Online Supplemental Data

This appendix has been provided by the authors to give readers additional information about their work

Supplementary Tables

Table 1. Demographic characteristics of training cohort for mRS score.

	mRS > 3 (N = 56)	mRS ≤ 3 (N = 35)	P
Demographic information			
Age (years)	62±11	57±13	0.09
male sex no. (%)	41 (73.2%)	29 (82.9%)	0.29
Premorbid mRS, 0	50 (89.3%)	30 (85.7%)	0.61
Imaging Score			
PC ASPECTS score (NCCT)	8 (6-9)	8 (7-9)	0.15
PC ASPECTS score (DWI)	6 (5-7)	7(6-8)	0.019*
Infarct volume (cm3)			
pons and midbrain	2.3±1.8	1.2±0.9	0.001
cerebellum, thalamus, and occipital cortex	10.6±14.7	8.4±11.4	0.44
total volume	12.9±14.3	9.6±11.4	0.23
Stroke information			
Initial NIHSS score	27 (17-32)	18 (8-27)	0.003*
Recanalization time (min)	502 (355-645)	374 (270-473)	0.02*
Imaging time (min)	198 (47-344)	115 (35-280)	0.28

Pre-stroke antithrombotic use yes. (%)	21 (37.5)	7 (20.0%)	0.08
TOAST classification			0.19
Large artery atherosclerosis	39 (69.6)	25 (71.4%)	
Cardioembolism	10 (17.9%)	9 (25.7%)	
Other stroke types	7 (12.5%)	1 (2.9%)	
Location of occlusion (%)			0.23
Distal BA	10 (17.9%)	13 (37.1%)	
Middle BA	24 (42.9%)	12 (34.3%)	
Proximal BA	9 (16.1%)	4 (11.4%)	
VA-V4	13 (23.2%)	6 (17.1%)	
eTICI grade. (%)			0.025*
0-2a	15 (26.8%)	3 (8.6%)	
2b	14 (25%)	5 (14.3%)	
2c	10 (17.9%)	6 (17.1%)	
3	17 (30.4%)	21 (60.0%)	
Stroke risks			
Hypertension no. (%)	33 (58.9%)	27 (77.1%)	0.07
Diabetes mellitus no. (%)	8 (14.3%)	5 (14.3%)	1.00

Atrial fibrillation no. (%)	9 (16.1%)	4 (11.4%)	0.54
Smoking no. (%)	20 (35.7%)	18 (51.4%)	0.14
Laboratory information			
White blood cells (per μl)	11±4	11±4	0.34
Hemoglobin (g/dl)	140.0±21.4	141.4±21.1	0.76
Total cholesterol (mg/dl)	4.8±1.2	5.2±1.5	0.17
HDL cholesterol (mg/dl)	1.3±0.4	1.3±0.4	0.86
Triglycerides (mg/dl)	1.8±2.8	1.7±1.2	0.74
LDL cholesterol (mg/dl)	2.9±0.9	3.2±1.3	0.36
Systolic BP (mm Hg)	152.6±25.0	150.5±21.6	0.68
Diastolic BP (mm Hg)	90.4±17.2	88.7±12.7	0.61

NIHSS, National Institutes of Health Stroke Scale Score; mRS, modified Rankin Score; TOAST, Trial of ORG 10172 in Acute Stroke Treatment; PC-ASPECT, Posterior circulation-Alberta Stroke Program early computed tomography score; NCCT, Non-contrast computed tomography; DWI, diffusion-weighted imaging; eTICI, extended thrombolysis in cerebral infarction; LDL, low-density lipoprotein; HDL, high-density lipoprotein; BP, blood pressure; MT, mechanical thrombectomy; HbA1c, glycated hemoglobin.

*$p < 0.05$.

