

Maximizing the Accuracy of a Thinprep Cell Analysis Model on Surepath

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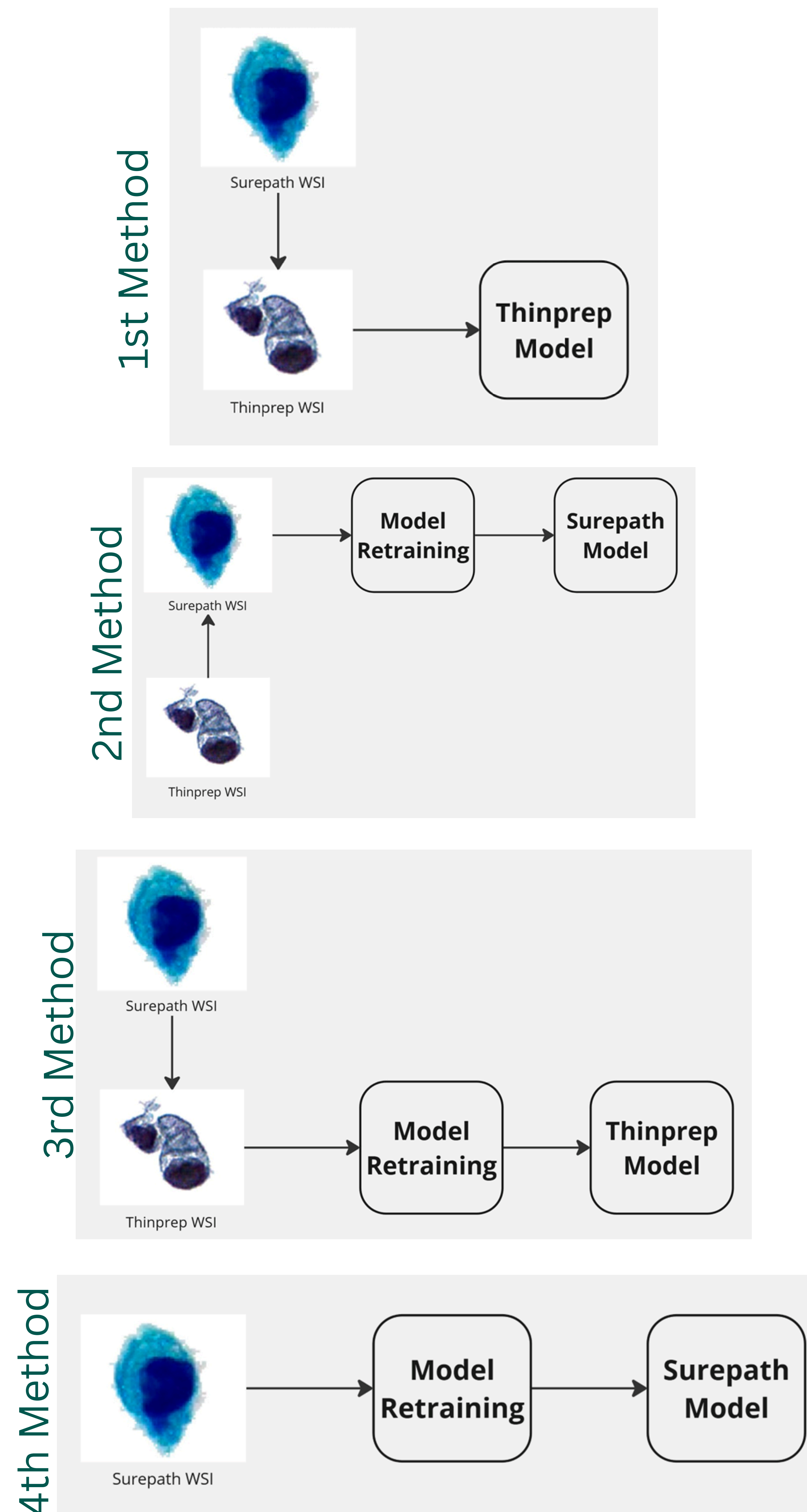
ABSTRACT

Cervical cancer and CIN affect millions of women globally, with LBC using Thinprep and Surepath for diagnosis. Dartmouth's model is effective for Thinprep but not optimized for Surepath, limiting its broader use. This project adapts the model for Surepath using CycleGAN architecture to improve diagnostic consistency. In a broader context, we attempt to find if transfer learning is beneficial or is restarting model learning better. We attempt to find what the best method of transfer learning is.

