

Computer Assisted Approach to Improve the Detection of Tall Cell Variant of Papillary Thyroid Carcinoma

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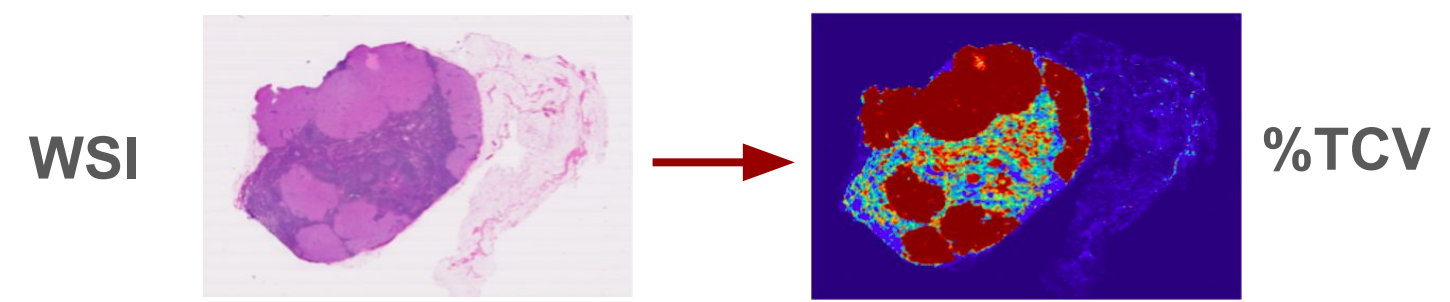


Tall Cell Variant

- Tall Cell Variant (TCV) is an aggressive subtype of Papillary Thyroid Carcinoma (PTC) that composed of cells that are at least three times taller than they are wide in at least 30% of given tumor estimate by visual assessment.
- There is significant subjectivity and lack of agreement in the identification and reporting of TCV PTC among expert pathologists.

Goal

- This work aims at utilizing digital histology images to develop a computer-assisted objective approach to diagnose TCV more precisely.
- Our workflow addresses two main challenges: (a) the multiscale morphological complexity in TCV and (b) intra-observer variability in TCV diagnosis.

