

Supplementary Tables

**Supplementary Table 1: Elastic net regression model for predicting high-grade tumors—
regression coefficients and performance metrics**

Parameters	Values
Intercept	+5.810
Morphology–compactness 1	+6.829
Morphology–compactness 2	+7.716
Intensity–intensity variance	-0.000012
Intensity–intensity skewness	-0.014493
Intensity–standard deviation	-0.000990
Intensity–intensity-based mean absolute deviation	-0.036222
Intensity–intensity-based robust mean absolute deviation	-0.001099
Intensity–intensity-based median absolute deviation	-0.027975
Intensity–intensity-based energy	-0.000000003
Intensity rim–approximate volume	-0.86063
Intensity histogram–skewness	-0.01616
Intensity histogram–maximum histogram gradient	-0.00042
Intensity histogram rim–approximate volume	-0.84506
Intensity histogram rim–sum	+0.000001209
GLCM–normalized inverse difference	-6.47508
GLRLM–short run-low grey level-emphasis	+6.24183
GLRLM–grey-level non-uniformity	+0.00144
NGTDM–contrast	+0.08554
NGTDM–busyness	+16.6653
NGTDM–coarseness	+0.00016
GLSZM–large zone-low grey level-emphasis	-6.049201
GLSZM–grey-level non-uniformity	+0.001638
GLSZM–normalized grey-level non-uniformity	+0.96766
Performance metrics	Values (95% CI)
Area under the ROC curve	0.831 (0.737–0.901)
Accuracy	78.3% (73.3%–83.2%)
Sensitivity	65.5% (57.0%–74.0%)
Specificity	84.1% (79.7%–88.5%)
Positive predictive value	65.5% (56.7%–74.3%)
Negative predictive value	34.5% (28.5%–40.5%)
Positive likelihood ratio	4.13 (2.34–7.98)
Negative likelihood ratio	0.41 (0.23–0.63)

CI=Confidence interval; *GLCM*=grey-level co-occurrence matrix; *GLRLM*=grey-level run-length matrix; *GLSZM*=grey-level size-zone matrix; *NGTDM*=neighboring grey-tone difference matrix; *ROC*=receiver operating characteristic.

**Supplementary Table 2: Elastic net regression model for predicting high acinar score—
regression coefficients and performance metrics**

Parameters	Values
Intercept	+0.8063177
Morphology–compactness 1	+0.0000007
Morphology–approximate volume	+0.0000008
Morphology–surface area	+0.0000002
Morphology–surface-to-volume ratio	-0.0045735
Morphology–center of mass shift	+0.0014785
Morphology–maximum 3D diameter	+0.0000276
Intensity–mean intensity	-0.0000746
Intensity–intensity skewness	-0.0006431
Intensity–median intensity	-0.0000596
Intensity–minimum intensity	-0.0000283
Intensity–10 th intensity percentile	-0.0000821
Intensity–25 th intensity percentile	-0.0000773
Intensity–50 th intensity percentile	-0.0000596
Intensity–75 th intensity percentile	-0.0000414
Intensity–90 th intensity percentile	-0.0000315
Intensity–standard deviation	+0.0000680
Intensity–maximum intensity	-0.00000727
Intensity–intensity interquartile range	+0.0003973
Intensity–intensity-based mean absolute deviation	+0.0005498
Intensity–intensity-based robust mean absolute deviation	+0.0010255
Intensity–intensity-based median absolute deviation	+0.0005589
Intensity–intensity-based coefficient of variation	-0.0018019
Intensity–intensity-based quartile coefficient of dispersion	-0.0028457
Intensity–area under curve cIVH	+0.0000304
Intensity–intensity-based energy	-0.00000000005
Intensity–root mean square intensity	-0.0001184
Intensity rim–minimum	-0.0000283
Intensity rim–mean	-0.0000610
Intensity rim–standard deviation	+0.0000067
Intensity rim–maximum	-0.00000731
Intensity rim–approximate volume	+0.0160129
Intensity rim–sum	-0.000000002
Intensity histogram–mean	+0.0001585
Intensity histogram–skewness	-0.00064552
Intensity histogram–median	+0.0001708
Intensity histogram–minimum grey level	+0.0001086
Intensity histogram–10 th percentile	+0.0001153

