Patch to Case-Level Decision Method Ideas

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Proposed Methods

Method 1: Average patch-level predictions for case-level predicted probability

Method 2: Use maximum-probability patch by case as predicted probability

Method 3: Use average of k-largest predicted probabilities at patch level as predicted probability

Method 4: Use k-largest predicted probabilities as predictors for a Support-Vector Classifier (Couture et al. 2018)

Method 5: Use GRAD-Cam features for k-largest predicted probability patches to produce feature map and use CNN to classify cases (Kosaraju et al. 2022)

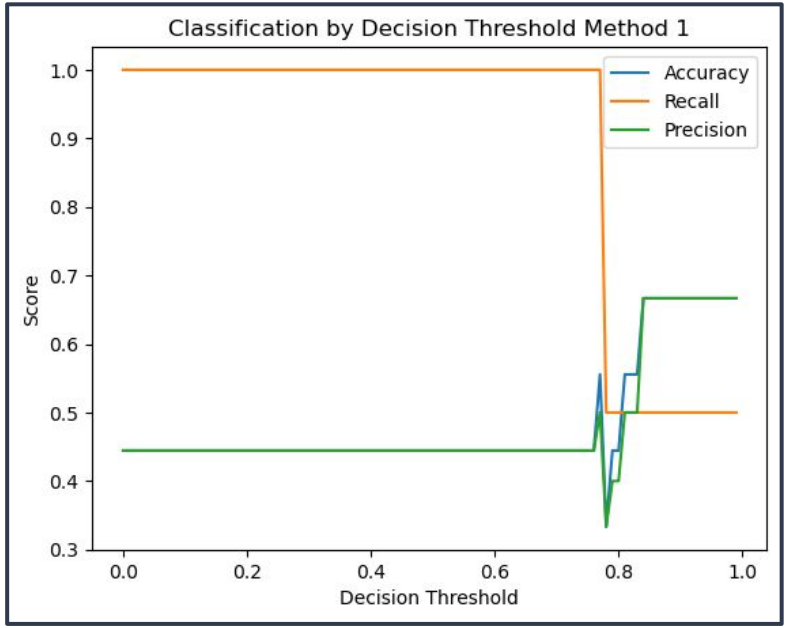
Method 1

Method: Average patch-level predictions for case-level predicted probability

Rationale: Uses information from all patches to make decision

Comments:

- Volatile tuning of decision threshold
- Averaging patches limits information from high-probability patches



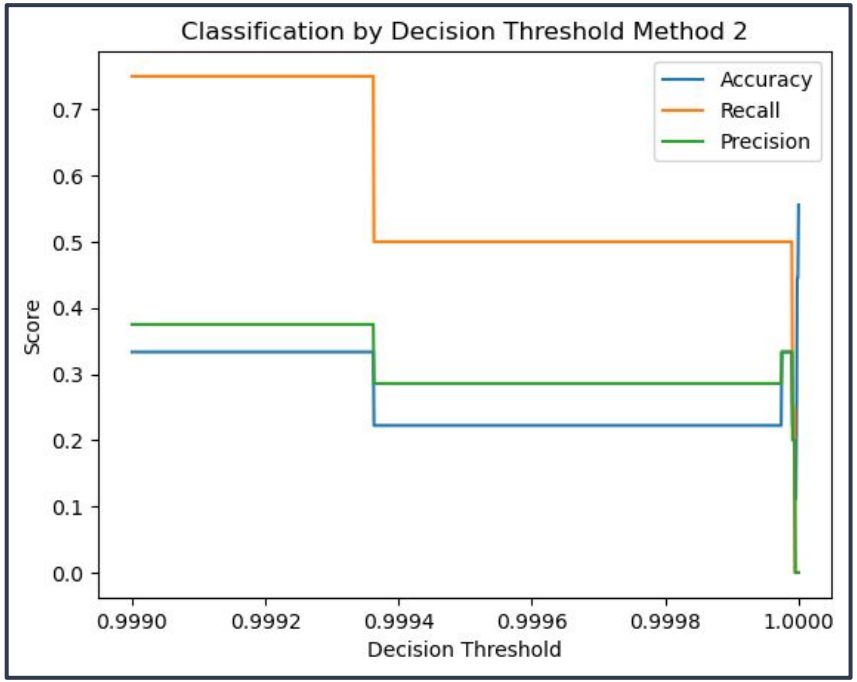
Method 2

Method: Use maximum-probability patch by case as predicted probability

Rationale: Highest probability patch should contain cancerous information

Comments:

- Requires finely tuned decision threshold
- Allows for high variance with one highly predicted patch



