



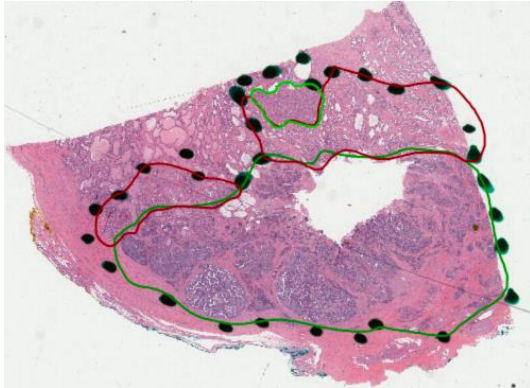
Biomedical Image Analysis and Efforts in Multimodality Combination

McWilliam School of Biomedical Informatics

Pathology Foundation Model Guided Prostate Tumor Grading

- Gleason score is a clinical standard for prostate tumor grading
- Highly related to outcome and treatment decision

Prostate Cancer Image and
Regional Annotation



Pathology Foundation Models

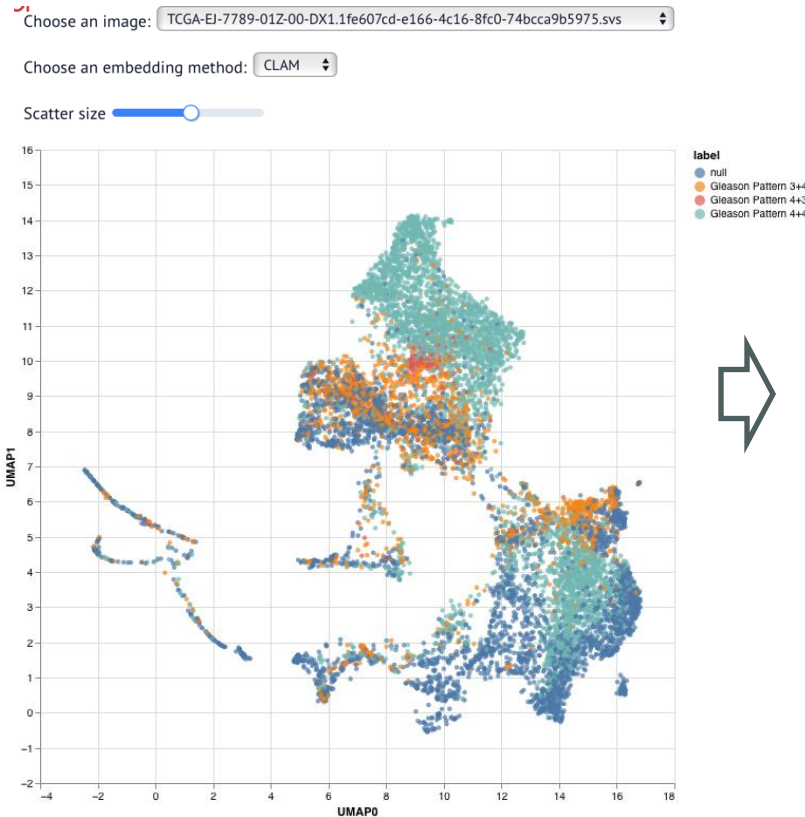


UNI

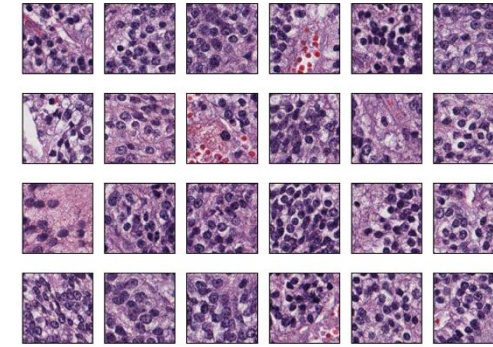


CLAM

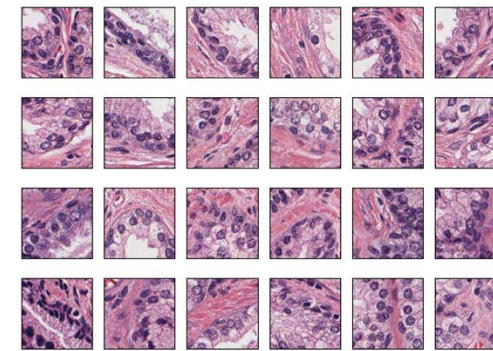
Interactive tool to explore image
embeddings from Foundation Models



