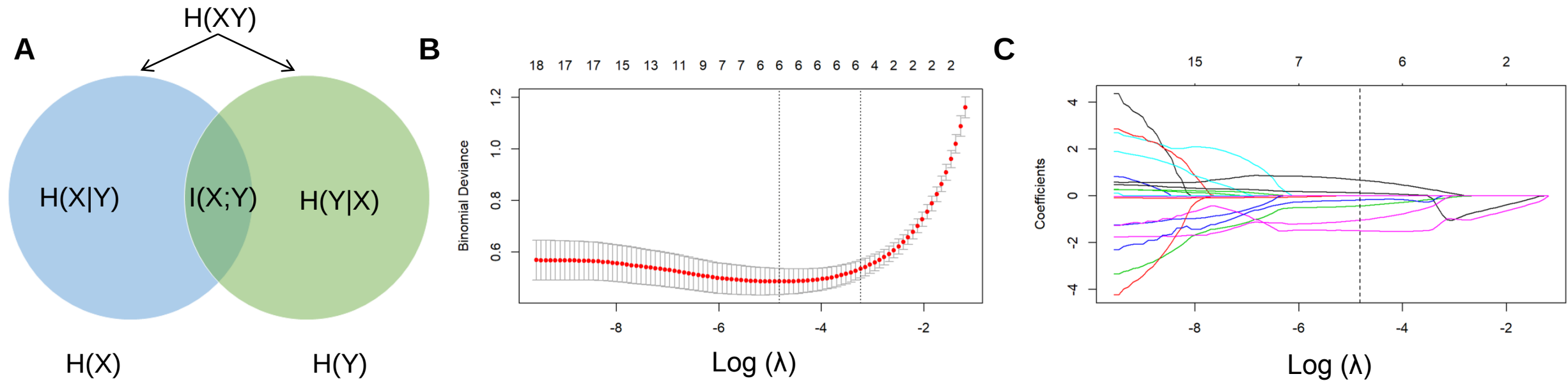




Supplementary Figure 1. Radiomics feature selection using minimum redundancy and maximum relevance (mRMR) and least absolute shrinkage and selection operator (LASSO). **(A)** mRMR was performed to eliminate the redundant and irrelevant features. **(B)** The area under the curve was plotted versus $\text{Log}(\lambda)$. **(C)** LASSO coefficient profiles of the 20 texture features. A coefficient profile plot was produced against the $\text{Log}(\lambda)$ sequence. Vertical line was drawn at the value selected using 10-fold cross-validation, where optimal λ resulted in 6 nonzero coefficients.

Supplementary Table 1. Pyradiomics plug-in unit extraction parameters (v2.2).

