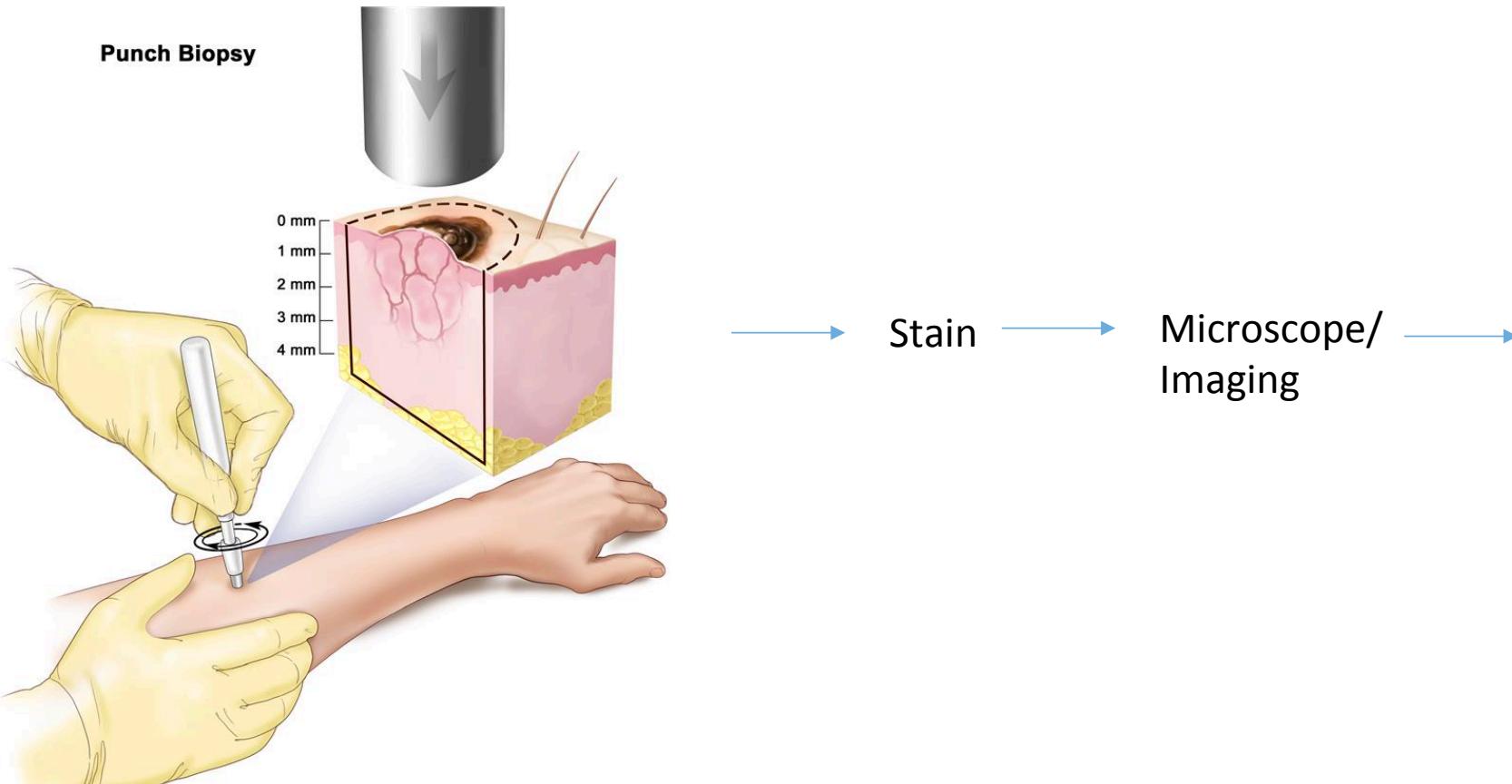


# Convolutional Neural Network Based Classification of Histopathologic Neoplastic Tissue

Aadi Kalloo

# Procedure



# Issues With Current Paradigm

Interobserver Agreement Between Pathologists Assessing Tumor-Infiltrating Lymphocytes (TILs) in Breast Cancer Using Methodology Proposed by the International TILs Working Group

## Methods

Tumor-infiltrating lymphocytes were assessed on a single hematoxylin and eosin (H&E)-stained slide obtained from the core biopsy of 75 triple-negative breast cancers. Four pathologists independently reviewed each slide and evaluated stromal TILs (sTILs) and intratumoral TIL (iTILs). The kappa statistic was used to estimate interobserver agreement for