Identified Gleason Texture
Patterns within Feature Space
4+4



3+4



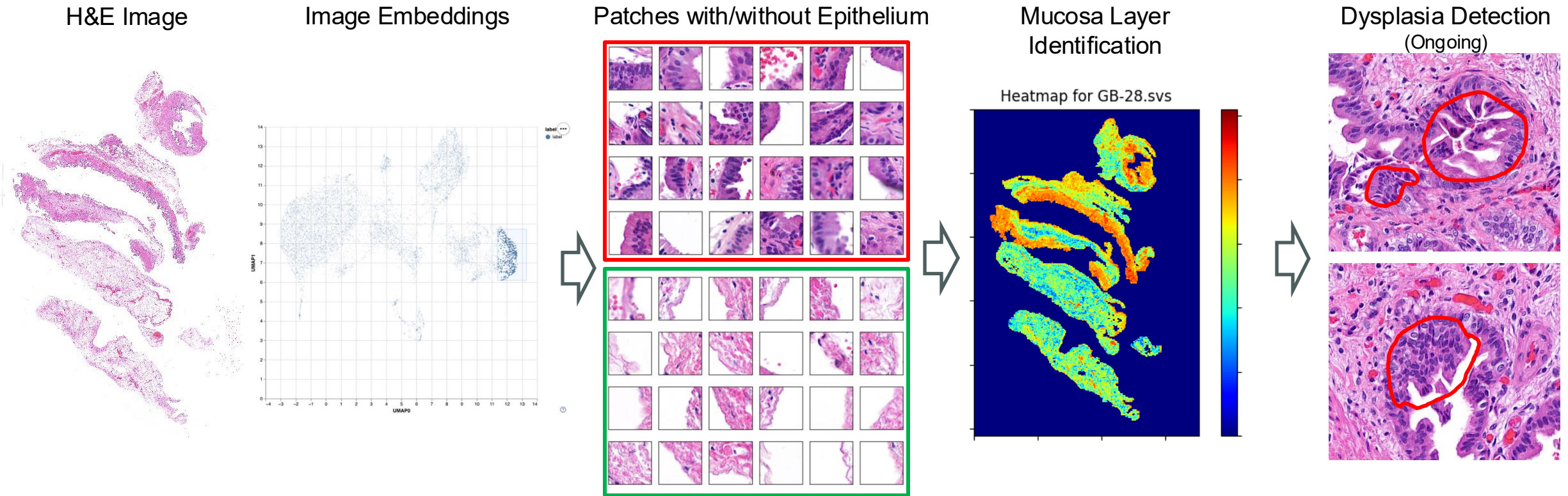
Applying to In-house
dataset (N=2170)

