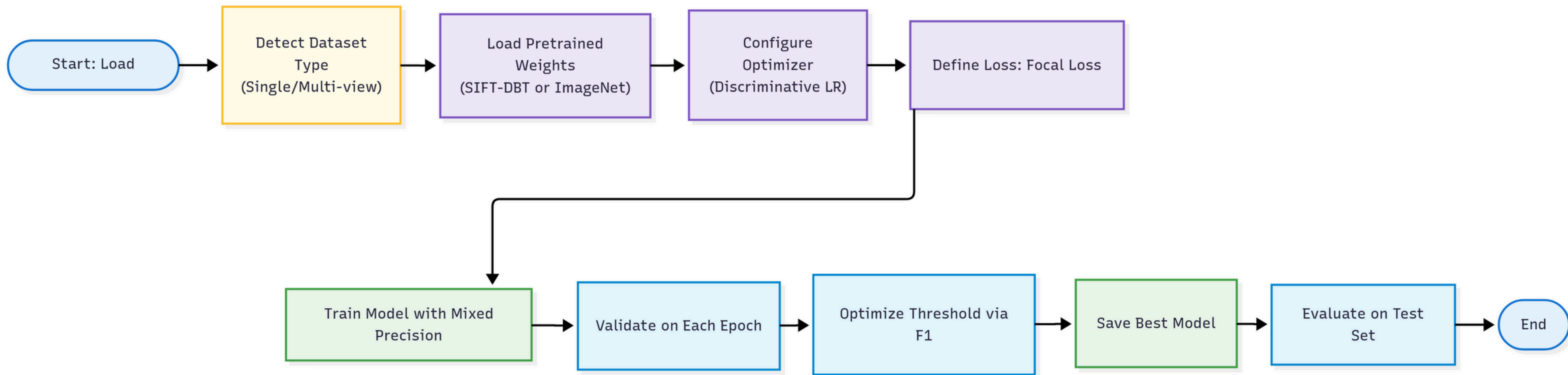
Methodology

Anomaly Detection



