

Supplementary Table 1. Electronic health record variables included in the ICPSR experiments. Labs and vitals utilized were the first value recorded upon admission and were represented as real valued measurements. Prior medical conditions and medications were one-hot encoded. Bold variables indicate those available in both the ICPSR development dataset and SOOP external validation dataset. *ICPSR: Inter-University Consortium for Political and Social Research ; SOOP: Stroke Outcome Optimization Project; NIHSS: National Institute of Health stroke scale total*

Demographic/Stroke	Prior Medications	Labs/Vitals	Prior Medical Conditions
Age	Anticholesterol	Systolic Blood Pressure	Atrial Fibrillation
Sex	Anticoagulation	Diastolic Blood Pressure	Carotid Stenosis
Race	Antiglucoase	Cholesterol	Chronic Renal Insufficiency
Body Mass Index	Antihypertensive	Triglycerides	Coronary Disease
NIHSS Total	Antiplatelets	High-density Lipoprotein	Diabetes Mellitus
		Low-density Lipoprotein	Dyslipidemia
		Hemoglobin	Family History of Stroke
		Glucose	Heart Failure
		Creatinine	Hormone Replacement
		Prothrombin	Hypertension
			Migraine
			Obesity
			Sleep Apnea
			Peripheral Vascular Disease
			Previous Stroke
			Prosthetic Heart Valve
			Sickle Cell
			Smoker
			Vein Thrombosis

Supplementary Table 2. Parameter grid for 5-fold cross validation for standard versions of Model 2. *SVM: support vector machine; ANN: artificial neural network; XGB: extreme gradient boosting; RF: random forest; EHR: electronic health records; IDF: image-derived features*

SVM	kernel	linear ^α , poly, rbf, sigmoid
	C	0.1, 0.5, 1.0
	Degree	2, 3, 4
ANN	batch size	50, 100, 200, 300
	initial learning rate	0.1, 0.01, 0.001
	hidden layer sizes	(10,), (5,5), (4,3,3)
XGB	num. estimators	100, 300, 500
	max depth	5, 10, None
	max features	1.0, 0.75, 0.5
	L_1	0, 0.01
	L_2	0, 0.01
RF	num. estimators	100, 300, 500
	max depth	5, 10, None
	max features	1.0, 0.75, 0.5

^α linear kernel only considered for EHR, IDF, and EHR+IDF feature combinations

Supplementary Table 3. Parameter grid for 5-fold cross validation for TRAM versions of Model 2. *TRAM: transfer and marginalize network*

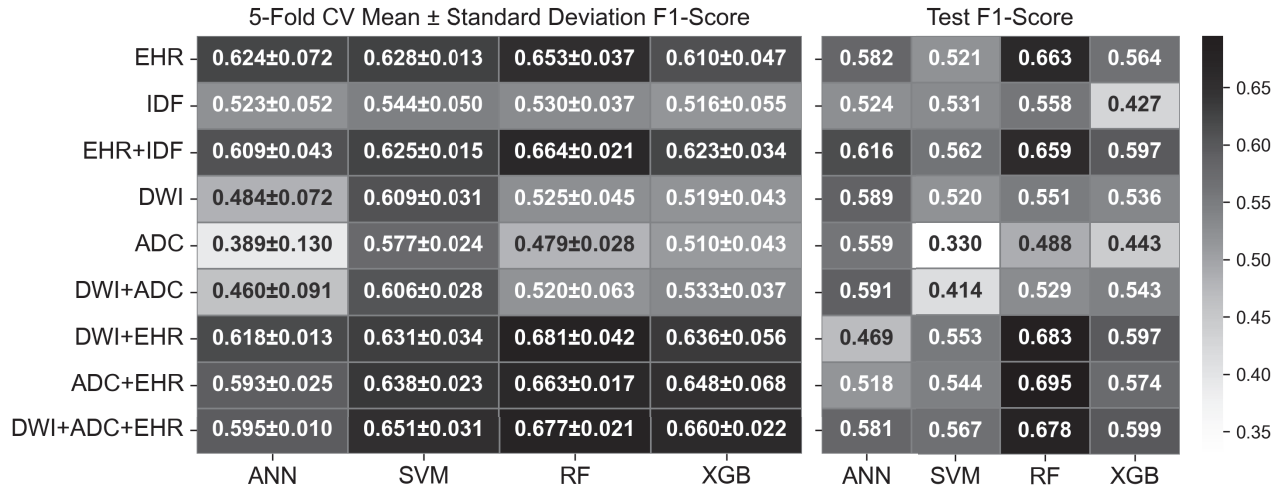
β	0, 0.05, 0.1, 0.25, 0.5
dropout	0, 0.2, 0.5
weight decay	0, 0.00001, 0.001
num. ρ_b linear layers	1, 2
num. ρ_p linear layers	1, 2

