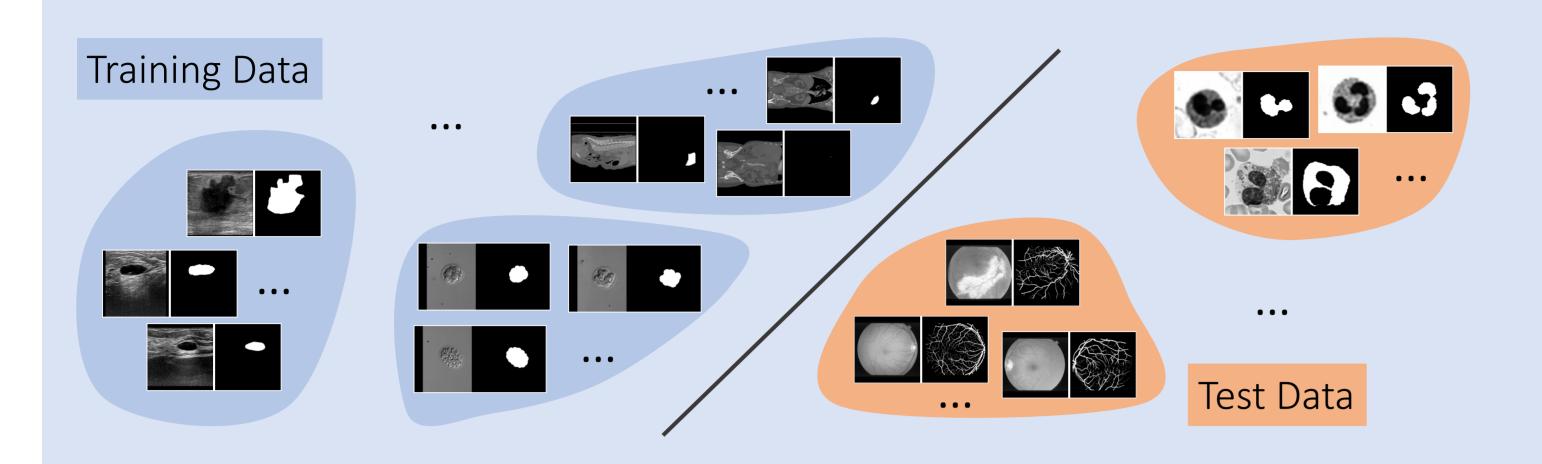


Tyche: Stochastic in Context Learning Model for Medical Segmentation Marianne Rakic, Jose Javier Gonzalez Ortiz, Hallee Wong, John V. Guttag, Adrian V. Dalca