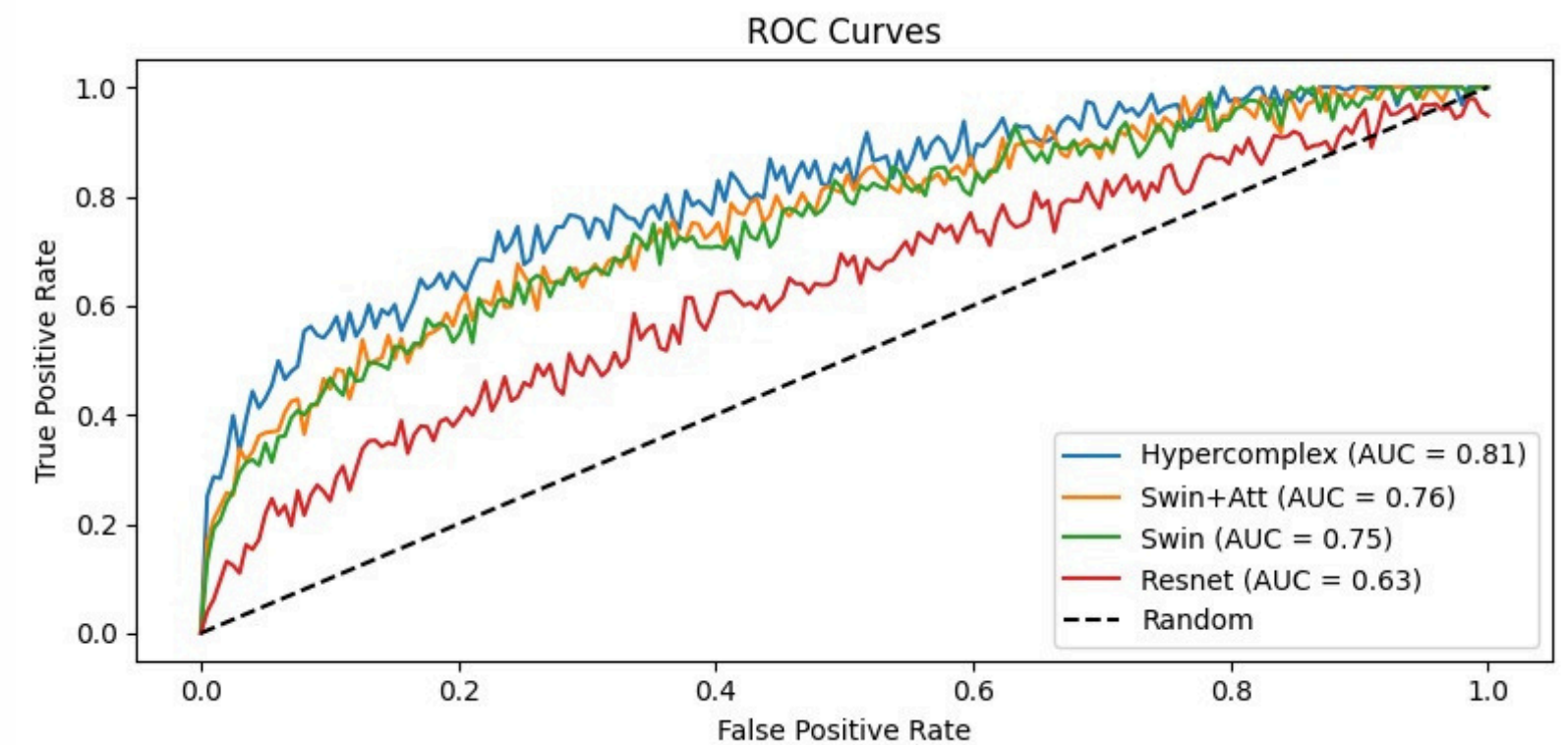
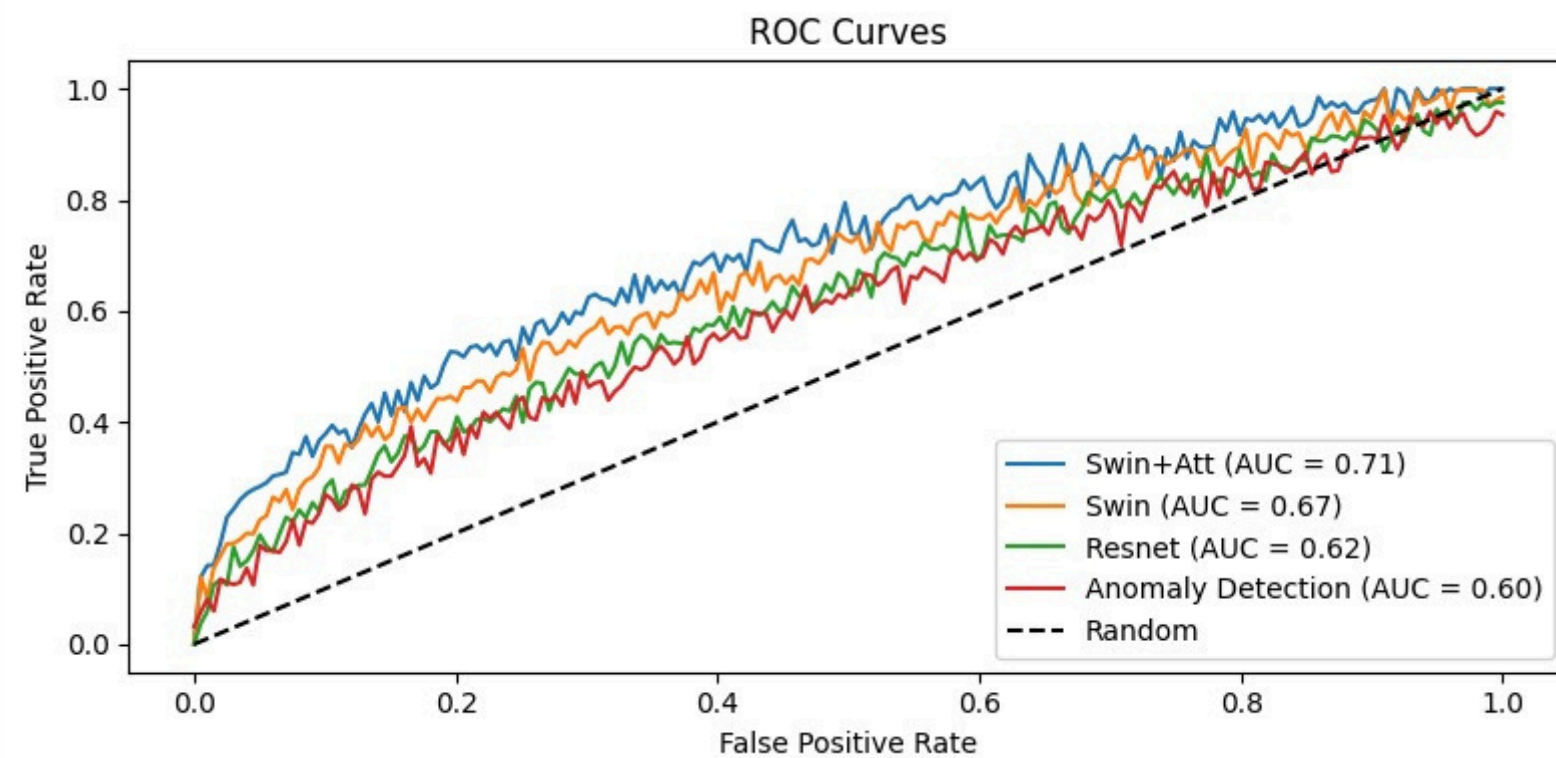
Methodology