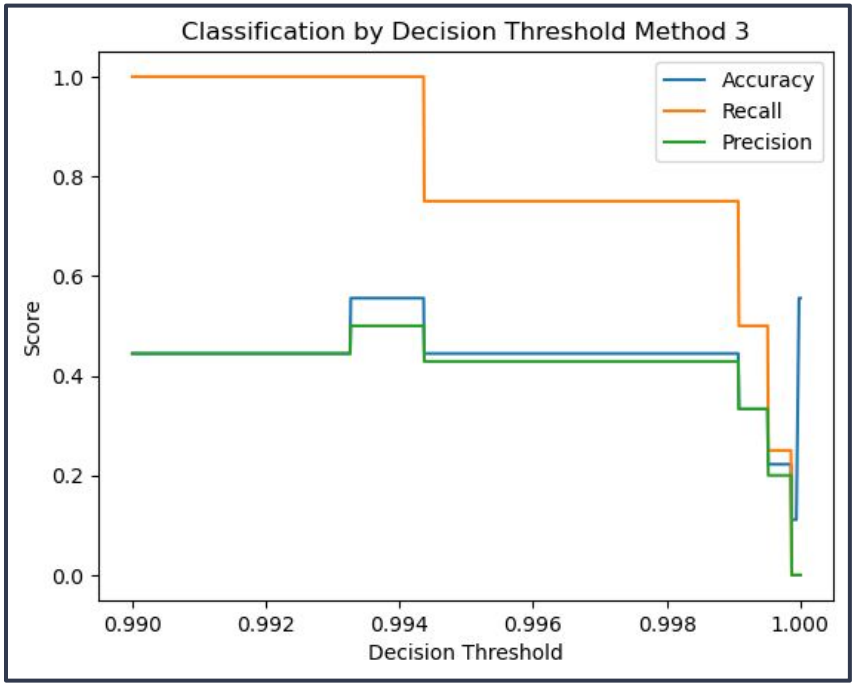
Method 3

Method: Use average of k-largest predicted probabilities at patch level as predicted probability (Used k = 25)

Rationale: Combines rationale from previous methods while limiting primary issues

Comments:

- Appeared to be more consistent than previous methods through multiple rounds of testing



Method 4

Method: Use k-largest predicted probabilities as predictors for a Support-Vector Classifier (Couture et al. 2018) (Used k = 25)

Rationale: Higher likelihood to extract features from many high-probability patches

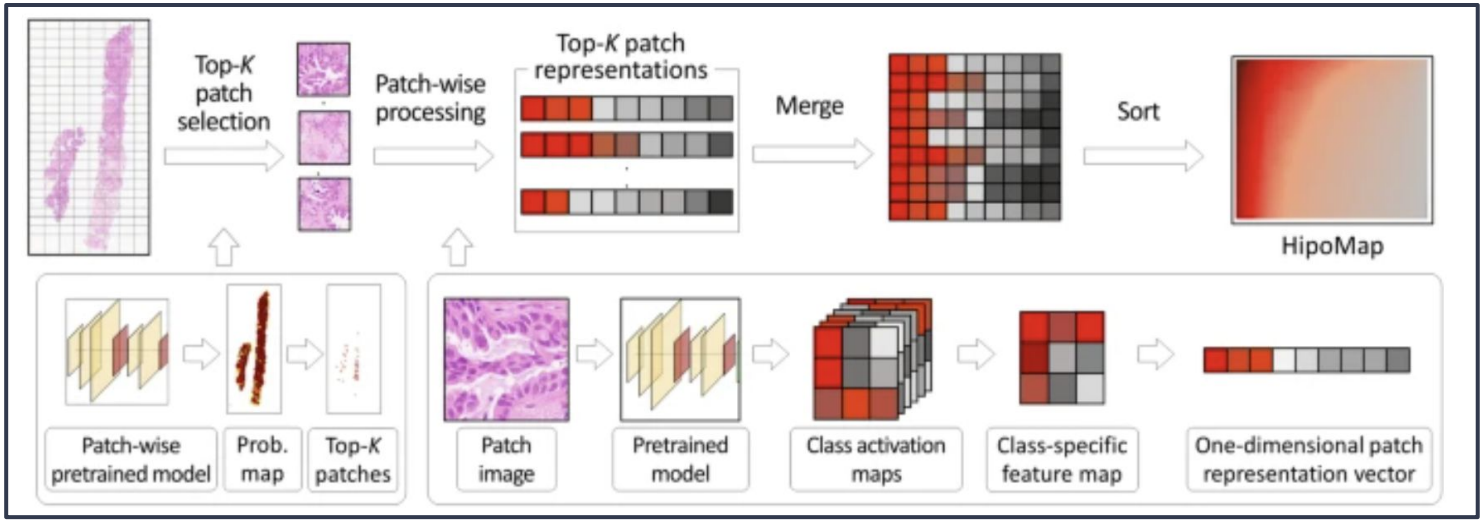
Comments:

- Produced consistently higher results for both train and test accuracy compared to previous methods without tuning decision threshold
- Limited by small sample size of cases (tested before all patches finished)

Method 5 (Not Implemented)

Method: Use GRAD-Cam features for k-largest predicted probability patches to produce feature map and use CNN to classify cases (Kosaraju et al. 2022)

Rationale: Higher likelihood to extract features from many large patches



Comments:

Likely to require significant computational load; may not be feasible with current computing limitations

Next Steps

- Test on completed patching dataset
- Test methods with best models developed so far
- Implement Method 5
- Tune K for SVC model