Supplementary Note 1 Volume-Based 3D Stroke Mask Dilation

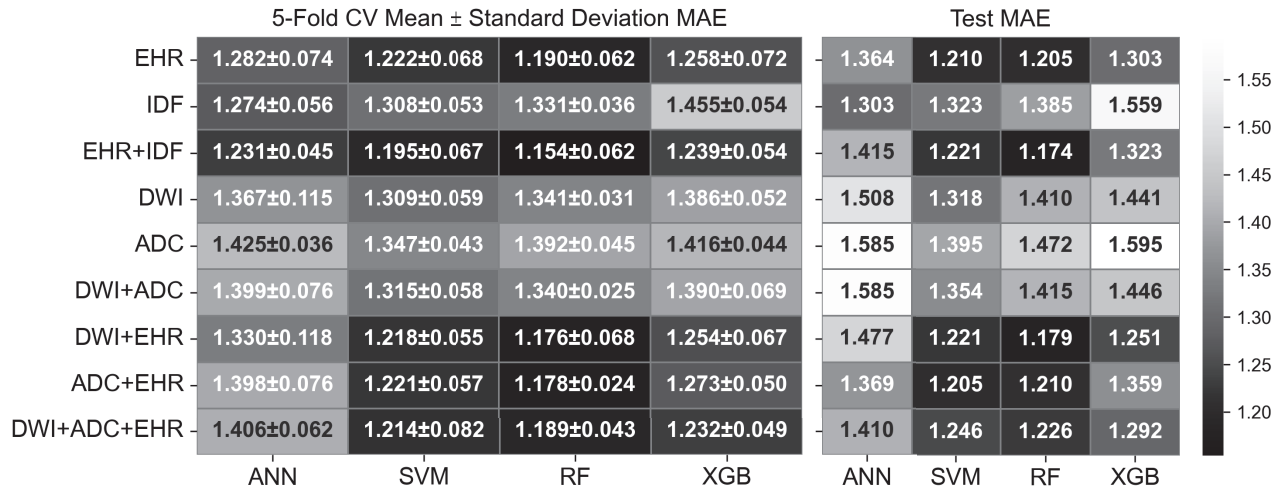
Require: Binary 3D stroke mask M , scaling factor s , 3D structuring kernel K (e.g., $3 \times 3 \times 3$ of ones)

Ensure: Dilated binary 3D mask $\hat{M}$ with volume $\geq s \times$ original volume

- 1: $V_{orig} \leftarrow \text{CalculateStrokeVolume}(M)$
 - 2: $\hat{M} \leftarrow M$
 - 3: **while** $\text{CalculateStrokeVolume}(\hat{M}) < s \times V_{orig}$ **do**
 - 4: $\hat{M} \leftarrow \text{Conv3D}(\hat{M}, K)$
 - 5: **end while**
 - 6: **return** $\hat{M}$
-

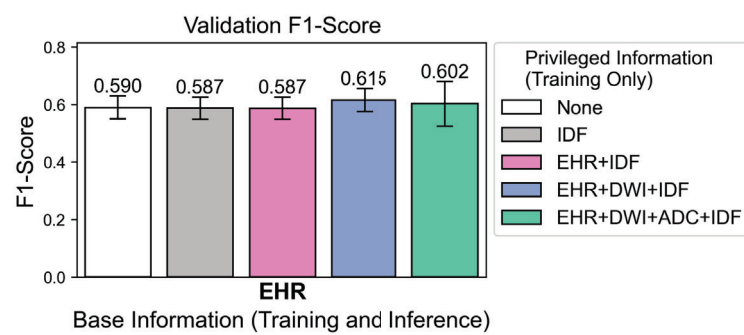


(a) Classification (90-day mRS > 2)

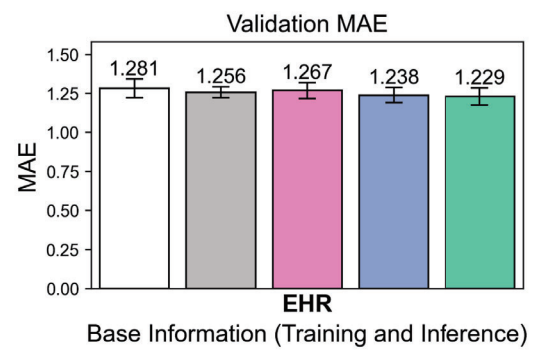


(b) Ordinal Regression (90-day mRS)

Supplementary Figure 1. Five-fold cross-validation (CV) mean and standard deviation (left) and hold-out test set performance (right) for combinations of ML methods and variable configurations for Model 2: (a) classification and (b) ordinal regression. *EHR*: electronic health records; *IDF*: image-derived features; *DWI*: diffusion weighted imaging; *ADC*: apparent diffusion coefficient; *MAE*: mean absolute error; *SVM*: support vector machine; *ANN*: artificial neural network; *XGB*: extreme gradient boosting; *RF*: random forest



(a)



(b)

Supplementary Figure 2. Five-fold cross validation TRAM performance on the ICPSR dataset for (a) classification of 90-day mRS > 2 and (b) ordinal regression of 90-day mRS for base and privileged information configurations using only base variables available in the SOOP external validation dataset. *EHR*: electronic health records; *IDF*: image-derived features; *DWI*: diffusion weighted imaging; *ADC*: apparent diffusion coefficient; *MAE*: mean absolute error