

feature	rep1	transform	lambda1	mean	sd
b0	0.94567				
NGLDM_IBSI_DEP_ENTROPY_2DV_HU	0.20525	BoxCox (1)	2.00000	19.56478	2.52560
LARGEST_PLANAR_DIAMETER_MM	0.15816	Log trans.		2.90773	0.50047
AREA_DENSITY_AEE	0.15799	Raw data		1.24156	0.13607
ANTPOST_LENGTH_MM	0.10496	Log trans.		2.76181	0.48508
L3_DISTANCE_MM	0.09033	Raw data		11.81783	5.05154
NGTDM_STRENGTH_2DF_HU	-0.10841	Raw data		32.19727	12.24336
FLATNESS_MM	0.21689	Raw data		0.60080	0.14668
GLCM_IBSI_JOINT_ENTROPY_2DF_HU	0.07277	Raw data		6.93482	0.83747
VOLUME_DENSITY_AABB	-0.09685	Raw data		0.39979	0.09539
GLCM_IBSI_SUM_ENTROPY_2DF_HU	0.01043	Raw data		5.06393	0.55465

Figure S1 Da Vinci Robot Surgical System. The robotic arms are prepared with a sterile cover prior to entering the operating field.

feature	rep1	transform	lambda1	mean	
	1.02726				
originalngtdmStrength	-0.03032	Log trans.		0.75914	0.872
wavelet.LHLfirstorderMean	0.08648	Raw due to fail in Boxcox trans.(2)		-20.02619	13.784
originalshapeLeastAxisLength	0.19995	Raw data		11.41005	4.907
originalshapeMaximum2DDiameterSlice	0.06555	Log trans.		2.93519	0.486
wavelet.LHHgldmLargeDependenceHighGrayLevelEmphasis	0.02587	BoxCox (1)	0.40000	51.34039	13.797
wavelet.LHHglszmZoneEntropy	0.10630	Raw data		4.87343	0.661
wavelet.HLLfirstorderSkewness	-0.11516	Raw data		-0.02236	0.454
wavelet.HLLgldmMCC	-0.14443	Raw data		0.53593	0.107
wavelet.HHLgldmImc1	0.00051	Raw due to fail in Boxcox trans.(2)		-0.03880	0.032
wavelet.HHHfirstorderKurtosis	0.17134	Log trans.		1.30574	0.173
wavelet.LLLfirstorderTotalEnergy	0.19519	Log trans.		20.43014	1.344
wavelet.LLLglszmZoneEntropy	0.01279	BoxCox (1)	2.00000	23.72869	3.590

Figure S2 PyRadiomics features selected from LASSO regression. LASSO, least absolute shrinkage and selection operator.

HealthMyne	PyRadiomics	Spearman's coefficient
FLATNESS_MM	originalshapeFlatness	0.9689
AREA_DENSITY_AEE	originalshapeLeastAxisLength	0.661
L3_DISTANCE_MM	originalshapeLeastAxisLength	0.9725
LARGEST_PLANAR_DIAMETER_MM	originalshapeMaximum2DDiameterSlice	0.9546
VOLUME_DENSITY_AABB	originalshapeSphericity	0.7103
ANTPOST_LENGTH_MM	originalshapeVoxelVolume	0.9079
GLCM_IBSI_JOINT_ENTROPY_2DF_HU	wavelet.LLLgldmJointEntropy	0.7307
NGLDM_IBSI_DEP_ENTROPY_2DV_HU	wavelet.LLLgldmJointEntropy	0.8019
GLCM_IBSI_SUM_ENTROPY_2DF_HU	wavelet.LLLgldmRunEntropy	0.7573
NGTDM_STRENGTH_2DF_HU	wavelet.LLLngtdmBusyness	-0.6813

Figure S3 PyRadiomics features selected from Spearman's rank correlation.

PyRadiomic Features
originalshapeFlatness
originalshapeLeastAxisLength
originalshapeMaximum2DDiameterColumn
originalshapeMaximum3DDiameter
originalshapeMeshVolume
originalshapeSphericity
originalshapeVoxelVolume
originalglcmSumEntropy
originalngtdmStrength
wavelet.LHLglcmJointEntropy
wavelet.LHHglcmDependenceEntropy

Figure S4 PyRadiomics features selected from Image Biomarker Standardization Initiative (IBSI).

$$\text{Prob}\{y = 1\} = \frac{1}{1 + \exp(-X\hat{\beta})}, \text{ where}$$

$$\begin{aligned}
X\hat{\beta} = & \\
& -6.212115 \\
& +2.958209p.\text{Mayo.mi} - 1.433518(p.\text{Mayo.mi} - 0.1117401)_+^3 \\
& +2.446982(p.\text{Mayo.mi} - 0.415246)_+^3 - 1.013464(p.\text{Mayo.mi} - 0.8445473)_+^3 \\
& +8.225733\text{glmnet.HM} - 14.4172(\text{glmnet.HM} - 0.4529068)_+^3 \\
& +42.2831(\text{glmnet.HM} - 0.710467)_+^3 - 27.8659(\text{glmnet.HM} - 0.843723)_+^3
\end{aligned}$$

and $(x)_+ = x$ if $x > 0$, 0 otherwise

Figure S5 Commercial (HealthMyne) ClinRad model.

$$\text{Prob}\{y = 1\} = \frac{1}{1 + \exp(-X\hat{\beta})}, \text{ where}$$

$$\begin{aligned}
X\hat{\beta} = & \\
& -6.424683 \\
& +2.119577p.\text{Mayo.mi} + 1.218757(p.\text{Mayo.mi} - 0.1117401)_+^3 \\
& -2.080389(p.\text{Mayo.mi} - 0.415246)_+^3 + 0.8616326(p.\text{Mayo.mi} - 0.8445473)_+^3 \\
& +8.992163\text{glmnet} - 17.61564(\text{glmnet} - 0.4247112)_+^3 \\
& +58.43884(\text{glmnet} - 0.7373793)_+^3 - 40.82321(\text{glmnet} - 0.8722989)_+^3
\end{aligned}$$

and $(x)_+ = x$ if $x > 0$, 0 otherwise

Figure S6 Open-Source (PyRadiomics) ClinRad model.