## Results

The kappa statistic for sTIL evaluation was 0.57 (standard error, 0.04). For iTILs, the ICC calculated to determine internal consistency within raters was 0.65 (95 % confidence interval [CI] 0.56–0.74;  $p < 0.0001$ ), and the ICC calculated to determine agreement among raters was 0.62 (95 % CI 0.50–0.72;  $p < 0.0001$ ). In 10 cases (13 %), there was not agreement between three of four pathologists. The pathologic features contributing to difficulty in TIL enumeration

## Interobserver Agreement on Histopathological Lesions in Class III or IV Lupus Nephritis

**Design, setting, participants, & measurements** A link to a survey containing pictures of 30 glomeruli was provided to all 360 members of the Renal Pathology Society; 34 responses were received from 12 countries (a response rate of 9.4%). The

**Results** Intraclass correlation for the presence of a class III/IV lesion was 0.39 (poor).

# Data Source

**CANCER**  
Digital Slide Archive

**Select Patients**

BLCA

Available Slides: 1085

[Filter by Name](#)

[Clear Filters](#)

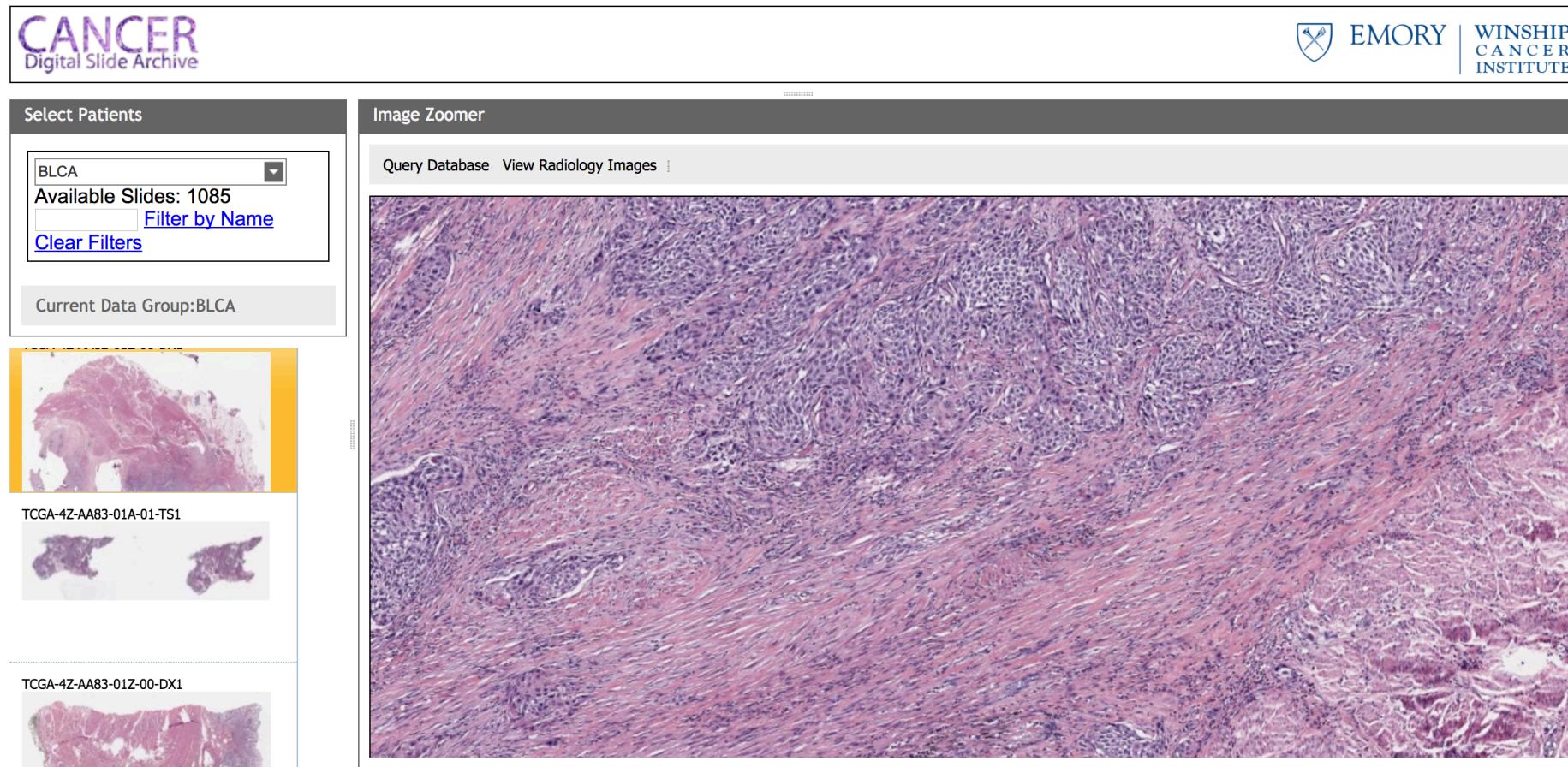
Current Data Group:BLCA

TCGA-4Z-AA83-01A-01-TS1

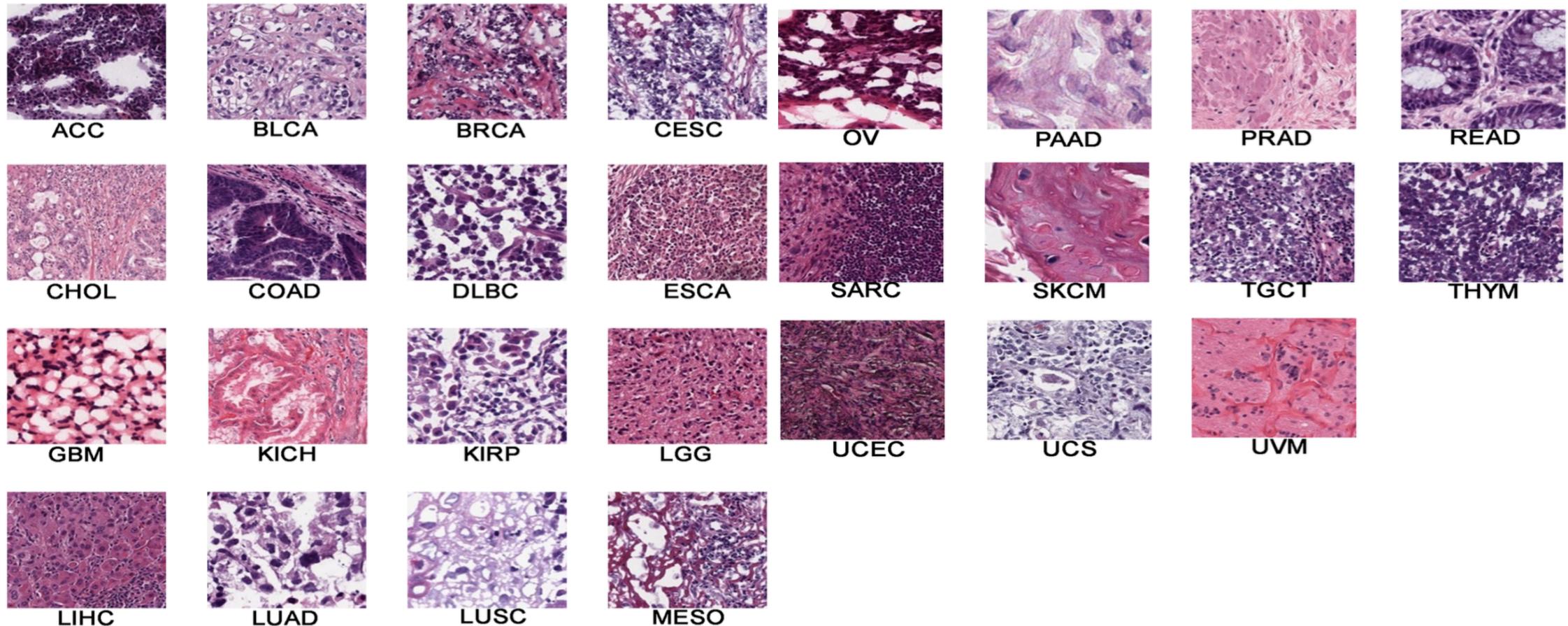
TCGA-4Z-AA83-01Z-00-DX1