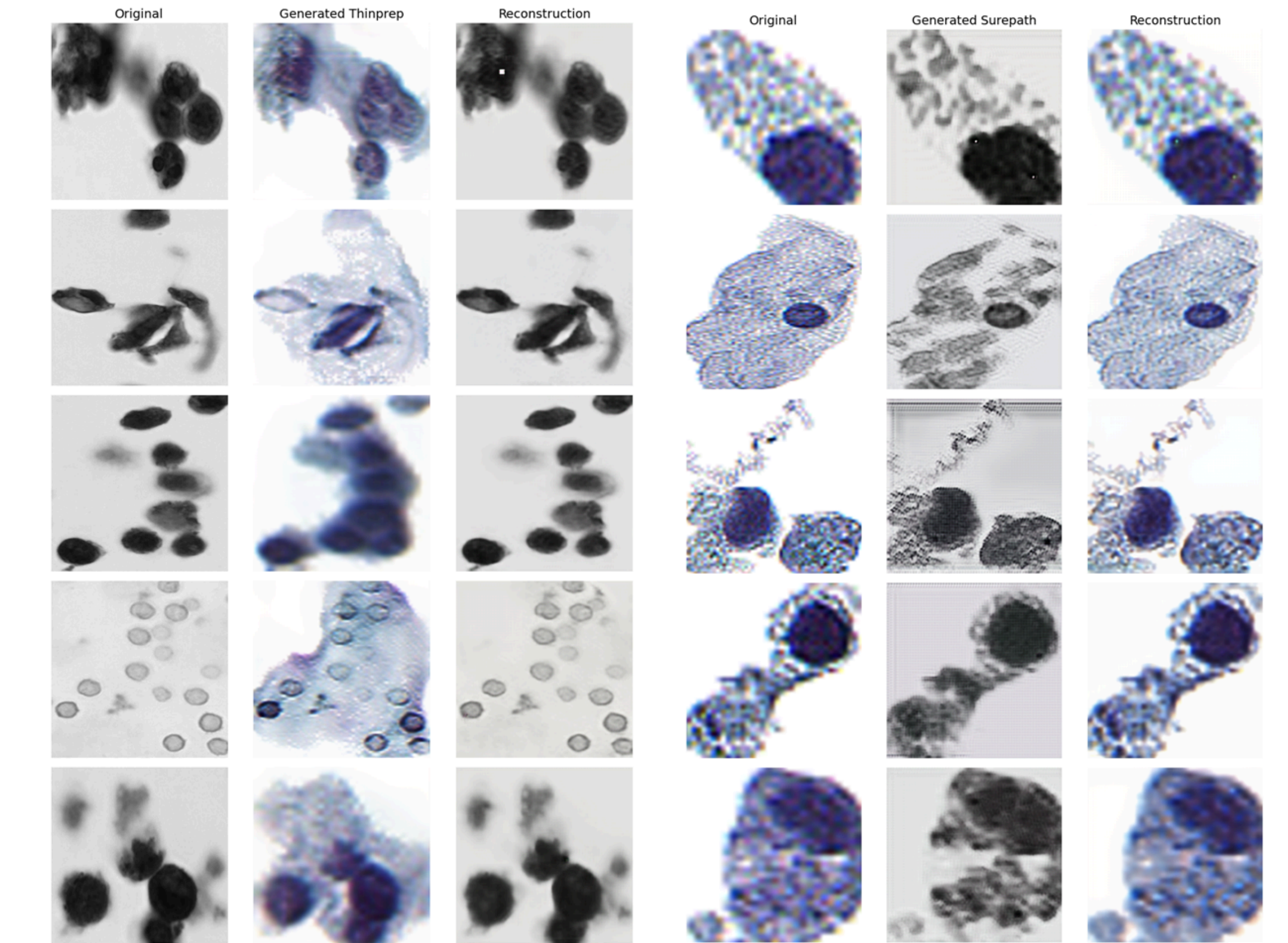
INTRODUCTION

- Cervical cancer is one of the leading causes of cancer-related deaths among women worldwide, this cancer accounts for over 300,000 deaths annually.
- Dartmouth has a Thinprep cell analysis model that can do benign/malignant cell classifications on these cervical cells.
- However, not all testing centers employ a Thinprep testing technique, which means that the current Dartmouth model is useless.
- These testing centers often employ the Surepath testing technique.
- Our goal is to find the best way we can adapt to Surepath using Dartmouth's current model.
- This project aims to answer the following questions:
 - Is it better to restart learning or transfer learning when dealing with a new domain in H&E staining?
 - What is the best way to transfer learning from one domain to another in H&E staining?
- We have two non-transfer learning methods and four transfer learning methods.
- The two non-transfer learning methods (not illustrated) are creating a brand new model and applying the current Thinprep Model to Surepath.