McGovern Medical School



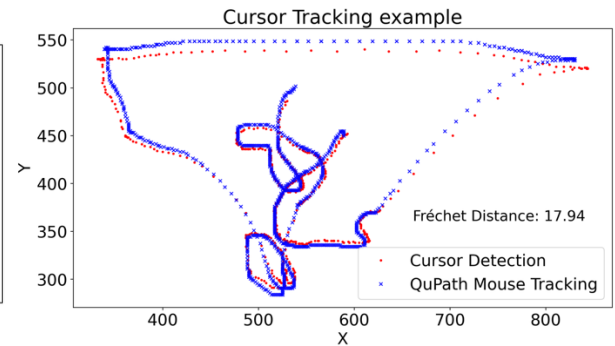
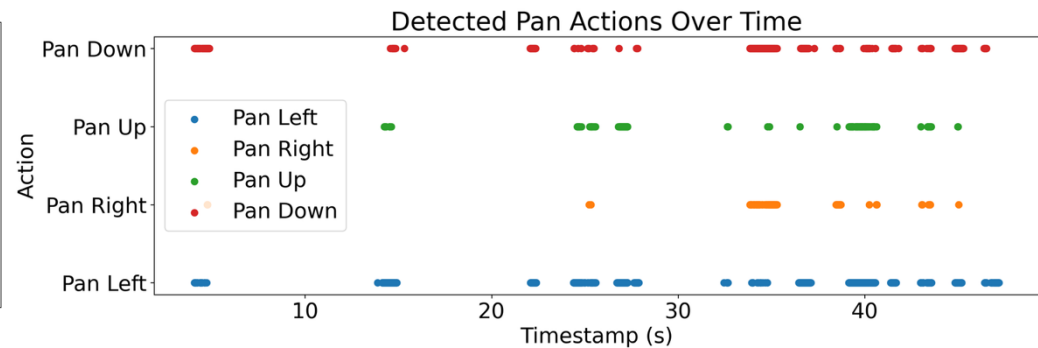
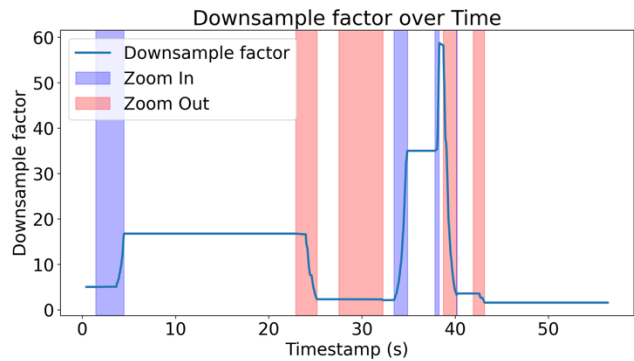
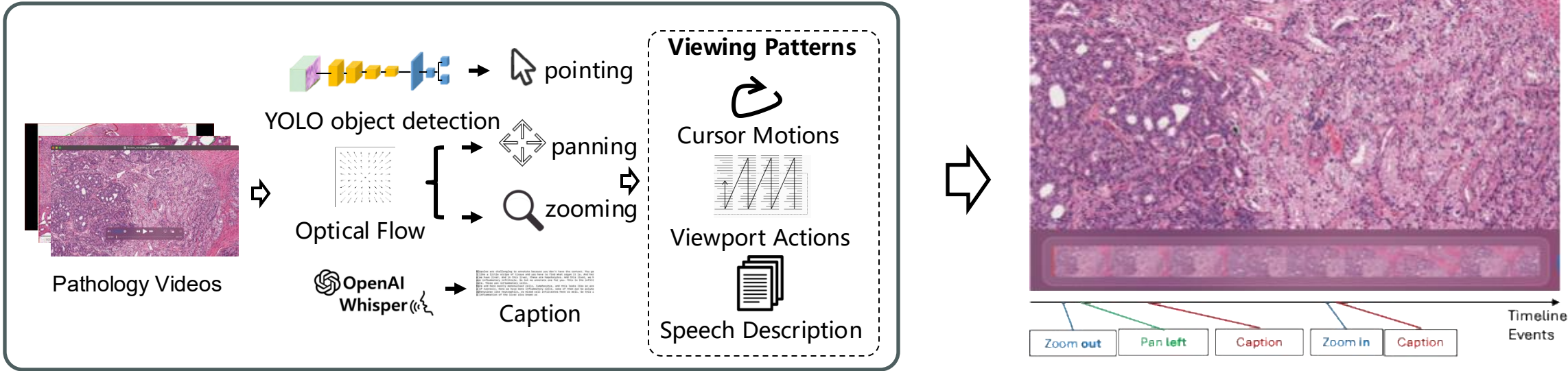
Dysplasia Detection within Gallbladder H&E Slides

- Incidental gallbladder dysplasia elevates the risk of invasive carcinoma
- Labor intensive to inspect the whole slide to locate the suspicious regions



