Table S1 Features selected from different phases

CT phase	Feature
Nonenhanced CT	wavelet_firstorder_wavelet-hll-mean
	wavelet_glcm_wavelet-llh-maximumprobability
	wavelet_firstorder_wavelet-llh-totalenergy
	wavelet_glcm_wavelet-llh-sumentropy
	wavelet_firstorder_wavelet-llh-energy
Arterial phase	shotnoise_gldm_smalldependencelowgraylevelemphasis
	laplaciansharpening_glszm_smallarealowgraylevelemphasis
	wavelet_glszm_wavelet-llh-sizezonenonuniformity
	wavelet_glszm_wavelet-lll-graylevelnonuniformity
	boxsigmaimage_glrlm_runlengthnonuniformity
Venous phase	log_gldm_log-sigma-2-0-mm-3d-dependencenonuniformitynormalized
	log_glszm_log-sigma-1-0-mm-3d-graylevelvariance
	boxsigmaimage_glrlm_runlengthnonuniformity
	log_glrlm_log-sigma-4-0-mm-3d-runlengthnonuniformity
	log_firstorder_log-sigma-0-5-mm-3d-totalenergy
	wavelet_glcm_wavelet-llh-differenceentropy
Nonenhanced CT + arterial phase	wavelet_firstorder_wavelet-hll-mean
	shotnoise_gldm_smalldependencelowgraylevelemphasis
	wavelet_glcm_wavelet-llh-maximumprobability
	laplaciansharpening_glszm_smallarealowgraylevelemphasis
	wavelet_firstorder_wavelet-llh-totalenergy
	wavelet_glszm_wavelet-lll-graylevelnonuniformity
	wavelet_glcm_wavelet-llh-sumentropy
Nonenhanced CT + venous phase	wavelet_firstorder_wavelet-hll-mean
	wavelet_glcm_wavelet-llh-maximumprobability
	wavelet_glcm_wavelet-llh-differenceentropy
	wavelet_firstorder_wavelet-llh-totalenergy
	log_glrlm_log-sigma-4-0-mm-3d-runlengthnonuniformity
	log_firstorder_log-sigma-0-5-mm-3d-totalenergy
	wavelet_glcm_wavelet-llh-sumentropy
Arterial phase + venous phase	shotnoise_gldm_smalldependencelowgraylevelemphasis
	laplaciansharpening_glszm_smallarealowgraylevelemphasis
	log_glrlm_log-sigma-4-0-mm-3d-runlengthnonuniformity
	log_firstorder_log-sigma-0-5-mm-3d-totalenergy
	boxsigmaimage_glrlm_runlengthnonuniformity
	wavelet_glszm_wavelet-lll-graylevelnonuniformity
	wavelet_glcm_wavelet-llh-differenceentropy
Nonenhanced CT + arterial phase + venous phase	plain_wavelet_firstorder_wavelet-hll-mean
	plain_wavelet_glcm_wavelet-llh-maximumprobability
	arterial_laplaciansharpening_glszm_smallarealowgraylevelemphasis
	plain_wavelet_firstorder_wavelet-llh-energy
	arterial_boxsigmaimage_glrlm_runlengthnonuniformity
	venous_log_glrlm_log-sigma-4-0-mm-3d-runlengthnonuniformity
	arterial_wavelet_glszm_wavelet-lll-graylevelnonuniformity
	venous_log_firstorder_log-sigma-0-5-mm-3d-totalenergy
	plain_wavelet_firstorder_wavelet-llh-totalenergy
	plain_wavelet_glcm_wavelet-llh-sumentropy

CT, computed tomography; GLCM, gray-level co-occurrence matrix; GLDM, gray-level dependence matrix; GLRLM, gray-level run length matrix; GLSZM, gray-level size zone matrix.

