

# Classification of Molecular Subgroups of Head and Neck Cancer with Histological Sections

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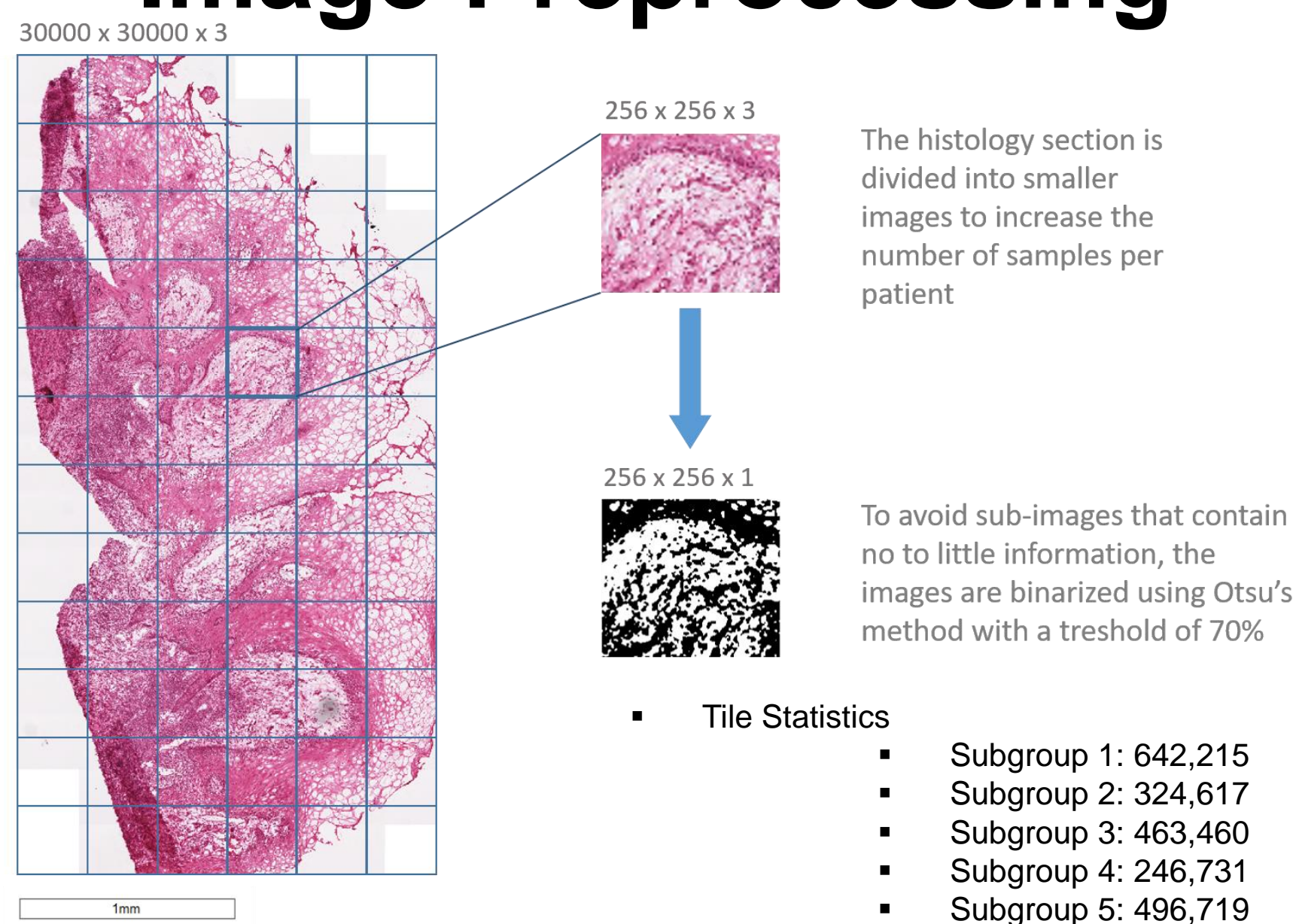
## Motivation and Background