Pathology Slides Diagnostic Reviewing Dynamics

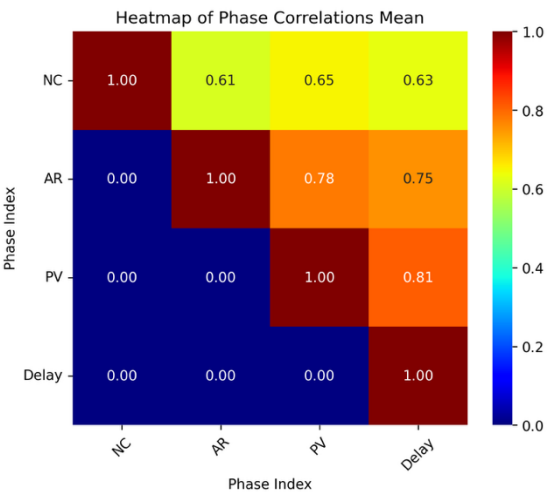
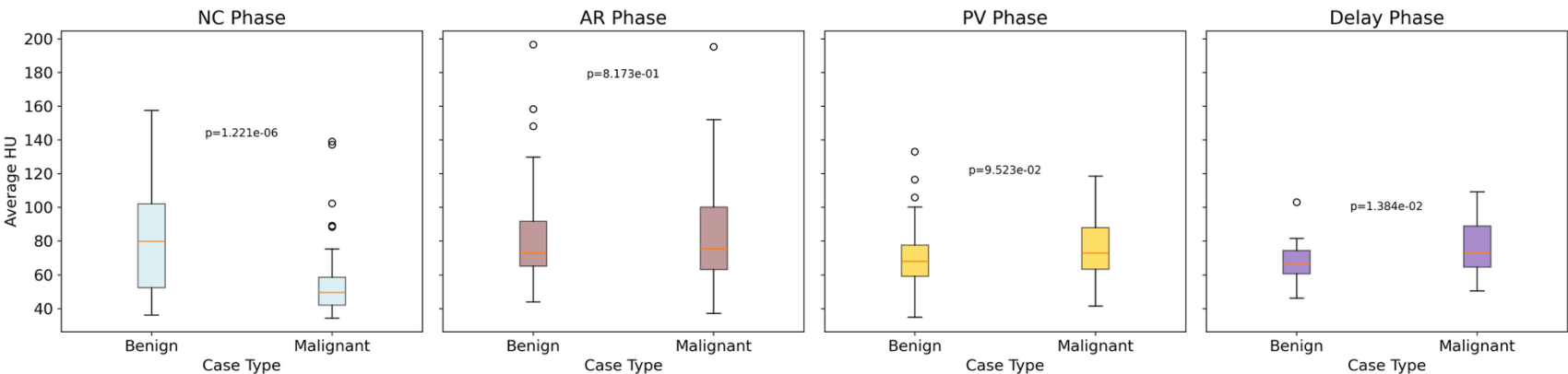
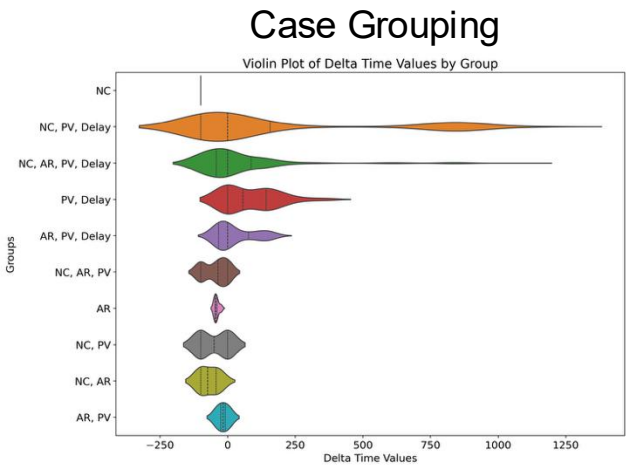
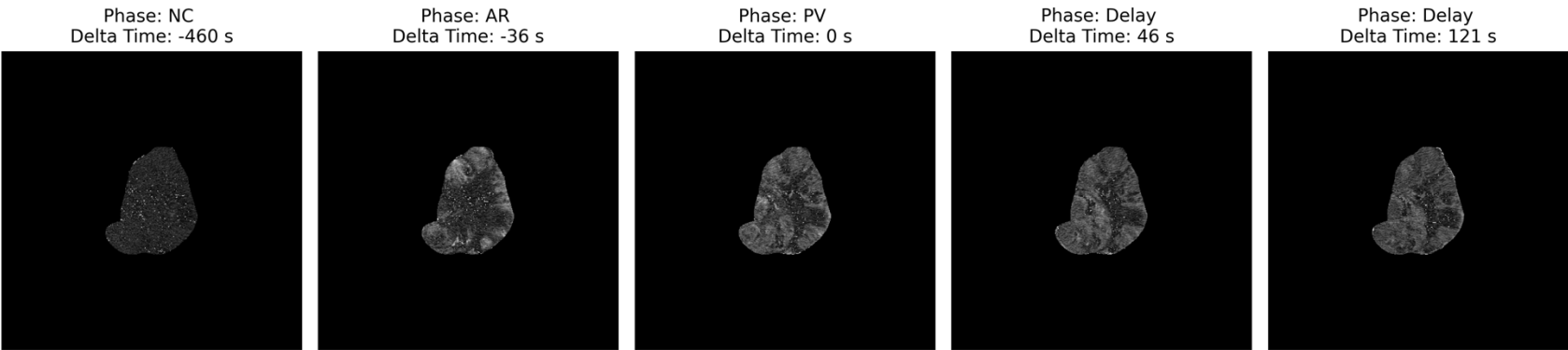
- Integrated pipeline to capture the diagnostic dynamics in pathology slide reviewing process
 - Help to establish standard slide reviewing workflow
 - Enhance the training of AI models for computational pathology tasks