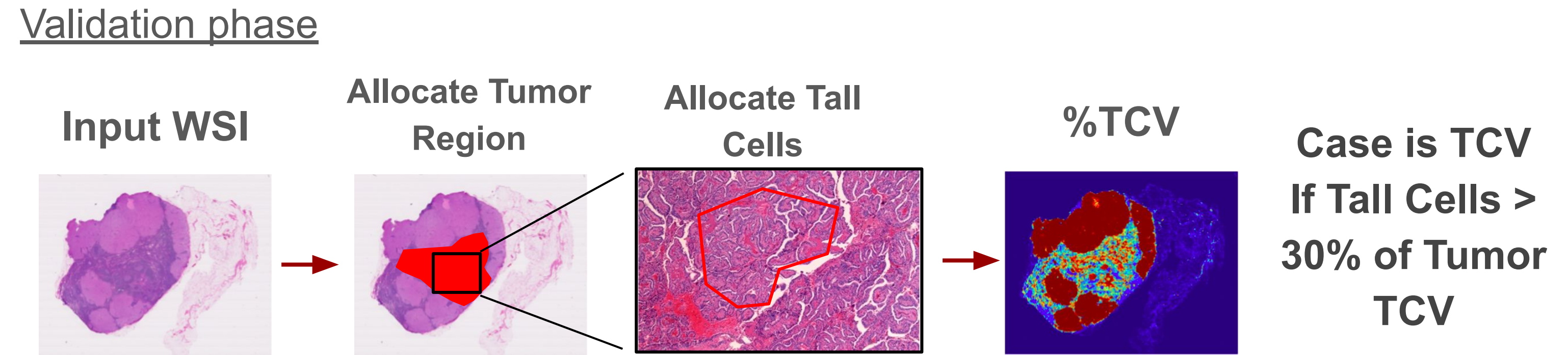
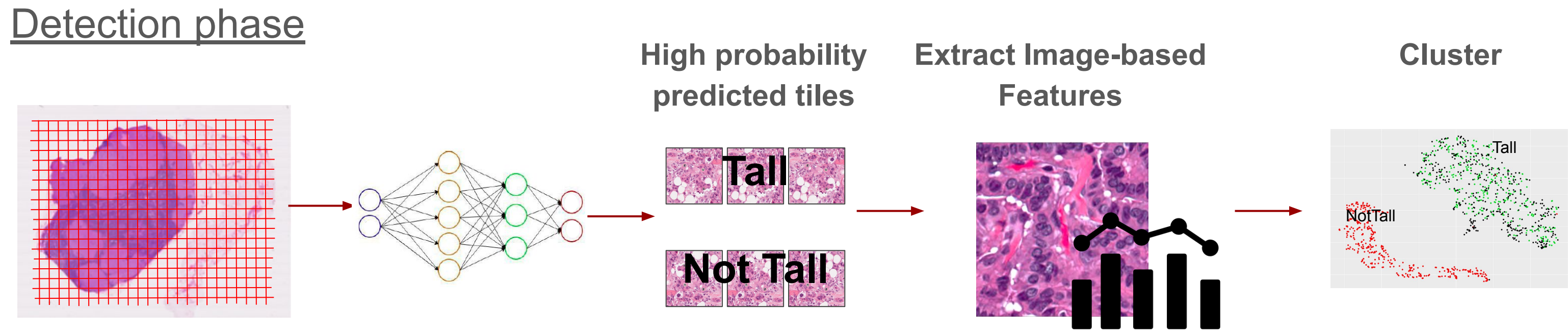
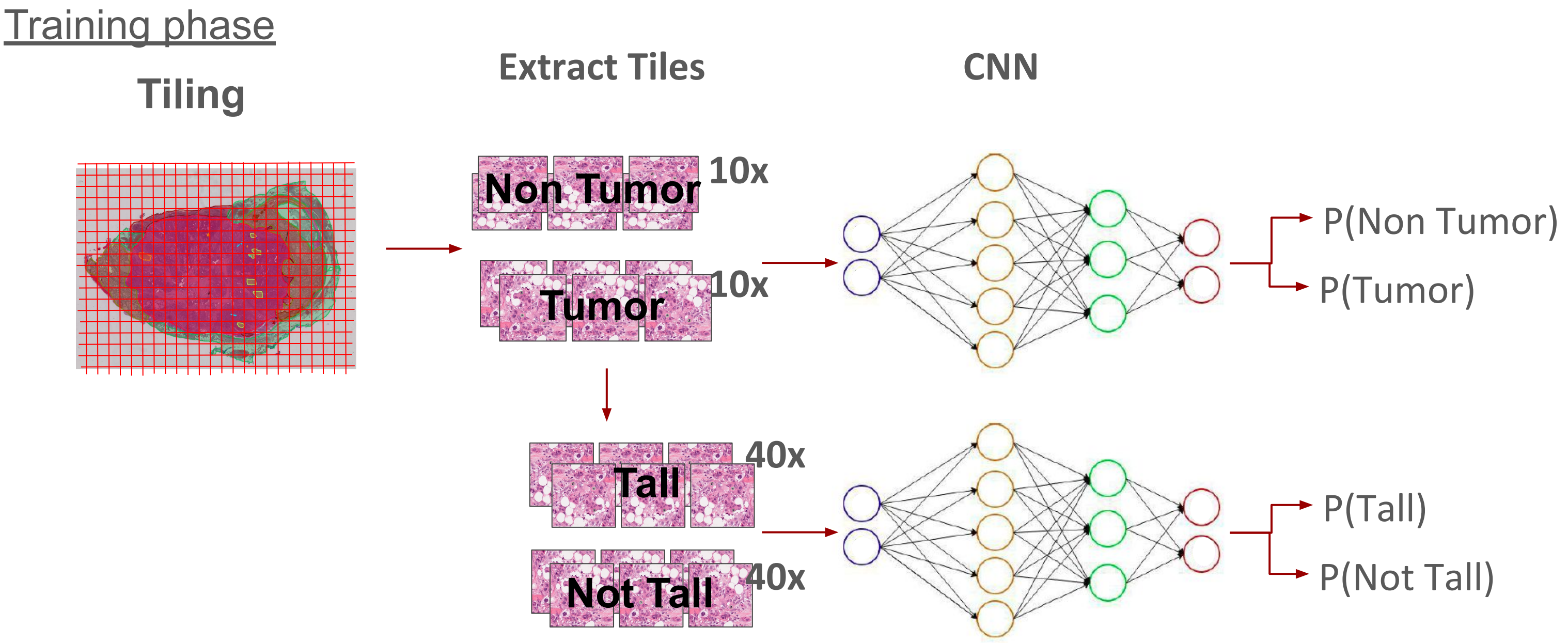
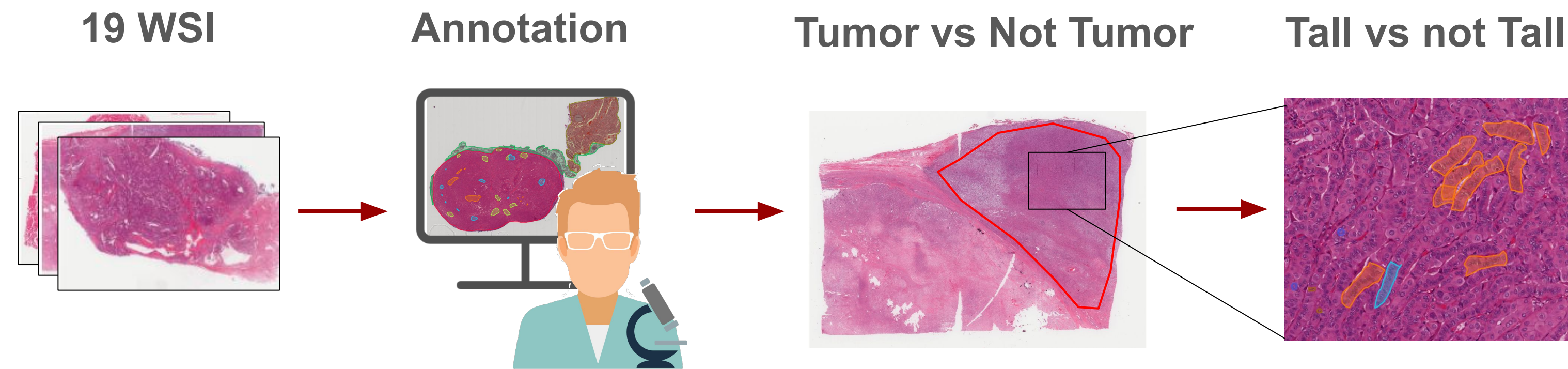