Motivation

Challenge 1: Task Diversity

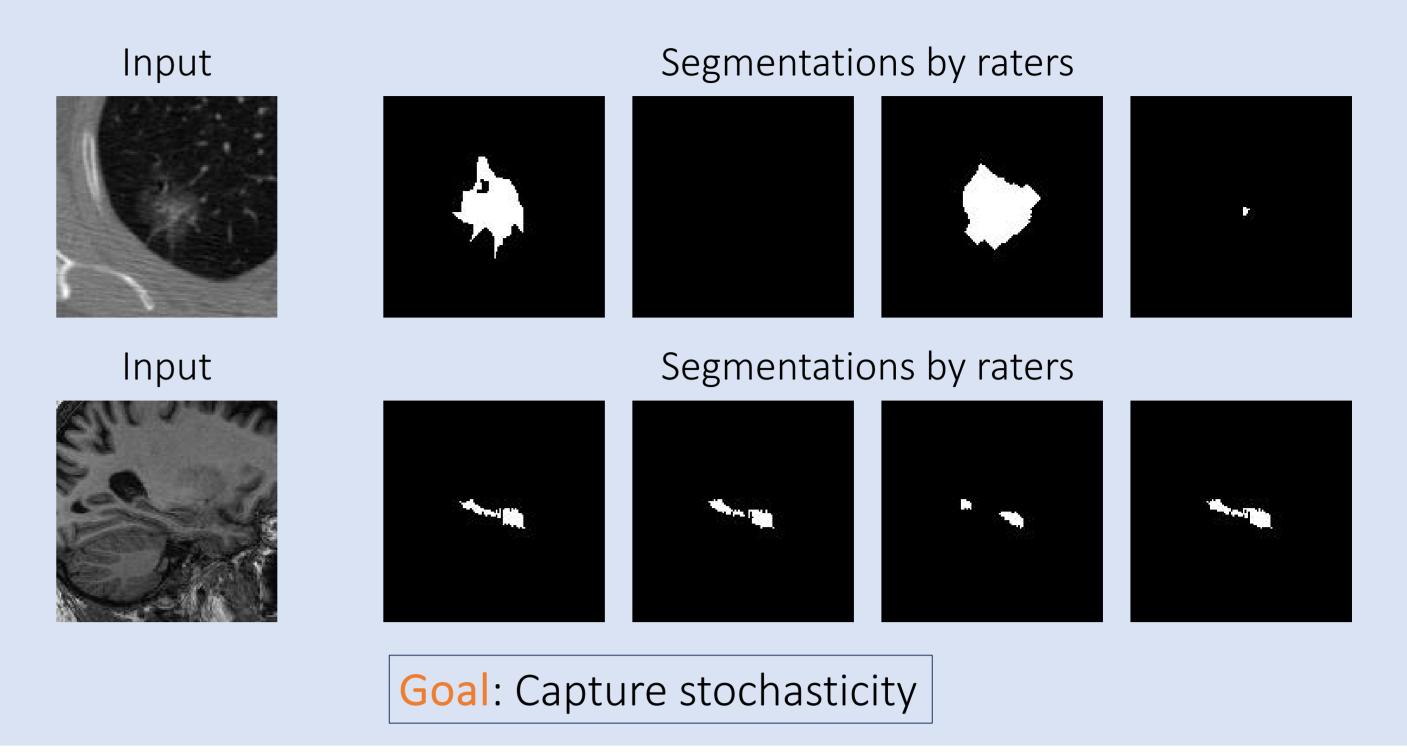
- Many learning tasks -> need to retrain for every new dataset
- Degrees of variability:
 Anatomy, Structure in one anatomy, Modality, Machine settings...



Goal: Avoid need to retrain

Challenge 2: Inherent Stochasticity

- Data inherently ambiguous
- Labels can be segmented differently by different raters
- Most models are deterministic and don't model this