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Intensity histogram–25 th percentile	+0.0001351
Intensity histogram–50 th percentile	+0.0001708
Intensity histogram–75 th percentile	+0.0001890
Intensity histogram–90 th percentile	+0.0002038
Intensity histogram–standard deviation	-0.0004898
Intensity histogram–maximum grey level	+0.0000410
Intensity histogram–mode	+0.0001840
Intensity histogram–interquartile range	+0.0000061
Intensity histogram–range	-0.0001599
Intensity histogram–coefficient of variation	-0.0173559
Intensity histogram–entropy log 10	-0.0099861
Intensity histogram–entropy log 2	-0.0030061
Intensity histogram–area under curve CSH	-0.0000110
Intensity histogram–uniformity	+0.047535
Intensity histogram–root mean square	+0.179368
Intensity histogram–maximum histogram gradient	+0.000037
Intensity histogram–maximum histogram gradient grey-level	+0.000178
Intensity histogram–minimum histogram gradient	-0.0000421
Intensity histogram–minimum histogram gradient grey-level	+0.0001853
Intensity histogram rim–minimum	+0.0001082
Intensity histogram rim–mean	+0.0001693
Intensity histogram rim–standard deviation	-0.0002589
Intensity histogram rim–maximum	+0.0000391
Intensity histogram rim–approximate volume	+0.0160130
Intensity histogram rim–sum	+0.000000006
GLCM–joint maximum	+0.0675074
GLCM–joint average	+0.0001584
GLCM–joint entropy log 2	-0.0013874
GLCM–joint entropy log 10	-0.0070755
GLCM–difference variance	+0.0000253
GLCM–difference entropy	-0.0019273
GLCM–sum average	+0.0000793
GLCM–sum variance	-0.00000008
GLCM–sum entropy	-0.0011481
GLCM–angular second moment	+0.1612474
GLCM–contrast	+0.0000267
GLCM–inverse difference	+0.0145287
GLCM–normalized inverse difference	-0.1748196
GLCM–inverse difference moment	+0.0146961
GLCM–normalized inverse difference moment	-0.4882590
GLCM–correlation	-0.0124204
GLCM–autocorrelation	+0.0000011
GLCM–cluster tendency	-0.00000002

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GLCM–cluster shade	-0.000000059
GLCM–cluster prominence	-0.000000001
GLRLM–short-run emphasis	-0.0349661
GLRLM–long-run emphasis	+0.0036514
GLRLM–low grey-level run emphasis	-0.3061962
GLRLM–high grey-level run emphasis	+0.0000012
GLRLM–run percentage	-0.0276715
NGTDM–coarseness	+0.0147034
NGTDM–contrast	+0.0034110
NGTDM–busyness	+0.0518077
NGTDM–complexity	-0.0000002
NGTDM–strength	-0.0001501
GLSZM–small-zone emphasis	-0.0361264
GLSZM–large-zone emphasis	+0.0000048
GLSZM–low grey-level zone emphasis	-0.0427363
GLSZM–high grey-level zone emphasis	+0.0000013
GLSZM–small zone-high grey level-emphasis	+0.0000015
GLSZM–large zone-low grey level-emphasis	-0.1797322
GLSZM–large zone-high grey level-emphasis	+0.000000001
GLSZM–normalized grey-level non-uniformity	+0.1212738
GLSZM–normalized zone-size non-uniformity	-0.0221919
GLSZM–zone percentage	-0.0068612
GLSZM–zone size variance	+0.0000149
GLSZM–zone size entropy	-0.0039887
Performance metrics	Values (95% CI)
Area under the ROC curve	0.686 (0.584–0.787)
Accuracy	66.3% (61.3%–71.3%)
Sensitivity	66.0% (59.6%–72.4%)
Specificity	66.7% (59.7%–73.6%)
Positive predictive value	70.2% (63.5%–76.9%)
Negative predictive value	29.8% (23.0%–36.6%)
Positive likelihood ratio	1.98 (1.30–3.26)
Negative likelihood ratio	0.51 (0.32–0.76)

CI=Confidence interval; *cIVH*=cumulative intensity-volume histogram; *CSH*=cumulative SUV-volume histogram; *GLCM*=grey-level co-occurrence matrix; *GLRLM*=grey-level run-length matrix; *GLSZM*=grey-level size-zone matrix; *NGTDM*=neighboring grey-tone difference matrix; *ROC*=receiver operating characteristic.