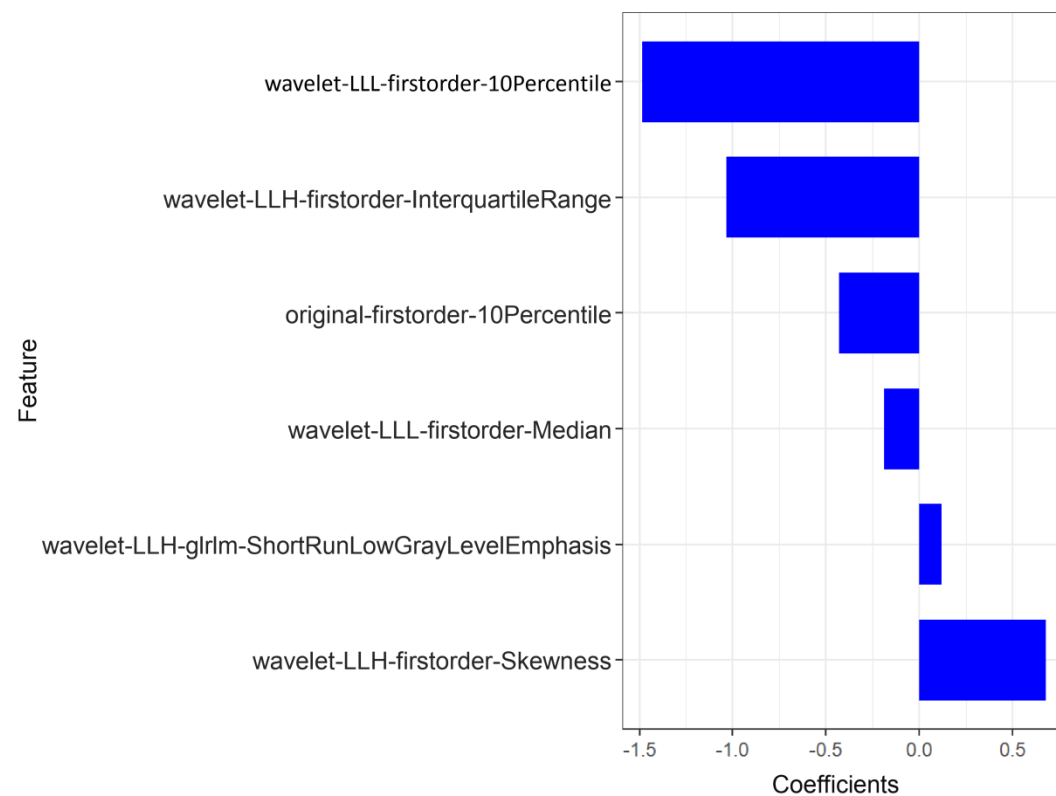
Parameters	Value
distances	[1]
force2Ddimension	0
force2D	False
interpolator	sitkBSpline
resampledPixelSpacing	None
normalizeScale	1
normalize	False
padDistance	5
removeOutliers	None
minimumROISize	None
binWidth	25
label	1
preCrop	False
resegmentRange	None
minimumROIDimensions	2
symmetricalGLCM	True
correctMask	True
additionalInfo	True

Supplementary Table 2. Characteristics of Patients.

Characteristics	Training (N=414)	Test (N=176)	<i>P</i>
Gender, No. (%)			
Male	106 (25.60)	40 (22.70)	0.459
Female	308 (74.40)	136 (77.30)	
Age, mean (SE), years	66.89 (0.54)	66.07 (0.83)	0.402
HGB, mean (SE), g/L	123.77 (1.30)	123.77 (1.79)	0.654
GLU, mean (SE), mmol/L	5.46 (0.07)	5.57 (0.12)	0.106
TBIL, mean (SE), umol/L	16.06 (2.81)	14.61 (0.56)	0.038
DBIL, mean (SE), umol/L	4.24 (0.67)	4.15 (0.27)	0.164
IBIL, mean (SE), umol/L	12.58 (2.89)	10.47 (0.38)	0.050
ALP, mean (SE), U/L	82.24 (1.28)	82.60 (2.66)	0.197
UA, mean (SE), umol/L	302.78 (4.11)	304.95 (6.72)	0.416
Ca, mean (SE), mmol/L	2.56 (0.25)	2.30 (0.01)	0.672
Mg, mean (SE), mmol/L	1.05 (0.01)	1.05 (0.01)	0.312
P, mean (SE), mmol/L	1.10 (0.01)	1.09 (0.01)	0.461
HCY, mean (SE), umol/L	13.93 (0.45)	13.95 (0.67)	0.539

NOTE. *P* value is derived from the univariable association analyses. Chi-Square was used to analyze the difference of categorical data (Age), while the independent sample *t*-test or Mann-Whitney *U* test was used to analyze the difference of quantitative data (Age, HGB, GLU, TBIL, DBIL, IBIL, ALP, UA, Ca, Mg, P, HCY)