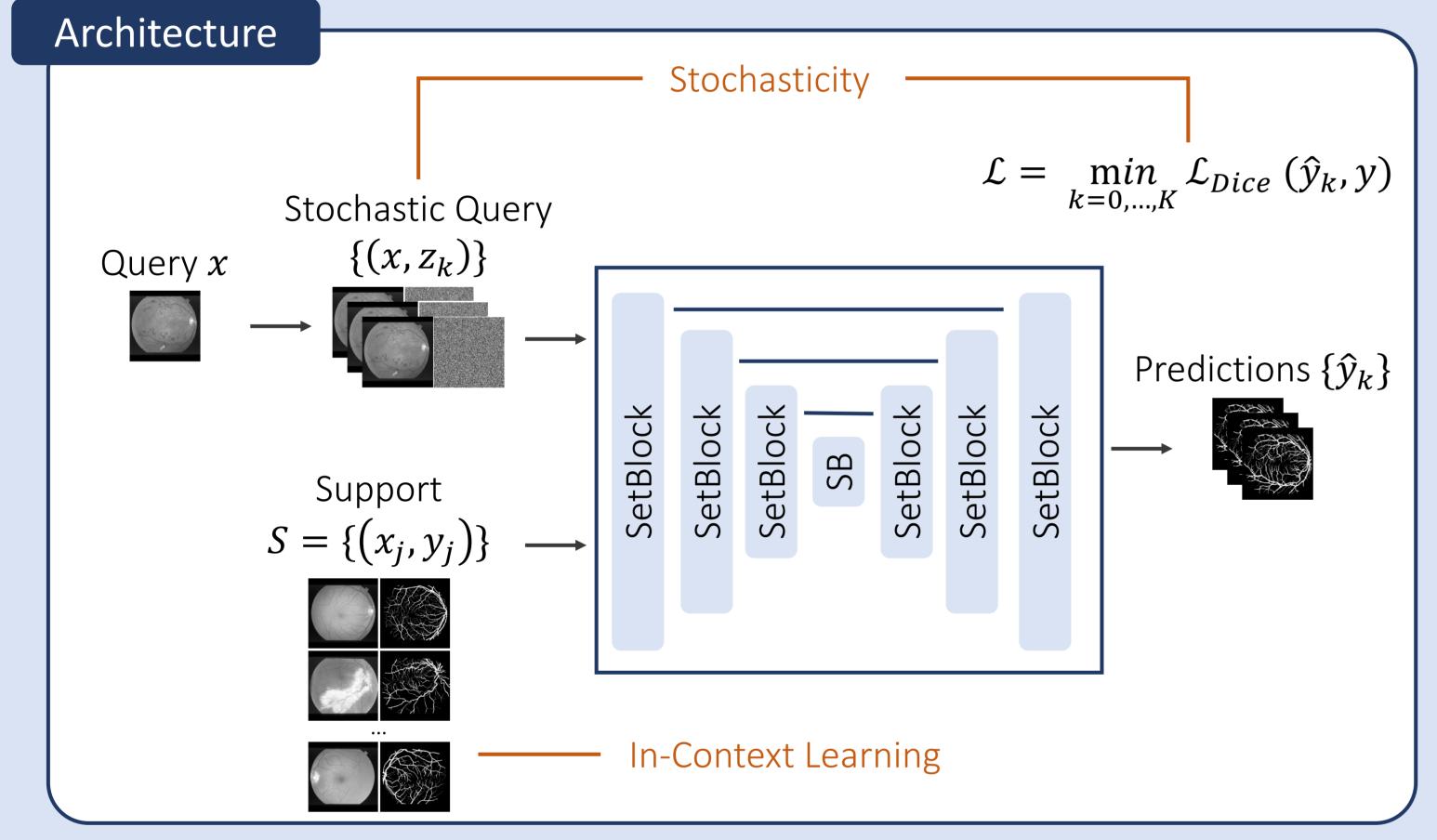


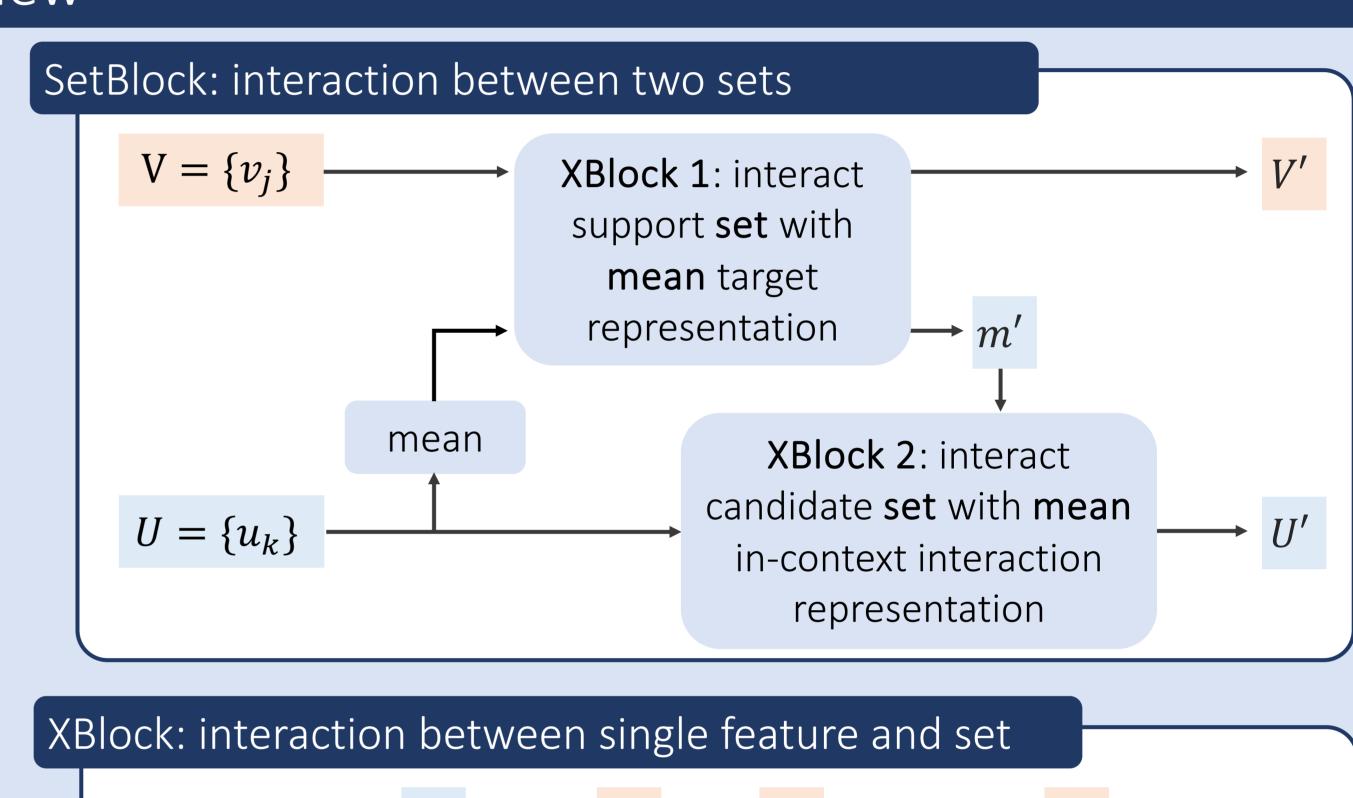
Take away: A single Tyche model produces many candidate segmentations for samples from unseen medical imaging datasets without retraining.