SIFT-DBT



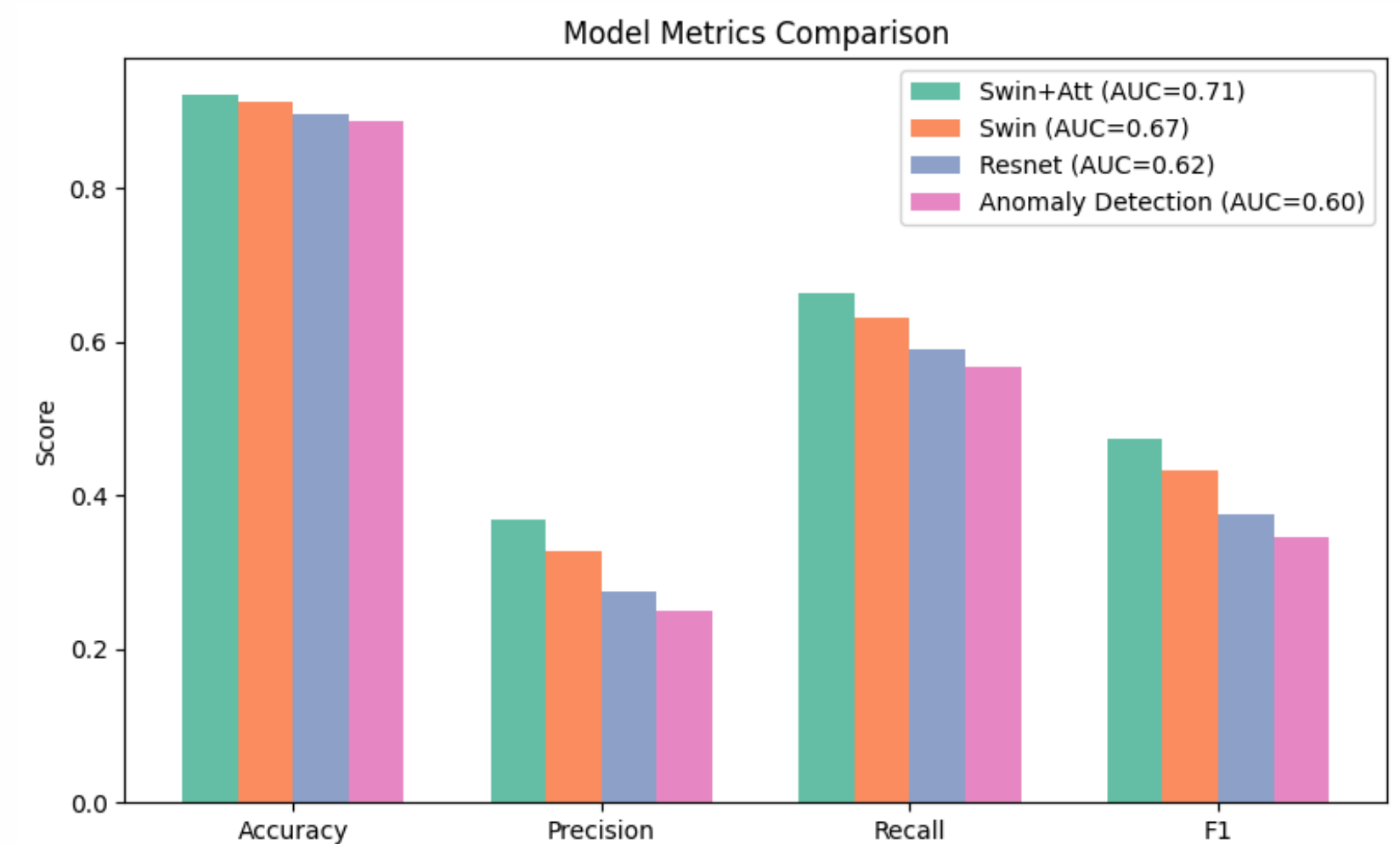