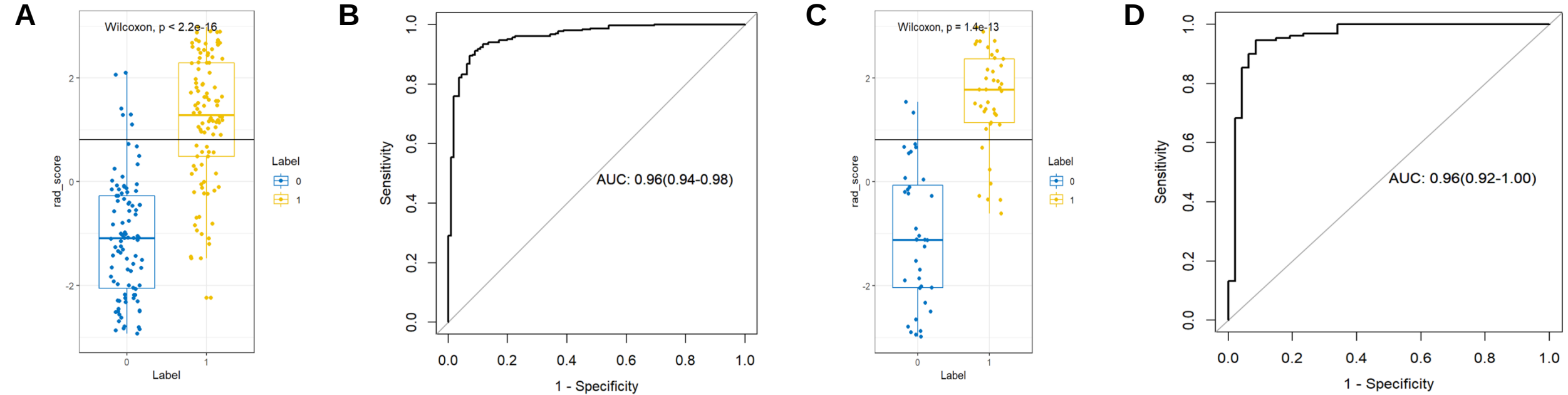
Abbreviations: HGB, hemoglobin; GLU, glucose; TBIL, total bilirubin; DBIL, direct bilirubin; IBIL, indirect bilirubin; ALP, alkaline phosphatase; UA, uric acid; Ca, calcium; Mg, magnesium; P, phosphorus; HCY, homocysteine; SE, standard error.