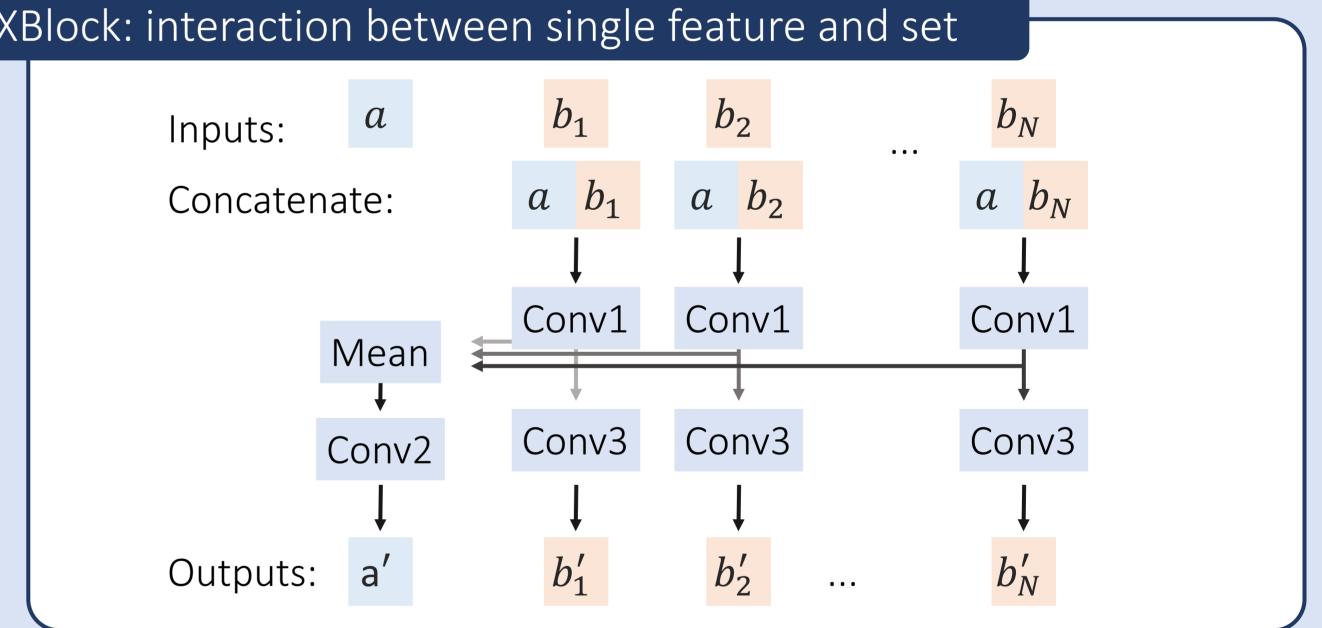
Tyche Overview

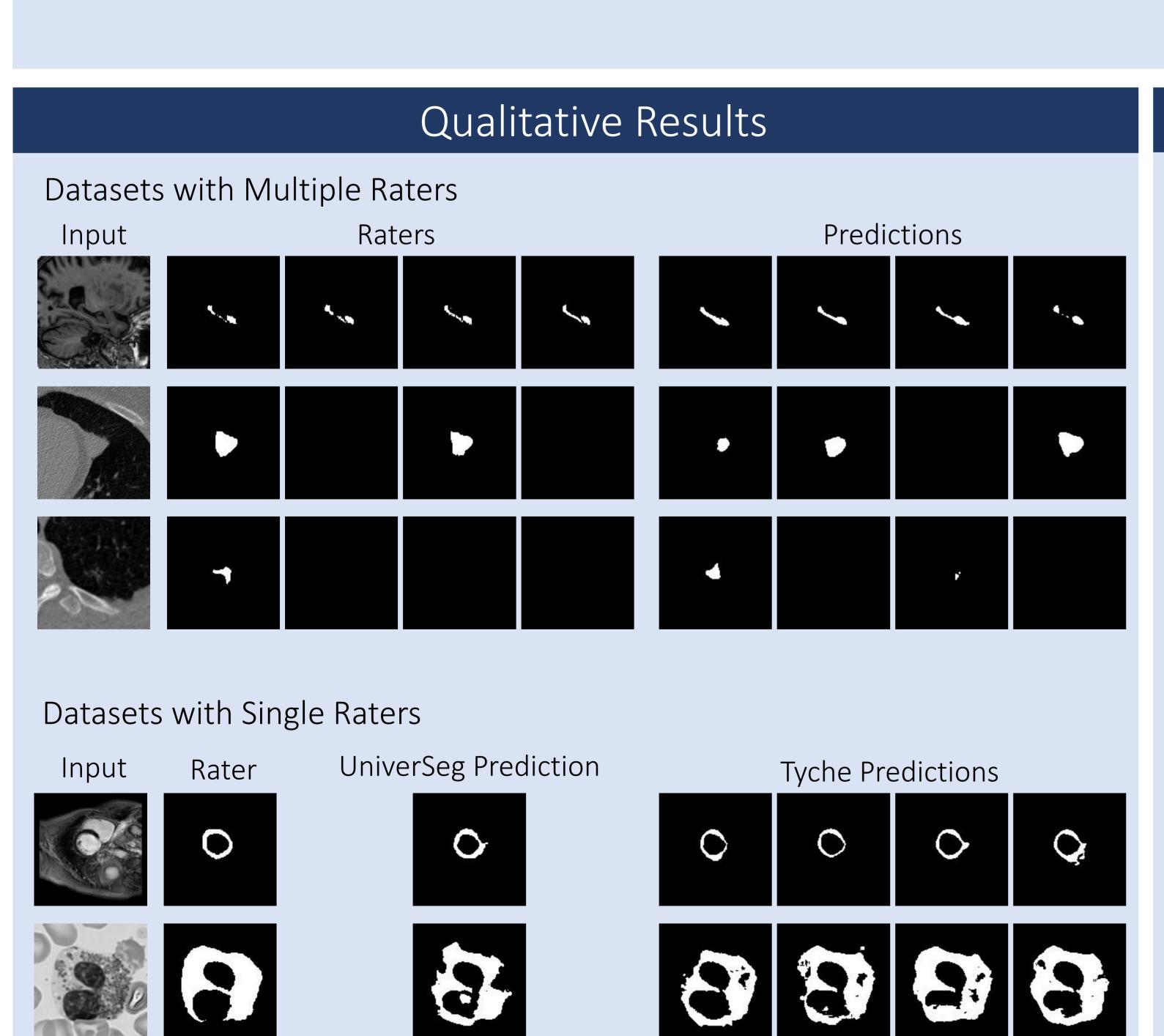
Model

- Can segment new unseen modalities and anatomies
- Provides a **set** of plausible segmentations
- In-context learning with a **support** set of valid image/segmentation pairs to describe potentially-unseen task









Quantitative Results Best Dice Score per Dataset tyche, Ki=8 tyche, Ki=24 tyche, Ki=64 .ö 0.7 STARE Multi-Rater Data 0.95 Hippocampus Data, Tyche and UniverSeg Comparison, support set: 16 LIDC-IDRI, Tyche and UniverSeg Comparison, support set: 16 0.65 Number of predictions, Ki Individual Dice score LIDC-IDRI, Tyche and UniverSeg Comparison, Ki=8 universeg 0.7 ---- best_dice_per_pred tyche, best Dice 0.3

Inference Support Size