Multiphase CT for Improved Adrenal Lesion Classification

- Abdominal CT imaging is routinely used in clinical practice to differentiate benign from malignant.
- Multiphase CT scans provide metabolism-related information about organs and tissues.

Example Multiphase Adrenal Lesion CT Images

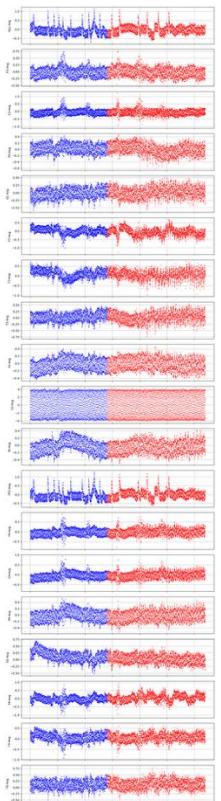
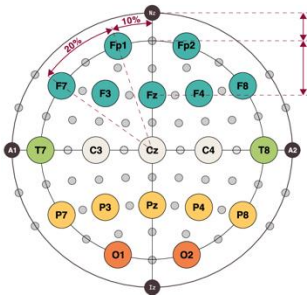


Epileptic Seizure Detection within Scalp EEG Recording

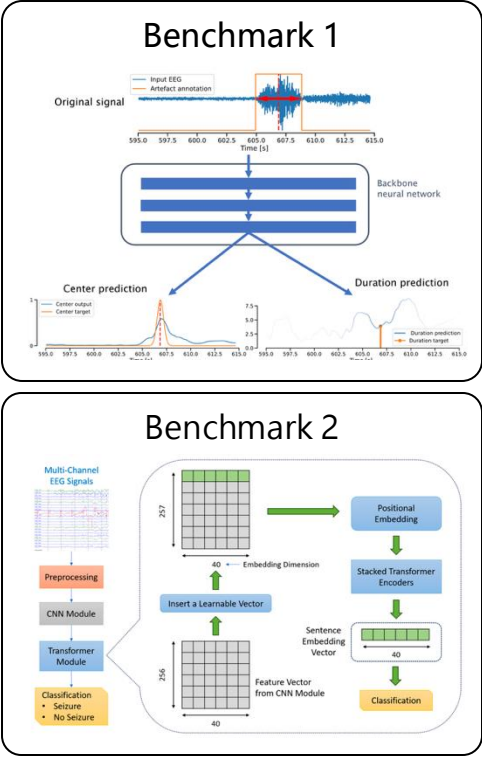
- EEG captures the abnormal electrical discharge in brain (epileptic seizure)
- Automatic seizure detection enables cost-effective diagnosis and early intervention