Table S2 Detailed results of the training set and test set for the single models

Classifier	Group	AUC (95% CI)	Sensitivity	Specificity	Accuracy	Precision	F1-score
QDA_CT	Training	0.85 (0.76–0.94)	0.698	0.818	0.75	0.833	0.759
	Test	0.719 (0.541–0.896)	0.667	0.6	0.636	0.667	0.667
Logistic_CT	Training	0.868 (0.785–0.95)	0.767	0.818	0.789	0.846	0.805
	Test	0.726 (0.55–0.902)	0.611	0.6	0.606	0.647	0.629
SVM_CT	Training	0.872 (0.793–0.952)	0.86	0.667	0.776	0.771	0.813
	Test	0.737 (0.565–0.909)	0.722	0.6	0.667	0.684	0.703
QDA_arterial phase	Training	0.753 (0.645–0.862)	0.721	0.636	0.684	0.721	0.721
	Test	0.73 (0.551–0.909)	0.722	0.6	0.667	0.684	0.703
Logistic_arterial phase	Training	0.757 (0.649–0.865)	0.698	0.636	0.671	0.714	0.706
	Test	0.726 (0.545–0.907)	0.667	0.6	0.636	0.667	0.667
SVM_arterial phase	Training	0.791 (0.691–0.892)	0.86	0.636	0.763	0.755	0.804
	Test	0.674 (0.483–0.866)	0.611	0.4	0.515	0.55	0.579
QDA_venous phase	Training	0.776 (0.667–0.884)	0.721	0.636	0.684	0.721	0.721
	Test	0.707 (0.519–0.896)	0.667	0.8	0.727	0.8	0.727
Logistic_venous phase	Training	0.787 (0.678–0.896)	0.721	0.697	0.711	0.756	0.738
	Test	0.693 (0.503–0.882)	0.667	0.667	0.667	0.706	0.686
SVM_venous phase	Training	0.796 (0.691–0.901)	0.744	0.667	0.711	0.744	0.744
	Test	0.704 (0.52–0.888)	0.667	0.667	0.667	0.706	0.686

AUC, area under the curve; CI, confidence interval; QDA, quadratic discriminant analysis; CT, computed tomography; SVM, support vector machine.

Table S3 Delong test for single models constructed with QDA

Method	Training group			Test group		
	QDA_CT	QDA_arterial.phase	QDA_venous.phase	QDA_CT	QDA_arterial.phase	QDA_venous.phase
QDA_CT	1	0.069	0.047	1	0.91	0.887
QDA_arterial.phase	0.069	1	0.589	0.91	1	0.725
QDA_venous.phase	0.047	0.589	1	0.887	0.725	1

QDA, quadratic discriminant analysis; CT, computed tomography.

Table S4 Delong test for the single models constructed with logistic regression

Method	Training group			Test group		
	Logistic_CT	Logistic_arterial.phase	Logistic_venous.phase	Logistic_CT	Logistic_arterial.phase	Logistic_venous.phase
Logistic_CT	1	0.04	0.098	1	1	0.6
Logistic_arterial.phase	0.04	1	0.514	1	1	0.604
Logistic_venous.phase	0.098	0.514	1	0.6	0.604	1

CT, computed tomography.

Table S5 Delong test for the single models constructed with SVM

Method	Training group			Test group		
	SVM_CT	SVM_arterial.phase	SVM_venous.phase	SVM_CT	SVM_arterial.phase	SVM_venous.phase
SVM_CT	1	0.13	0.11	1	0.533	0.666
SVM_arterial.phase	0.13	1	0.921	0.533	1	0.646
SVM_venous.phase	0.11	0.921	1	0.666	0.646	1

SVM, support vector machine; CT, computed tomography.