- Recent research found 5 possible molecular subgroups of head and neck cancer<sup>2</sup>
- Currently there is no focused/individual cancer treatment
- Currently, DNA screening is required to identify the subgroup – this is very costly and not often performed
- The goal of this project is to identify the molecular subtypes from pathological images

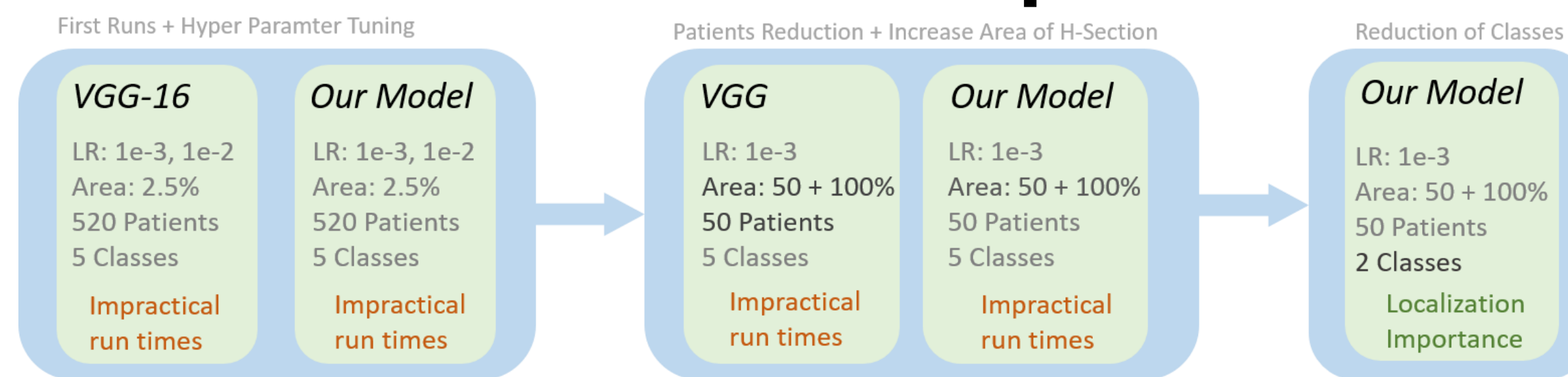
## Data

- The Cancer Genome Atlas (cancergenome.nih.gov, TCGA project)
- Head and Neck Cancer: 520 Patients
  - Subgroups 1: 148; 2: 79; 3: 113; 4: 60; 5: 120
- Images are approx. 30,000x30,000
- High resolution details are important features
- Labels: Unsupervised clustering of DNA methylation data
  - Shift from clinical factors to biological features

