

Test Time Transform Prediction for Open Set Histopathological Image Recognition

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Tissue typology annotation in Whole Slide histological images is a complex & tedious task for developing computational pathology models.

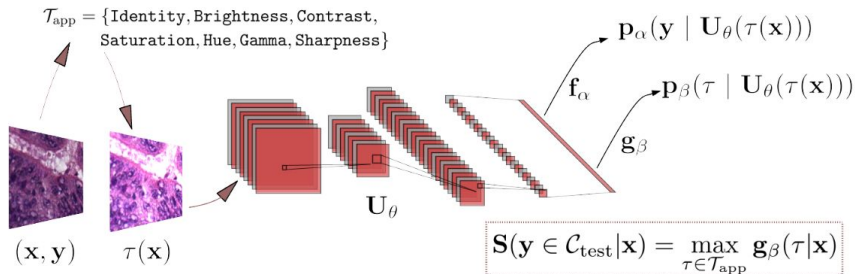
We address this problem by applying Open Set Recognition techniques to the task of jointly classifying tissue from a set of annotated classes, *e.g.* clinically relevant tissue categories, while rejecting in test time Open Set samples, *i.e.* images that belong to categories not present in the training set.

We introduce a new approach for Open Set histopathological image recognition based on learning to accurately identify image categories and simultaneously predict which data augmentation transform has been applied. In test time, we measure model confidence in predicting this transform, which we expect to be lower for images in the Open Set. Comprehensive experiments in the context of colorectal cancer assessment from histological images provide evidence on the strengths of our approach to automatically identify samples from unknown categories.

Decoupled Color-Appearance Data Augmentation



Test-Time Transform Prediction (T3PO) for OSR



Experimental Results

We measure Accuracy on the Closed Set and AUC on Closed vs Open

	Split 0		Split 1		Split 2	
	ACC	AUC	ACC	AUC	ACC	AUC
CE+	93.03	91.66	94.27	82.51	92.88	90.02
ARPL	92.84	88.96	92.51	80.28	93.39	82.39
MC-Dropout	93.16	91.52	94.02	82.19	92.80	85.45
T3PO (Ours)	92.54	93.55	94.27	84.73	91.80	91.24

	Split 0		Split 1		Split 2	
	ACC	AUC	ACC	AUC	ACC	AUC
CE+	99.54	96.50	99.69	84.59	99.62	82.96
ARPL	98.88	91.76	99.33	78.00	98.98	79.96
MC-Dropout	99.57	96.23	99.64	84.93	99.58	84.52
T3PO (Ours)	99.46	96.57	99.66	83.32	99.56	92.42

<https://arxiv.org/abs/2206.10033> || <https://github.com/agaldran/t3po>