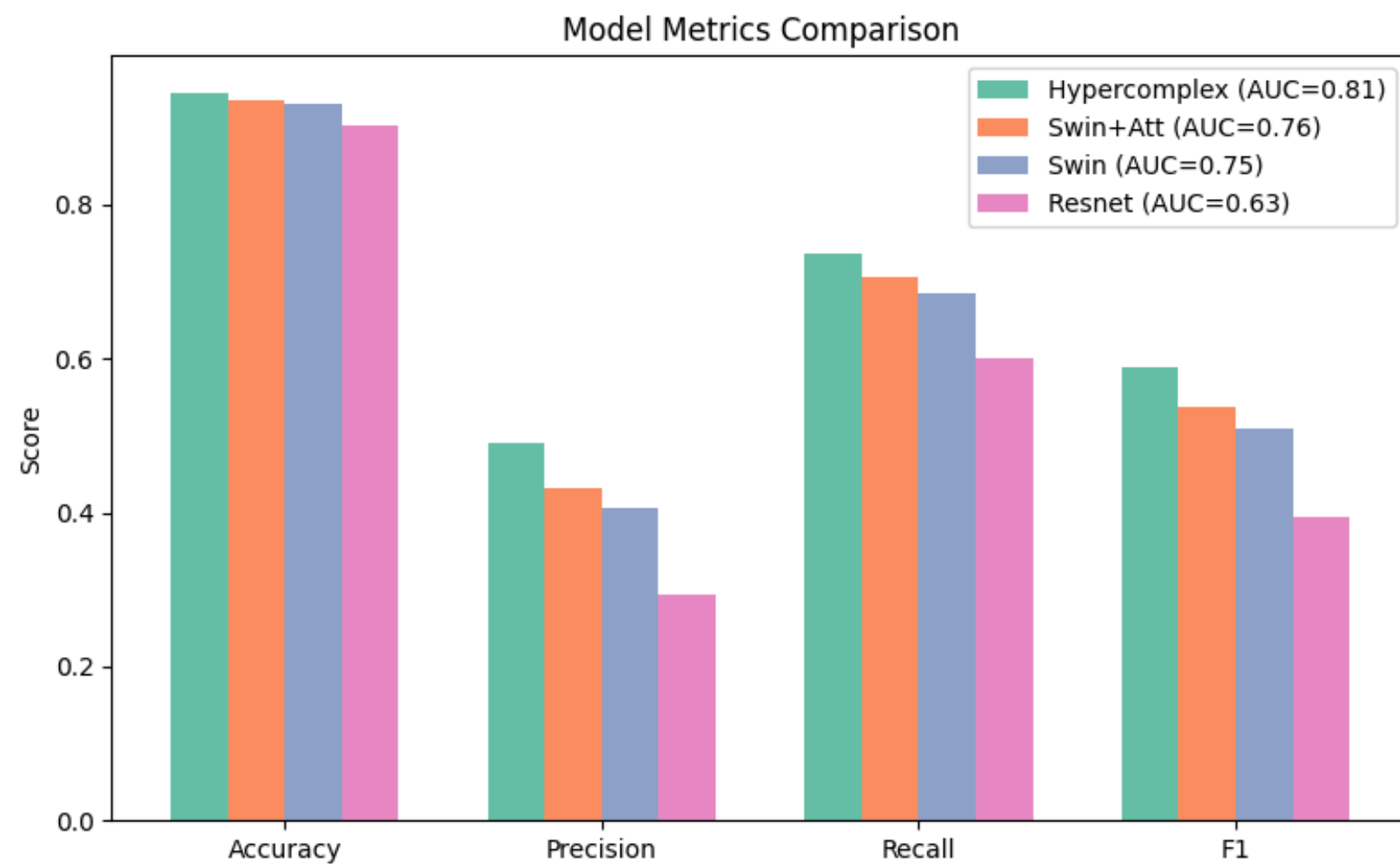
Results