## Image Preprocessing



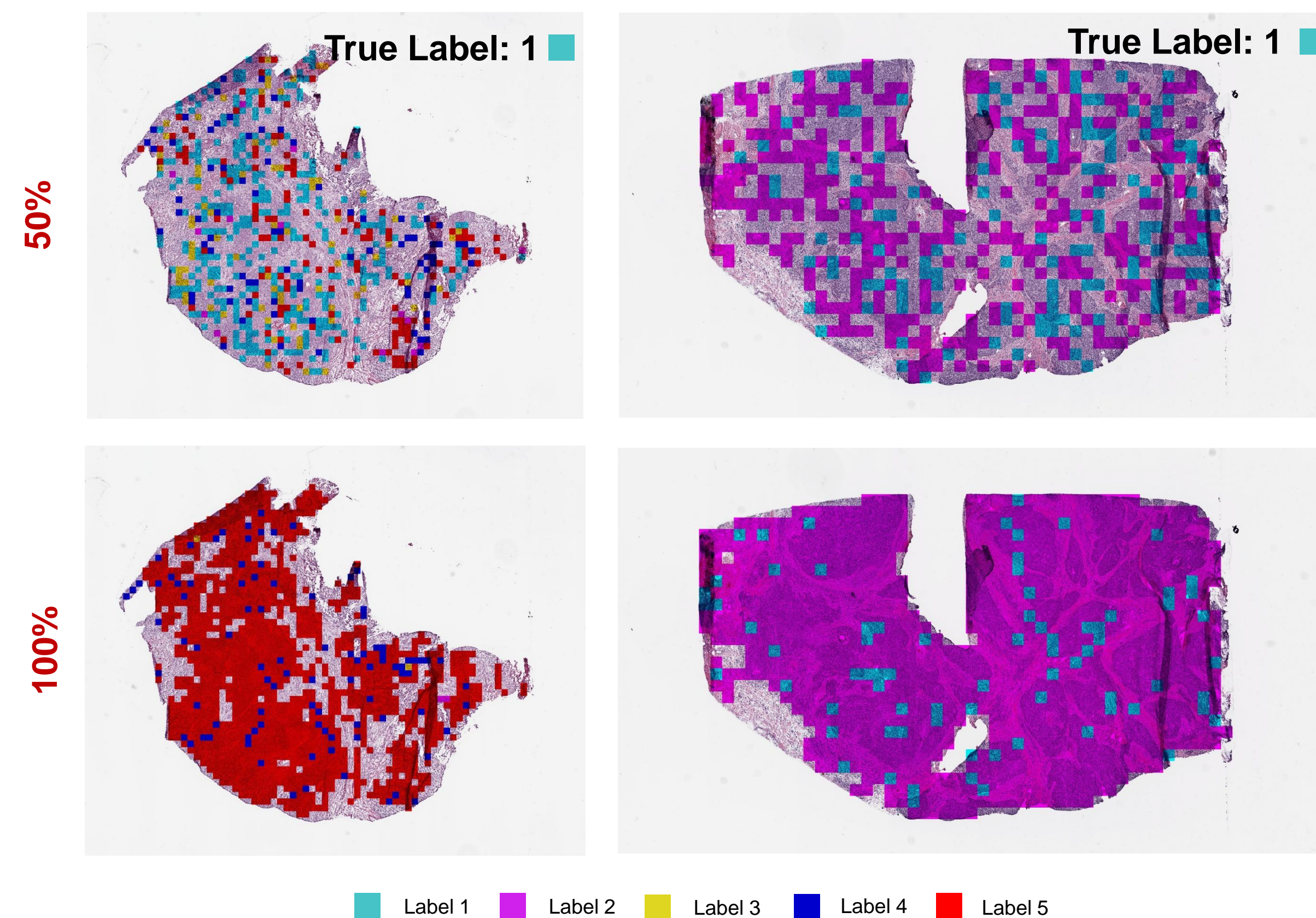
## Experiments & Results



50 Patients - Our Model

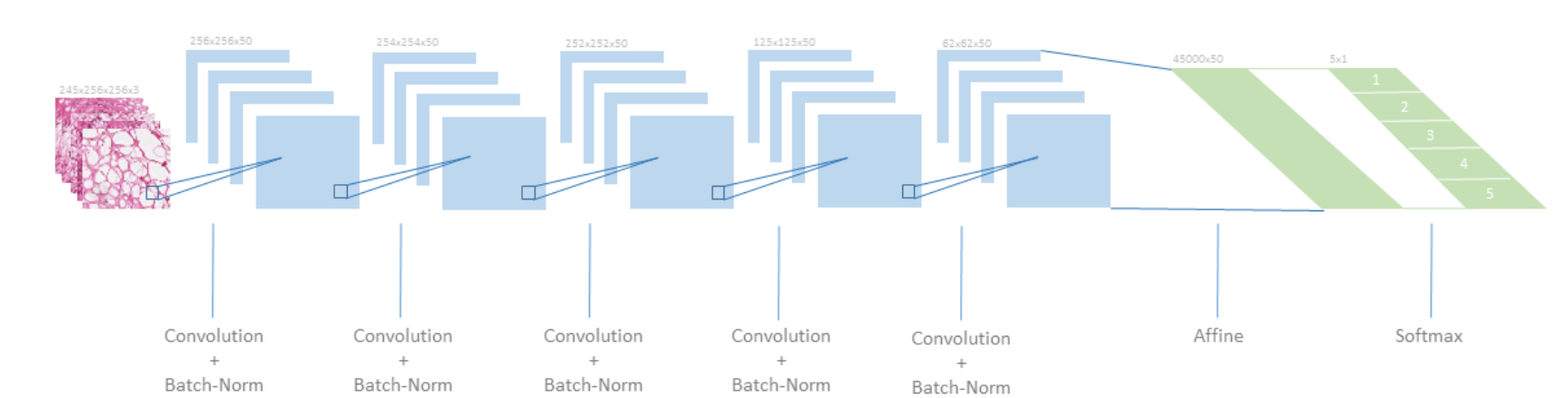
5 Classes

2 Classes

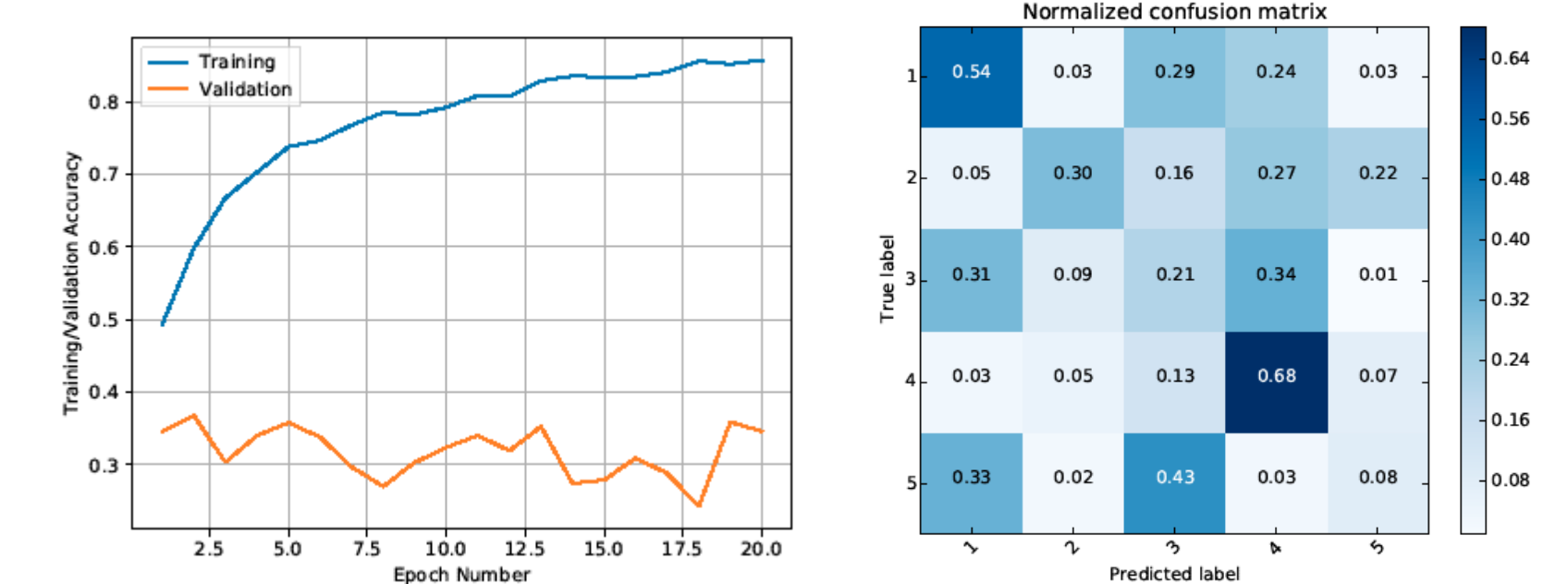


- Localization is very likely to play an important role: the entire histology section should be used
- Medical professional input is required to assert that DNA information is contained in images
- Validation must be interpreted with care: localization + low # patients
- Computational resources are critical