Table S6 Detailed results of the training set and test set for the fusion models

Method	Group	AUC (95% CI)	Sensitivity	Specificity	Accuracy	Precision	F1-score
QDA_1	Training	0.866 (0.784–0.948)	0.744	0.848	0.789	0.865	0.8
	Test	0.73 (0.55–0.909)	0.556	0.933	0.727	0.909	0.69
Logistic_1	Training	0.879 (0.801–0.956)	0.907	0.727	0.829	0.812	0.857
	Test	0.726 (0.547–0.905)	0.556	0.933	0.727	0.909	0.69
SVM_1	Training	0.888 (0.812–0.964)	0.93	0.727	0.842	0.816	0.869
	Test	0.763 (0.594–0.932)	0.667	0.867	0.758	0.857	0.75
QDA_2	Training	0.851 (0.761–0.94)	0.698	0.879	0.776	0.882	0.779
	Test	0.733 (0.554–0.913)	0.611	0.933	0.758	0.917	0.733
Logistic_2	Training	0.884 (0.808–0.961)	0.837	0.818	0.829	0.857	0.847
	Test	0.726 (0.545–0.907)	0.611	0.933	0.758	0.917	0.733
SVM_2	Training	0.883 (0.806–0.96)	0.837	0.848	0.842	0.878	0.857
	Test	0.722 (0.539–0.905)	0.611	0.933	0.758	0.917	0.733
QDA_3	Training	0.788 (0.685–0.891)	0.721	0.758	0.737	0.795	0.756
	Test	0.707 (0.523–0.892)	0.722	0.733	0.727	0.765	0.743
Logistic_3	Training	0.825 (0.73–0.921)	0.953	0.636	0.816	0.774	0.854
	Test	0.7 (0.515–0.885)	0.667	0.8	0.727	0.8	0.727
SVM_3	Training	0.852 (0.761–0.943)	0.884	0.697	0.803	0.792	0.835
	Test	0.693 (0.506–0.879)	0.556	0.867	0.697	0.833	0.667
QDA_4	Training	0.825 (0.729–0.92)	0.793	0.606	0.789	0.755	0.833
	Test	0.763 (0.59–0.935)	0.722	0.867	0.788	0.867	0.788
Logistic_4	Training	0.844 (0.754–0.933)	0.907	0.636	0.789	0.765	0.83
	Test	0.763 (0.59–0.936)	0.722	0.867	0.788	0.867	0.788
SVM_4	Training	0.967 (0.935–0.998)	0.86	0.97	0.908	0.974	0.913
	Test	0.754 (0.584–0.924)	0.611	0.867	0.727	0.846	0.71

AUC, area under the curve; CI, confidence interval; QDA, quadratic discriminant analysis; SVM, support vector machine.

Table S7 Delong test for the fusion models constructed with QDA

Method	Training group				Test group			
	QDA_1	QDA_2	QDA_3	QDA_4	QDA_1	QDA_2	QDA_3	QDA_4
QDA_1	1	0.417	0.033	0.046	1	0.854	0.705	0.304
QDA_2	0.417	1	0.106	0.28	0.854	1	0.671	0.468
QDA_3	0.033	0.106	1	0.154	0.705	0.671	1	0.167
QDA_4	0.046	0.28	0.154	1	0.304	0.468	0.167	1

QDA, quadratic discriminant analysis.

Table S8 Delong test for the fusion models constructed with the logistic regression

Method	Training group				Test group			
	Logistic_1	Logistic_2	Logistic_3	Logistic_4	Logistic_1	Logistic_2	Logistic_3	Logistic_4
Logistic_1	1	0.692	0.144	0.073	1	1	0.625	0.161
Logistic_2	0.692	1	0.107	0.068	1	1	0.608	0.311
Logistic_3	0.144	0.107	1	0.546	0.625	0.608	1	0.168
Logistic_4	0.073	0.068	0.546	1	0.161	0.311	0.168	1

Table S9 Delong test for the fusion models constructed with SVM

Method	Training group				Test group			
	SVM_1	SVM_2	SVM_3	SVM_4	SVM_1	SVM_2	SVM_3	SVM_4
SVM_1	1	0.856	0.226	0.012	1	0.321	0.161	0.871
SVM_2	0.856	1	0.438	0.01	0.321	1	0.57	0.567
SVM_3	0.226	0.438	1	0.006	0.161	0.57	1	0.435
SVM_4	0.012	0.01	0.006	1	0.871	0.567	0.435	1

SVM, support vector machine.