**Supplementary Table 3: Elastic net regression model for predicting high nuclear score—
regression coefficients and performance metrics**

Parameters	Values
Intercept	-3.185690
Morphology–compactness 2	+4.344902
Intensity–minimum intensity	-0.000370
Intensity–intensity interquartile range	+0.001597
Intensity–intensity-based coefficient of variation	-0.2336265
Intensity–intensity-based area under curve cIVH	+0.000883
Intensity–intensity-based energy	-0.0000000025
Intensity rim–minimum	-0.000564
Intensity histogram–minimum histogram gradient	-0.000145
GLCM–joint maximum	+3.142242
GLCM–difference average	+0.278464
GLCM–angular second moment	+20.95683
GLCM–dissimilarity	+0.044204
GLCM–inverse variance	-2.895997
GLCM–cluster shade	+0.000016
GLRLM–long-run high grey-level emphasis	+0.000014
NGTDM–busyness	+17.58200
NGTDM–complexity	+0.000310
GLSZM–large-zone emphasis	+0.002649
GLSZM–high grey-level zone emphasis	+0.000083
GLSZM–small zone-low grey level-emphasis	-0.0102821
GLSZM–large zone-low grey level-emphasis	-0.1073358
Performance metrics	Values (95% CI)
Area under the ROC curve	0.859 (0.772–0.926)
Accuracy	79.3% (74.6%–84.1%)
Sensitivity	70.4% (64.4%–76.3%)
Specificity	92.1% (87.9%–96.3%)
Positive predictive value	92.7% (88.6%–96.7%)
Negative predictive value	7.3% (3.7%–11.0%)
Positive likelihood ratio	8.91 (3.70–32.75)
Negative likelihood ratio	0.32 (0.21–0.46)

CI=Confidence interval; *cIVH*=cumulative intensity-volume histogram; *GLCM*=grey-level co-occurrence matrix; *GLRLM*=grey-level run-length matrix; *GLSZM*=grey-level size-zone matrix; *NGTDM*=neighboring grey-tone difference matrix; *ROC*=receiver operating characteristic.

Supplementary Table 4: Elastic net regression model for predicting high progesterone receptor expression—regression coefficients and performance metrics

Parameters	Values
Intercept	-0.3869159
Morphology–integrated intensity	-0.00000019
Intensity–intensity skewness	-0.0036865
Intensity–maximum intensity	-0.0003666
Intensity–intensity-based quartile coefficient of dispersion	+0.1657475
Intensity–area under curve cIVH	-0.0008920
Intensity–total lesion glycolysis	-0.0002232
Intensity rim–maximum	-0.0003562
Intensity rim–approximate volume	-0.4525692
Intensity histogram–skewness	-0.0020286
Intensity histogram–root mean square	+11.68308
Intensity histogram rim–approximate volume	-0.4524576
NGTDM–coarseness	+13.48707
NGTDM–busyness	-1.351310
GLSZM–low grey-level zone emphasis	+28.16019
GLSZM–small zone-low grey level-emphasis	+13.38890
Performance metrics	Values (95% CI)
Area under the ROC curve	0.772 (0.688–0.855)
Accuracy	69.6% (64.6%–74.6%)
Sensitivity	88.2% (82.9%–93.5%)
Specificity	58.6% (52.4%–64.8%)
Positive predictive value	55.6% (48.8%–62.3%)
Negative predictive value	44.4% (36.4%–52.5%)
Positive likelihood ratio	2.13 (1.58–3.01)
Negative likelihood ratio	0.20 (0.07–0.44)