Table S1. Feature classification

Radiomic features	All (N=3748)	M-W&RF select (N = 28)	LASSO (N = 7)
Firstorder statistics	36	NA	NA
Shape and size	28	1	NA
Textural features	150	3	NA
Image filter			
LoG	930	20	2
Wavelet	1488	41	3
Square	186	1	NA
Square root	186	2	NA
Logarithm	186	1	NA
Exponential	186	2	NA
Gradient	186	2	NA
Lbp2D	186	5	1

M-W, Mann-Whitney U test; RF, Random Forest classifier; LASSO, The Least Absolute Shrinkage and Selection Operator; NA, not applicable

Table S2. Covariance diagnosis

Radiomic feature	Tolerance	VIF
log-sigma-1-0-mm-3D_glcm_ClusterProminence	0.272	3.683
log-sigma-2-0-mm-3D_glcm_ClusterTendency	0.252	3.973
wavelet-LHH_glszm_ZoneVariance	0.657	1.523
wavelet-HHL_firstorder_Median	0.838	1.193
lbp-2D_firstorder_TotalEnergy	0.302	3.307

wavelet-HLL_glcm_MCC	0.794	1.260

VIF, Variance Inflation Factor.

Table S3. Demographic characteristics of testing cohort for mRS score.

	mRS > 3 (N = 12)	**mRS ≤ 3 (N = 19)**	**P**
Demographic information			
Age (years)	67±7	61±11	0.11
male sex no. (%)	8 (66.7%)	18 (94.7%)	0.06
Premorbid mRS, 0	9 (75.0%)	13 (68.4%)	1.00
Imaging Score			
PC ASPECTS score (NCCT)	8 (6-9)	8 (7-9)	0.33
PC ASPECTS score (DWI)	7 (4-8)	7 (6-8)	0.23
Infarct volume (cm^3)			
pons and midbrain	2.7±2.8	0.5±0.5	0.001
cerebellum, thalamus, and occipital cortex	15.1±24.5	9.2±1.0	0.44
total volume	17.8±26.7	9.7±1.0	0.33
Stroke information			
Initial NIHSS score	25 (16-32)	7 (3-15)	0.001*

Recanalization time (min)	550 (405-921)	595 (417-762)	1.00
Imaging time (min)	616 (163-896)	316 (190-456)	0.55
Pre-stroke antithrombotic use yes. (%)	3 (25.0%)	4 (21.1%)	1.00
TOAST classification			0.26
Large artery atherosclerosis	10 (83.3%)	15 (78.9%)	
Cardioembolism	1 (8.3%)	4 (21.1%)	
Other stroke types	1 (8.3%)	0 (0.0%)	
Location of occlusion (%)			0.58
Distal BA	4 (33.3%)	4 (21.1%)	
Middle BA	1 (8.3%)	4 (21.1%)	
Proximal BA	3 (25.0%)	7 (36.8%)	
VA-V4	4 (33.3%)	4 (21.1%)	
eTICI. (%)			0.01
0-2a	4 (33.3%)	1 (5.3%)	
2b	4 (33.3%)	2 (10.5%)	
2c	0 (0.0%)	5 (26.3%)	
3	4 (33.3%)	11 (57.9%)	
Stroke risks			

Hypertension no. (%)	11 (91.7%)	15 (78.9%)	0.62
Diabetes mellitus no. (%)	4 (33.3%)	6 (31.6%)	1.00
Atrial fibrillation no. (%)	1 (8.3%)	2 (10.5%)	1.00
Smoking no. (%)	5 (41.7%)	13 (68.4%)	0.26
Laboratory information			
White blood cells (per μl)	9.2±2.0	9.2±2.9	0.98
Total cholesterol (mg/dl)	4.6±1.6	3.9±1.1	0.25
HDL cholesterol (mg/dl)	1.1 (1.0-1.2)	1.1 (0.9-1.2)	0.75
Triglycerides (mg/dl)	1.1 (0.8-1.2)	1.1 (0.8-1.5)	1.00
LDL cholesterol (mg/dl)	2.9±1.4	2.2±0.9	0.14
Systolic BP (mm Hg)	149.0±22.7	161.8±28.2	0.20
Diastolic BP (mm Hg)	81.9±10.2	85.7±18.2	0.52

NIHSS, National Institutes of Health Stroke Scale Score; mRS, modified Rankin Score; TOAST, Trial of ORG 10172 in Acute Stroke Treatment; PC-ASPECT, Posterior circulation-Alberta Stroke Program early computed tomography score; NCCT, Non-contrast computed tomography; DWI, diffusion-weighted imaging; LDL, low-density lipoprotein; HDL, high-density lipoprotein; BP, blood pressure; MT, mechanical thrombectomy; HbA1c, glycated hemoglobin.

*p < 0.05.