**Image Zoomer**

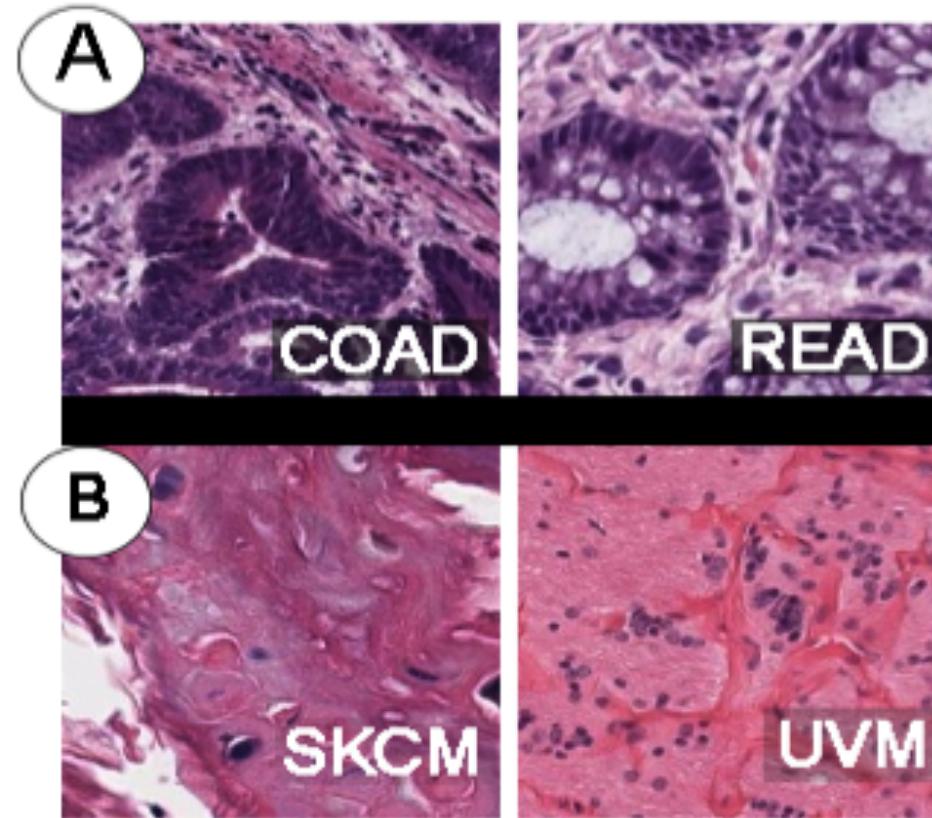
Query Database View Radiology Images



# Illustrations of Cancer Types Used



# Visual Similarities Between Cancer Types



# Representation of dataset classes vs human population

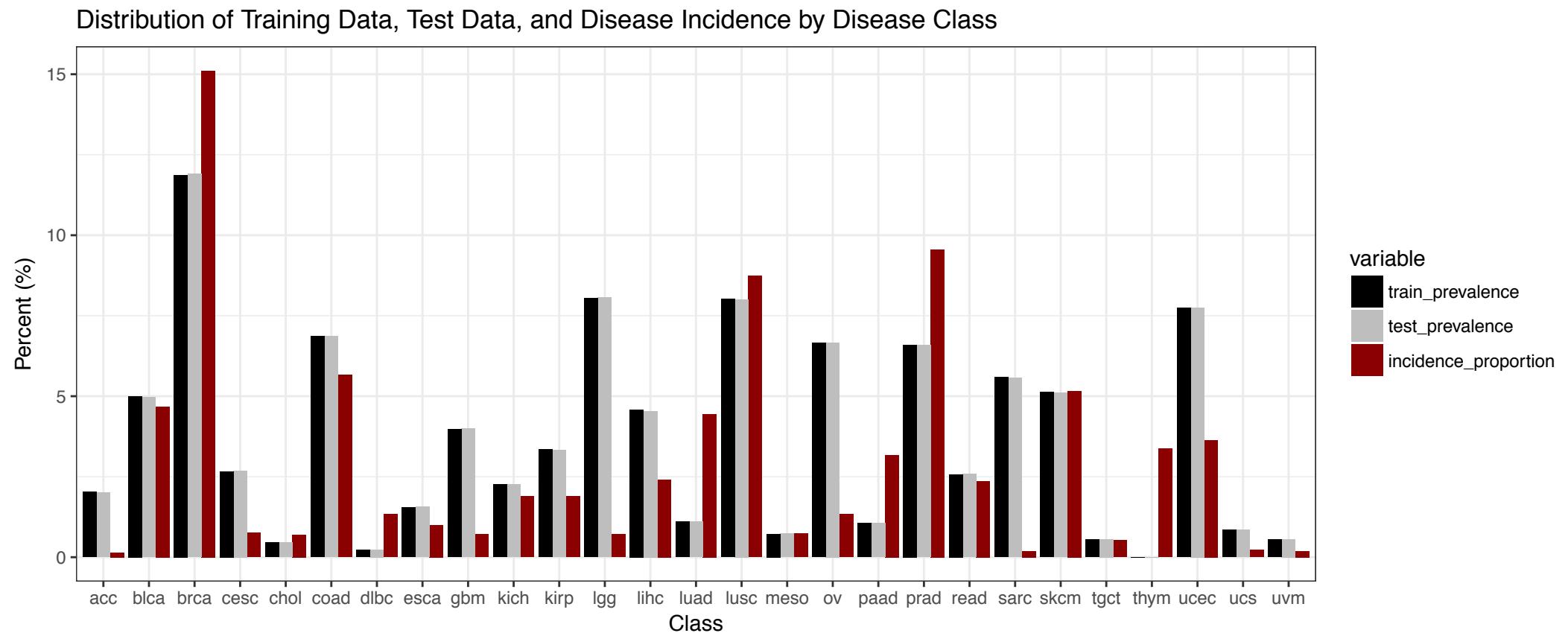


Table 1: Training and architecture parameters for models used

Model.Name	Conv.layers	Total.FCN	Optimizer	Total.Epochs
Model A	10	411	Adadelta	200
Model B	16	10027	Adadelta	200
Model C	42	1051	Adadelta	200
Model D	42	10027	Adadelta	200
Model E	42	100027	Adadelta	200
Model F	42	100027	Adadelta + Adagrad	400