Data

- 19 WSI:**
- 8 TCV (tall cell variant)
 - 8 CPTC (CPTC=classical PTC)
 - 3 FTCV (tall cell features <30%)
- Tiles:**
- Augmented using geometric transformation
 - Tiles 512x512 pixels

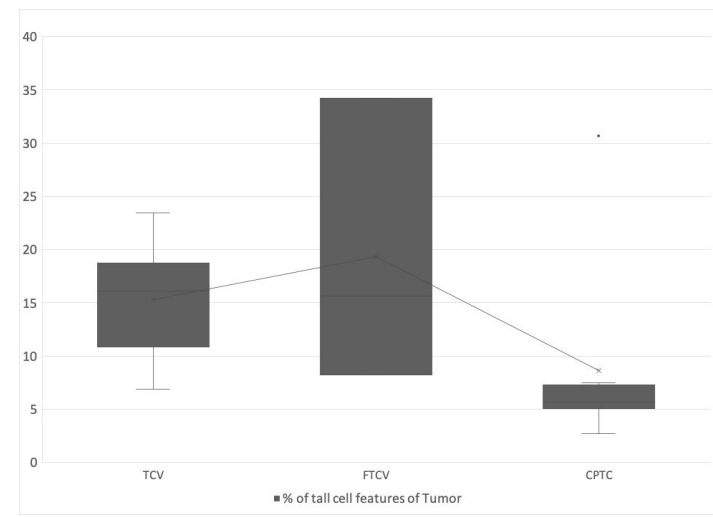
	Tumor	Non Tumor
10x	17388	21385
20x	487584	679769
	Tall	Non Tall
40x	5928	9616

Method and Design



Results

- The CNN showed 92% overall accuracy (#true positive/ #total tiles) in detecting tumor regions.
- Our findings allow the identification of tall cell feature with 75% accuracy.
- Using a threshold of (0.4) for predicting tall cell features, the percentage of tall cell features in all cases are reported as the following:



Conclusion

- A fine-tunes pretrained Resnet50 architecture provides an accurate and confident CNN model to predict tumor, tall cells features.
- Digital image analysis potentially transcend visual assessment in quantifying tall cells in TCV-PTC.
- None of our cases met the percentage threshold proposed (30%) for TCV-PTC.
- Our findings tends to challenge the current diagnostic criteria for diagnosing TCV-PTC
- We predict even further increases in accuracy as additional training images are collected from future intra- and inter departmental cases.

E-Poster QR