Balanced Datasets

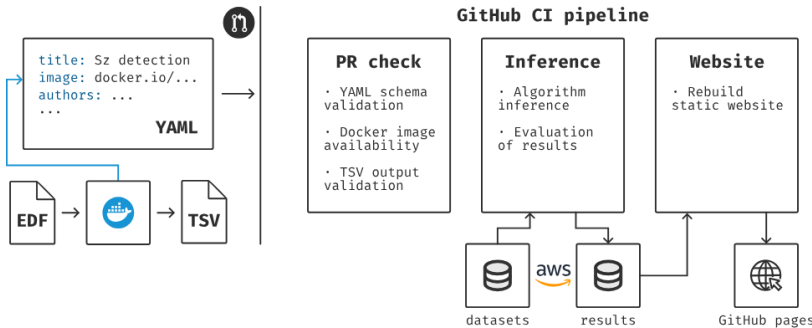
19 Chanel scalp EEG



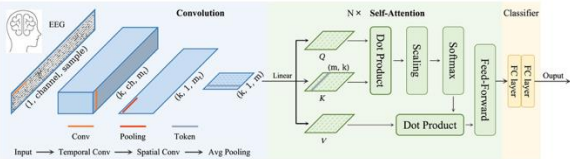
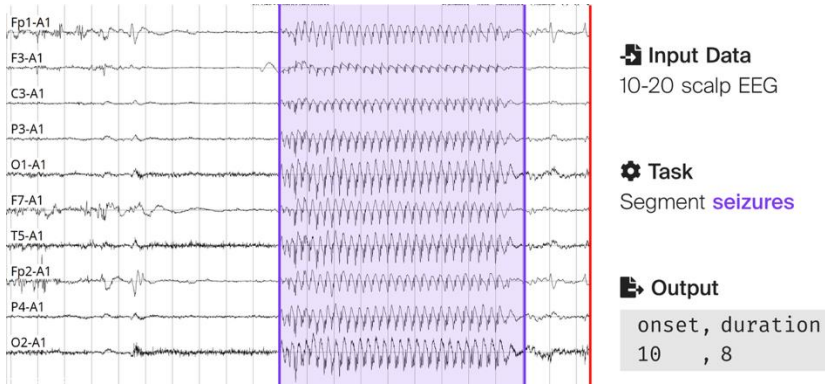
Public data:
Siena Scalp EEG



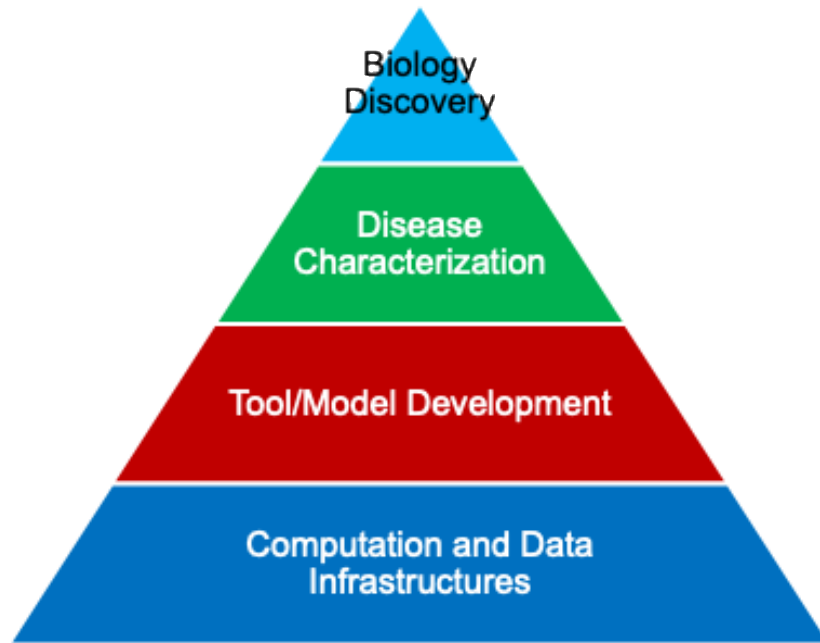
Validation Framework



Standardized Output



Long-term Goals



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