### Training History: Validation Accuracy vs Epoch

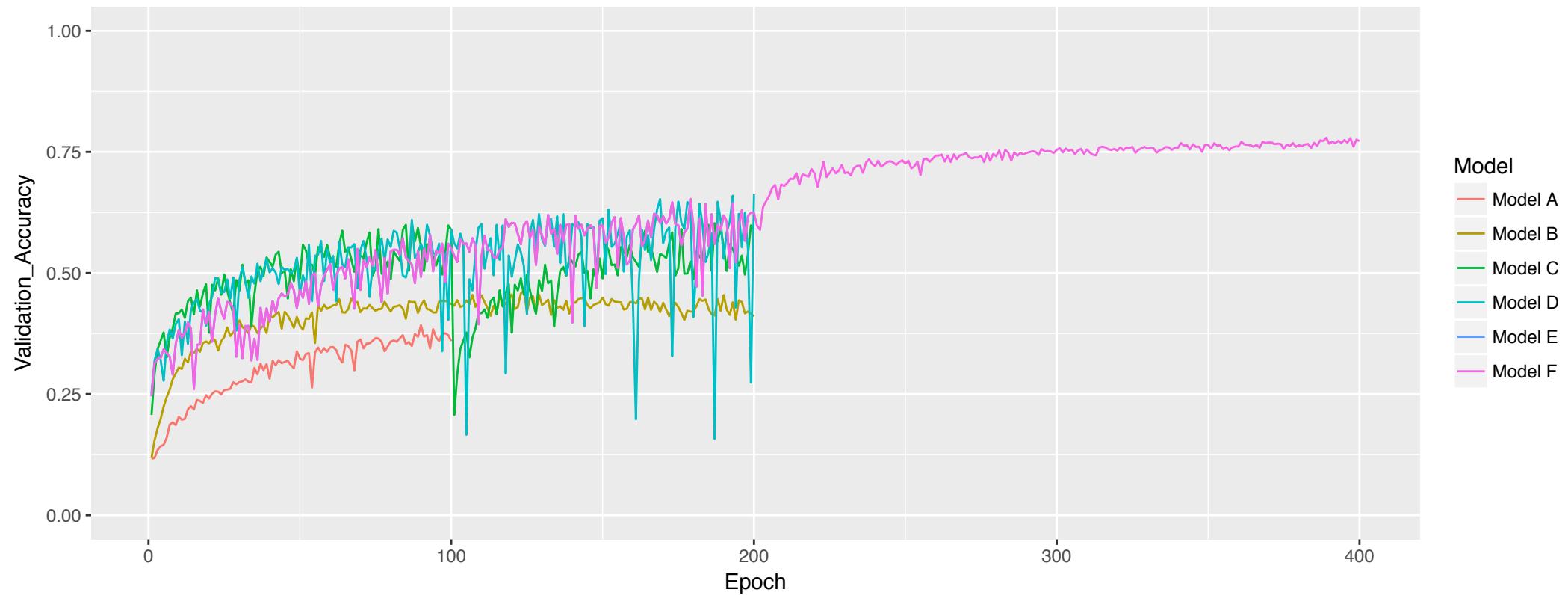
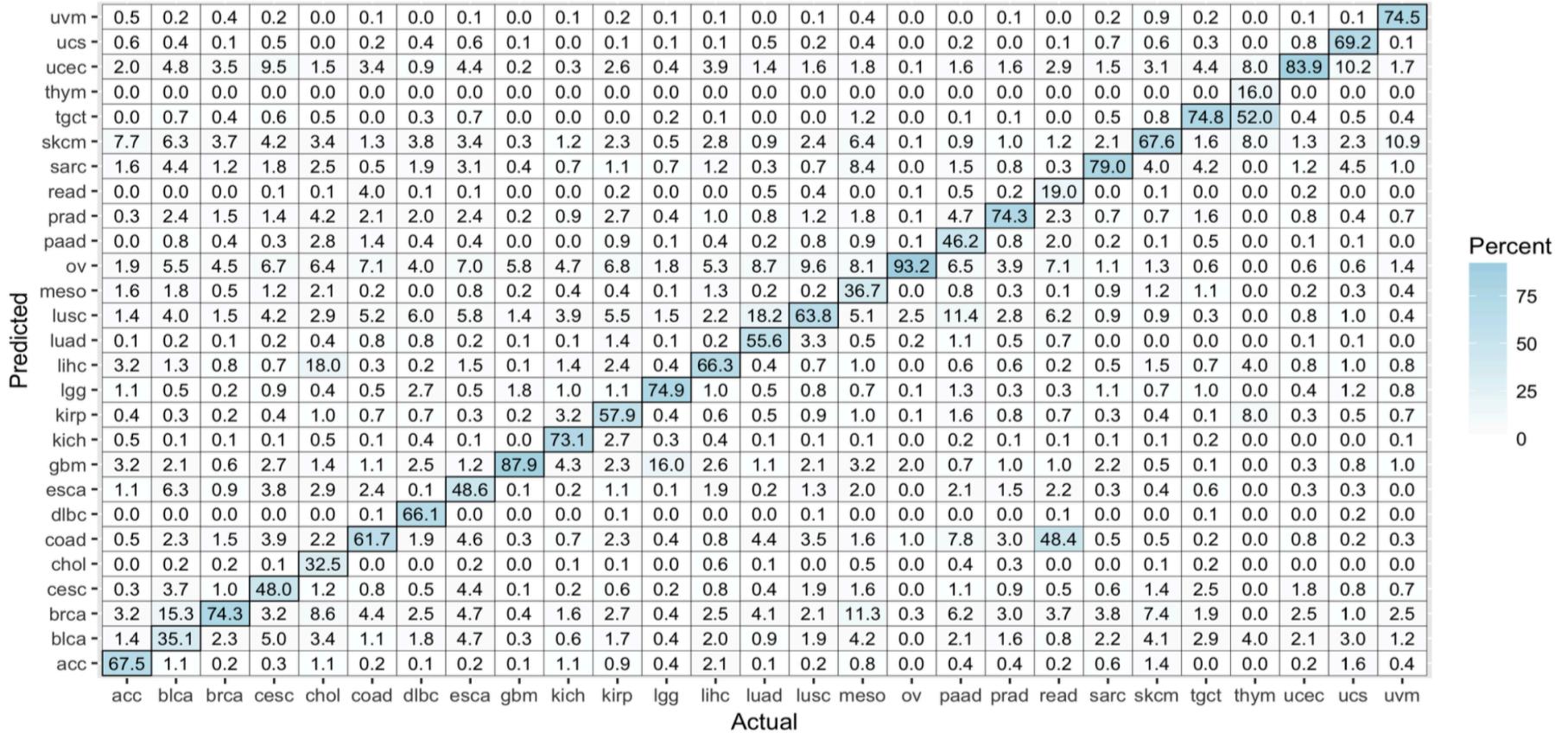


Table 2: Model performance with comparison statistics

model_name	accuracy	Recall_macro	Precision_macro	Kappa	Weighted_Kappa
Model F	0.685	0.610	0.653	0.664	0.640
Model D	0.585	0.496	0.520	0.557	0.512
Model E	0.578	0.466	0.528	0.550	0.515
Model C	0.532	0.412	0.489	0.500	0.456
Model B	0.115	0.078	0.068	0.056	0.025
Model A	0.095	0.078	0.066	0.031	0.029



# Future Work

- Labeling of histopathology imaging data and detection of the *location* of neoplastic tissue and cancer type based on cell morphology