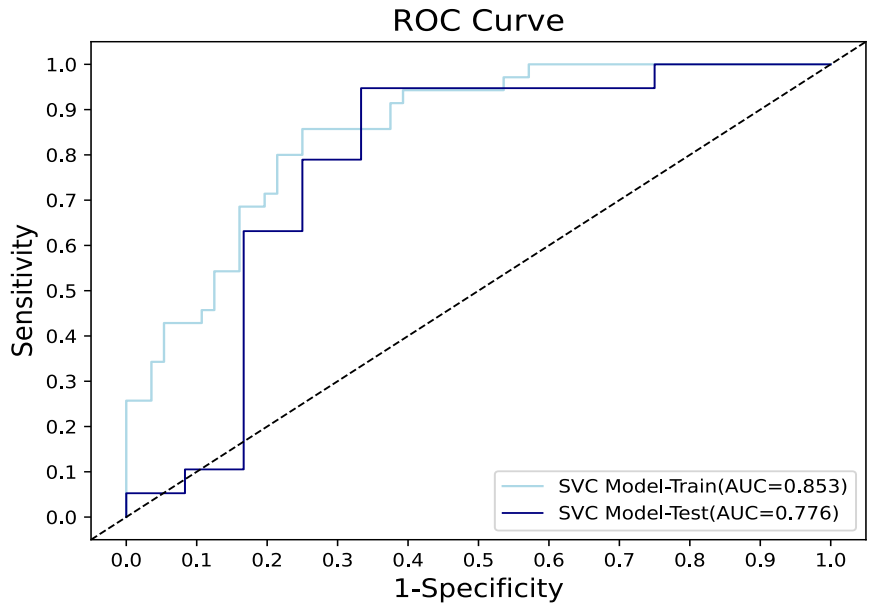
Table S4. Diagnostic performance of the integrated model in the training and testing cohorts.

	AUC	Accuracy	Sensitivity	Specificity	PPV	NPV
Training cohort	0.853 (0.763-0.919)	81.3%	68.2%	89.4%	85.7%	75.0%
Testing cohort	0.776 (0.591-0.906)	74.2%	78.9%	66.7%	78.9%	66.7%

AUC, area under the curve; CI, confidence interval; NPV, negative predictive value; PPV, positive predictive value

Supplementary figures

Figure S1. Receiver operating characteristic curve results from the integrated model.



Integrated model (RFs and TICI scores).

Figure S2. Calculation formula and implications of RFs.

1.Total Energy: Here, is optional value, defined by voxelArrayShift, which shifts the intensities to prevent negative values in X. This ensures that voxels with the lowest gray values contribute the least to Energy, instead of voxels with gray level intensity closest to 0. Total Energy is the value of Energy feature scaled by the volume of the voxel in cubic mm.

$$total\ energy = V_{voxel} \sum_{i=1}^{N_p} (\mathbf{X}(i) + c)^2$$

2.Median:The median gray level intensity within the ROI.

3.Cluster Prominence: Cluster Prominence is a measure of the skewness and asymmetry of the GLCM. A higher values implies more asymmetry about the mean while a lower value indicates a peak near the mean value and less variation about the mean.

$$cluster\ prominence = \sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \left(i + j - \mu_x - \mu_y\right)^4 p(i, j)$$

4.Cluster Tendency: Cluster Tendency is a measure of groupings of voxels with similar gray-level values.

$$cluster\ tendency = \sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \left(i + j - \mu_x - \mu_y\right)^2 p(i, j)$$

5.Maximal Correlation Coefficient: The Maximal Correlation Coefficient is a measure of complexity of the texture and 0≤MCC≤1.In case of a flat region, each GLCM matrix has shape (1, 1), resulting in just 1 eigenvalue. In this case, an arbitrary value of 1 is returned.

$$MCC = \sqrt{\text{second largest eigenvalue of Q}}$$

$$Q(i, j) = \sum_{k=0}^{N_g} \frac{p(i, k)p(j, k)}{p_x(i)p_y(k)}$$

6.Zone Variance (ZV): ZV measures the variance in zone size volumes for the zones.

$$ZV = \sum_{i=1}^{N_g} \sum_{j=1}^{N_s} p(i, j)(j - \mu)^2 \quad \mu = \sum_{i=1}^{N_g} \sum_{j=1}^{N_s} p(i, j)j$$