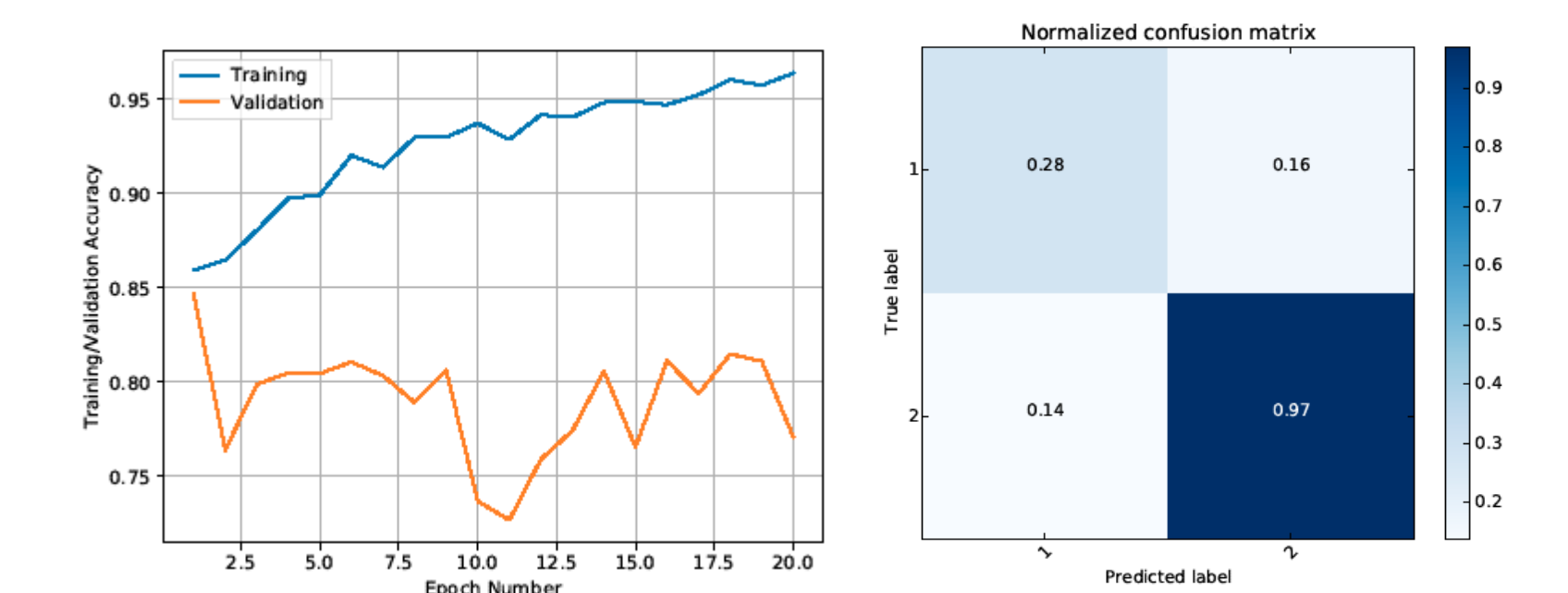
## Our Model



50 Patients - Our Model – 5 Classes – 50%



50 Patients - Our Model – 2 Classes – 50%



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[2] K. Brennan, J. Koenig, A. Gentles, J. Sunwoo, and O. Gevaert. Identification of an atypical etiological head and neck squamous carcinoma subtype featuring the cpq island methylator phenotype. *EBioMedicine*, 17:223–236, 2017.

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[4] R. L. Grossman, A. P. Heath, V. Ferretti, H. E. Varmus, D. R. Lowy, W. A. Kibbe, and L. M. Staudt. Toward a shared vision for cancer genomic data. *New England Journal of Medicine*, 375(12):1109–1112, 2016.

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