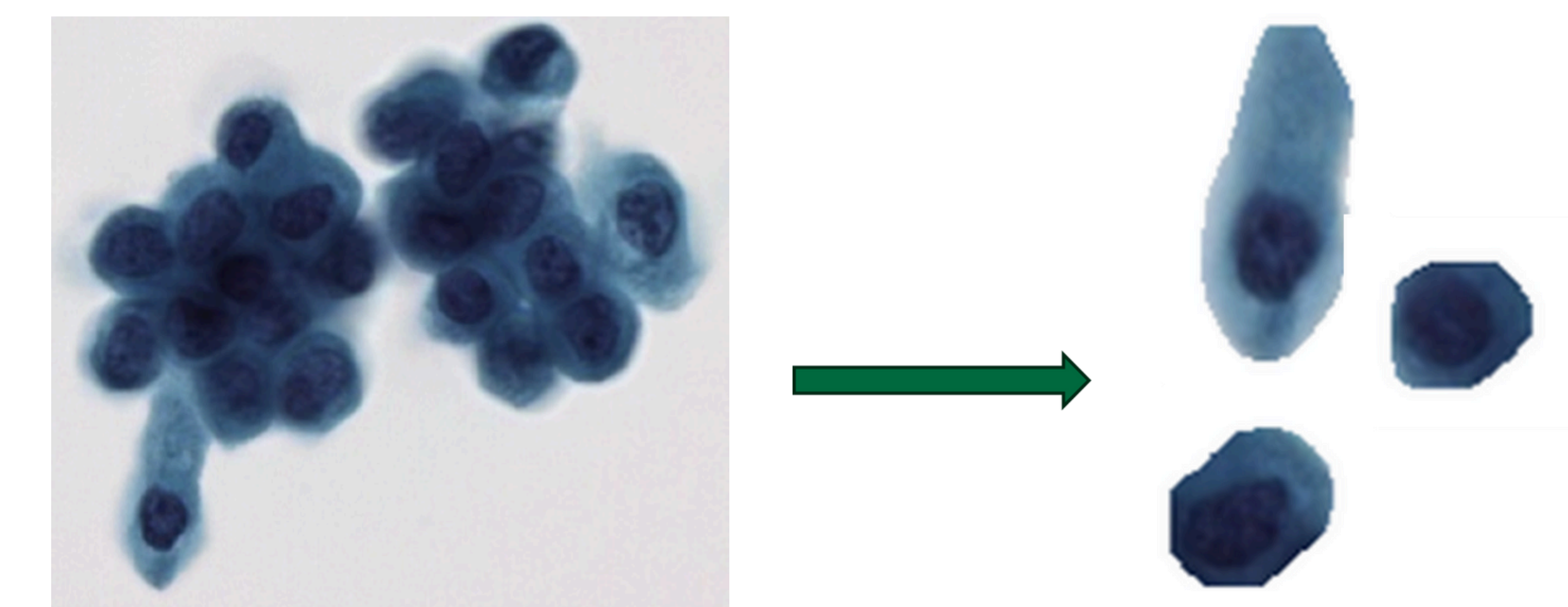
Four Transfer learning Methods



Preliminary Results



- These are preliminary CycleGAN sample images.
- The image on the left displays Surepath to Thinprep to Surepath conversion.
- The image on the right displays Thinprep to Surepath to Thinprep conversion.
- Due to an error in the way we dealt with Surepath images, the Surepath images turned into black and white images. However, we did fix this issue in the cell extraction attempt, as displayed below.



- We are working on cell extraction to significantly improve the quality of the CycleGAN results

REFERENCES

References Link:
<https://docs.google.com/document/d/1TYUzN0DfHAQ1mhjpJRLdbc3XAZfpoRC9utN7BOTbu0A/edit?usp=sharing>