Training



Results

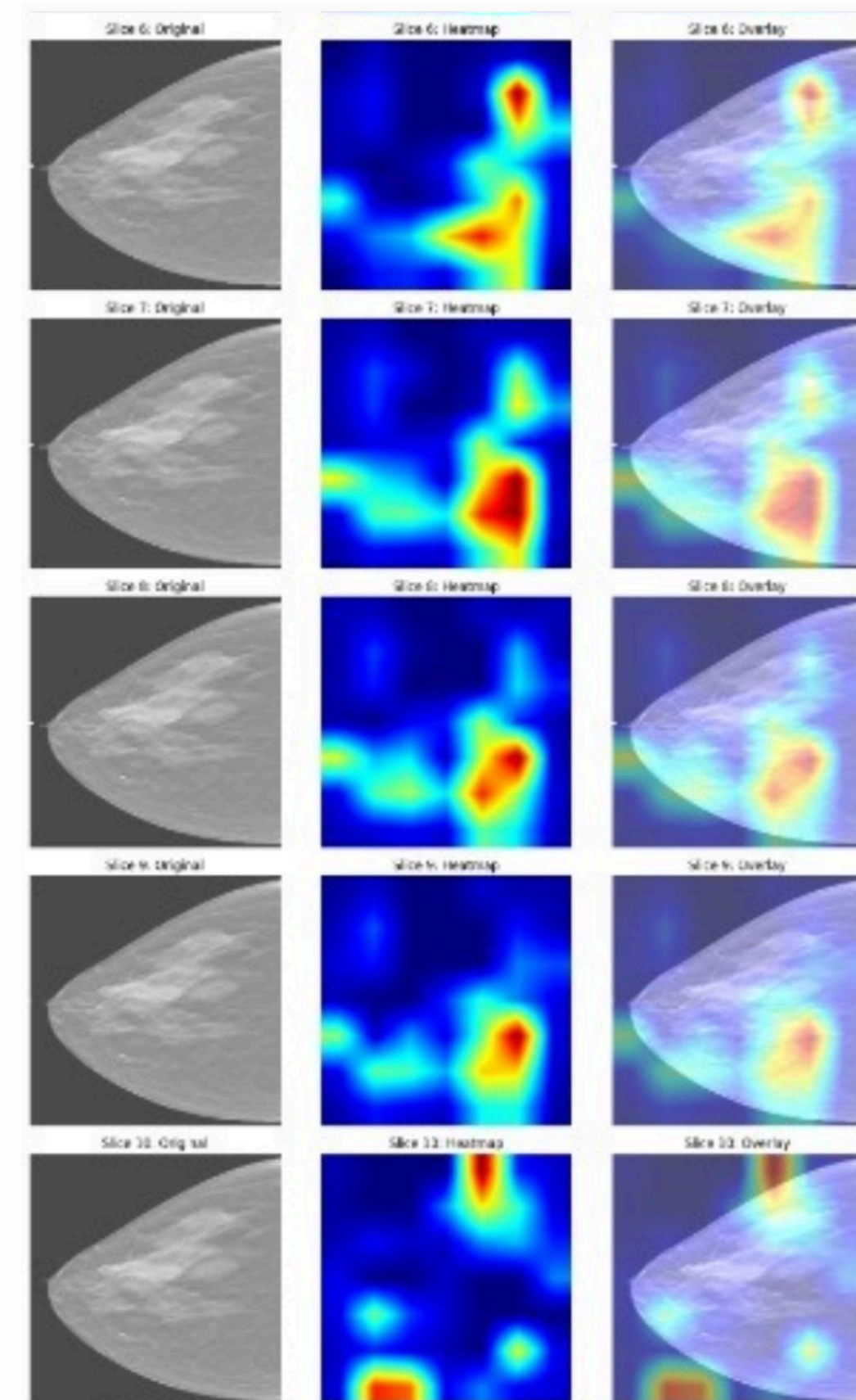
Training



Results

Attention Visualization

- Clear activations
- Useful view for interpretability



Conclusions

- Overall achieved satisfactory performance even in clear presence of limitation
- Multi-view approach greatly helps in classification

Limitations

- Large dataset with heavy samples
- Little computing power to process complex architectures and large data
- Great class imbalance

Thanks for the attention



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