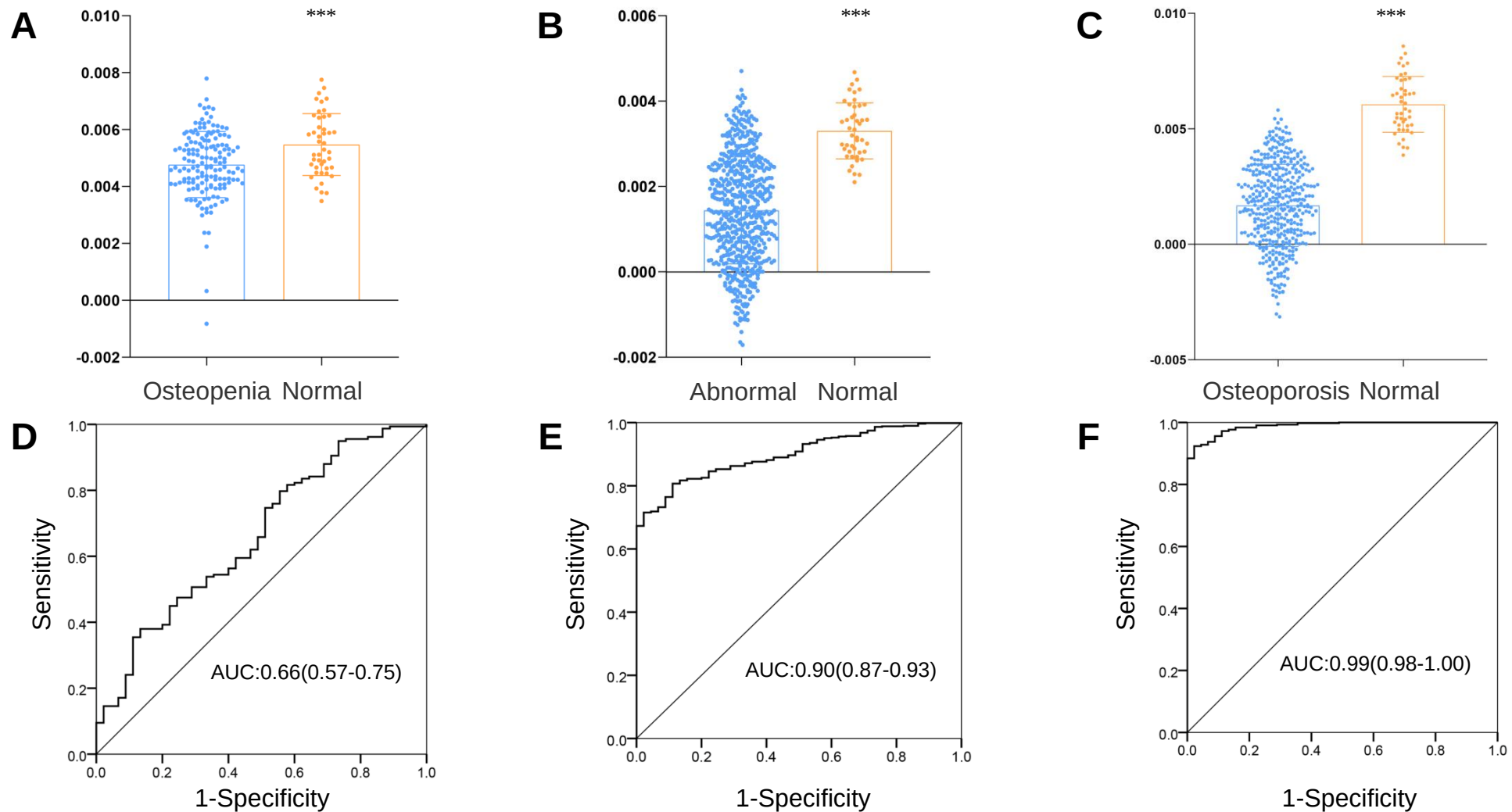
Supplementary Figure 2. The contribution of each feature to the radiomic signature was shown by histogram.

Training cohort

Test cohort



Supplementary Figure 3. Performance of rad-score in discriminating between osteoporosis and osteopenia. The box plot (**A**) and ROC (**B**) of rad-score in discriminating the osteoporosis and osteopenia in training cohort. The box plot (**C**) and ROC (**D**) of rad-score in discriminating the osteoporosis and osteopenia in test cohort. 0, osteopenia; 1, osteoporosis. Wilcoxon test, $P < 0.05$. Rad, radiomics.



Supplementary Figure 4. Performance of rad-score in discriminating between normal and osteopenia, abnormal and osteoporosis. **(A-C)** Box plot of rad-score in discriminating between normal and osteopenia, abnormal and osteoporosis. **(D-F)** ROC of rad-score in discriminating between normal and osteopenia, abnormal and osteoporosis. Wilcoxon test, *** P value <0.001 . Osteopenia-N=158, Abnormal-N=590, Osteoporosis-N=432, Normal-N=45

Rad-score = -1.486*wavelet-LLL-firstorder-10Percentile+-1.032*wavelet-LLH-firstorder-InterquartileRange+-0.428*original-firstorder-10Percentile+-0.187*wavelet-LLL-firstorder-Median+0.123*wavelet-LLH-glrlm-ShortRunLowGrayLevelEmphasis +0.68*wavelet-LLH-firstorder-Skewness+ 2.755