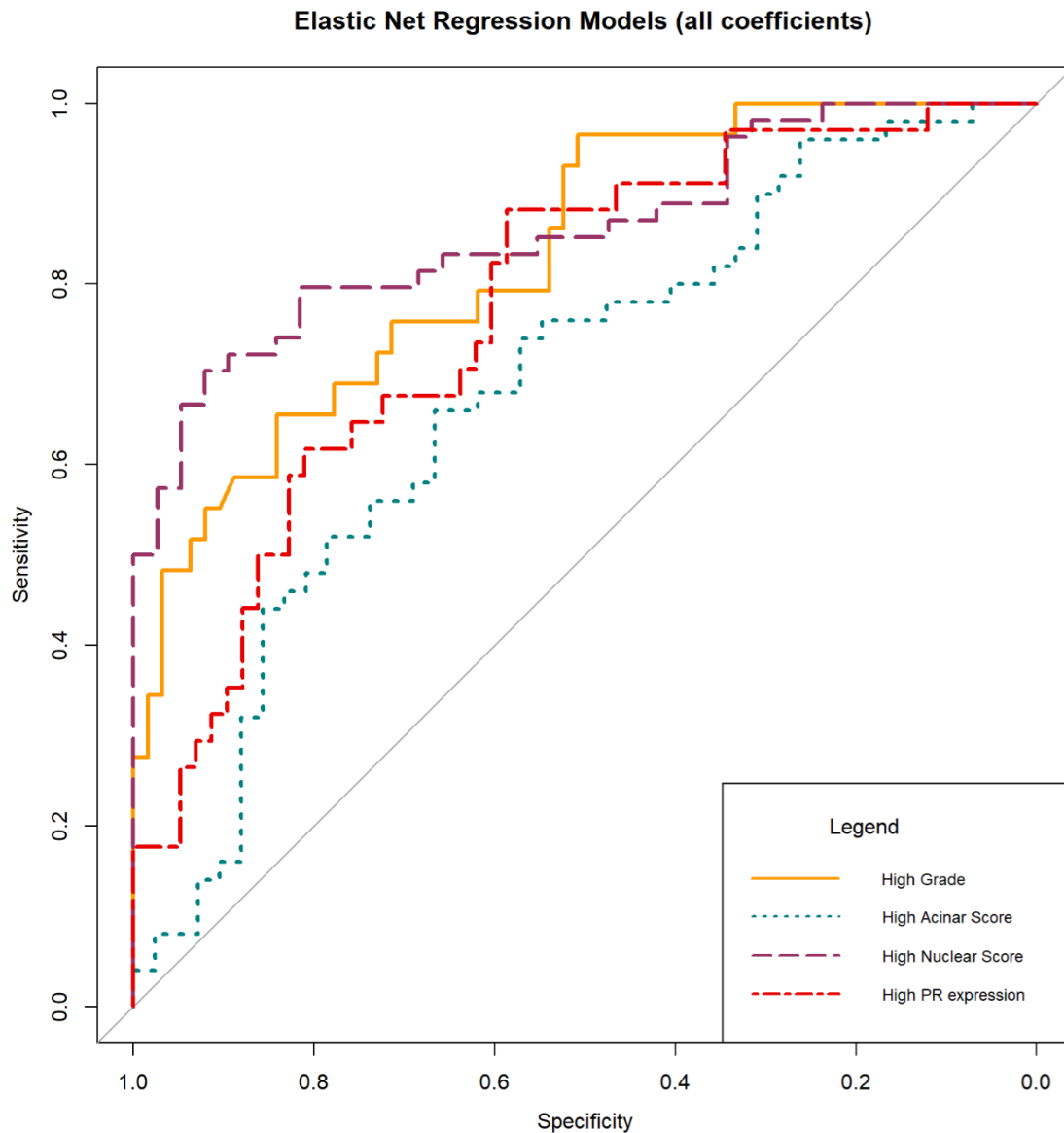
CI=Confidence interval; *cIVH*=cumulative intensity-volume histogram; *GLSZM*=grey-level size-zone matrix; *NGTDM*=neighboring grey-tone difference matrix; *ROC*=receiver operating characteristic.

**Supplementary Table 5: Elastic net regression model for predicting Ki-67 expression—
regression coefficients**

Parameters	Values
Intercept	+0.4218003
Morphology–voxel count	+0.000002252
Morphology–compactness 1	-0.3725237
Morphology–compactness 2	-0.04778263
Morphology–sphericity	-0.00941744
Intensity–intensity skewness	-0.00227238
Intensity–minimum intensity	-0.00000884
Intensity–standard deviation	-0.00022138
Intensity–maximum intensity	-0.00000021
Intensity–intensity interquartile range	-0.00006097
Intensity–intensity-based mean absolute deviation	-0.00109771
Intensity–intensity-based robust mean absolute deviation	-0.00068279
Intensity–intensity-based median absolute deviation	-0.00084519
Intensity–area under curve cIVH	-0.00000324
Intensity–root mean square intensity	-0.00001208
Intensity rim–minimum	-0.00000948
Intensity rim–maximum	-0.00000039
Intensity rim–voxel count	+0.0000022
Intensity rim–approximate volume	-0.00108374
Intensity histogram–skewness	-0.00228673
Intensity histogram rim–voxel count	+0.00000159
Intensity histogram rim–approximate volume	-0.00105962
Intensity histogram rim–sum	+0.00000001
GLCM–correlation	-0.07310996
GLCM–cluster prominence	-0.000000001
GLRLM–short-run emphasis	+0.00115498
GLRLM–long-run emphasis	-0.00430590
GLRLM–grey-level non-uniformity	+0.00002377
GLRLM–run-length non-uniformity	+0.00000720
GLRLM–run percentage	+0.01393620
NGTDM–busyness	+0.3049802
GLSZM–large-zone emphasis	-0.00008317
GLSZM–large zone-low grey level-emphasis	-0.17811370
GLSZM–large zone-high grey level-emphasis	-0.000000003
GLSZM–grey-level non-uniformity	+0.00019311
GLSZM–zone-size non-uniformity	+0.00001668
GLSZM–zone percentage	+0.00451377
GLSZM–zone-size variance	-0.00005187

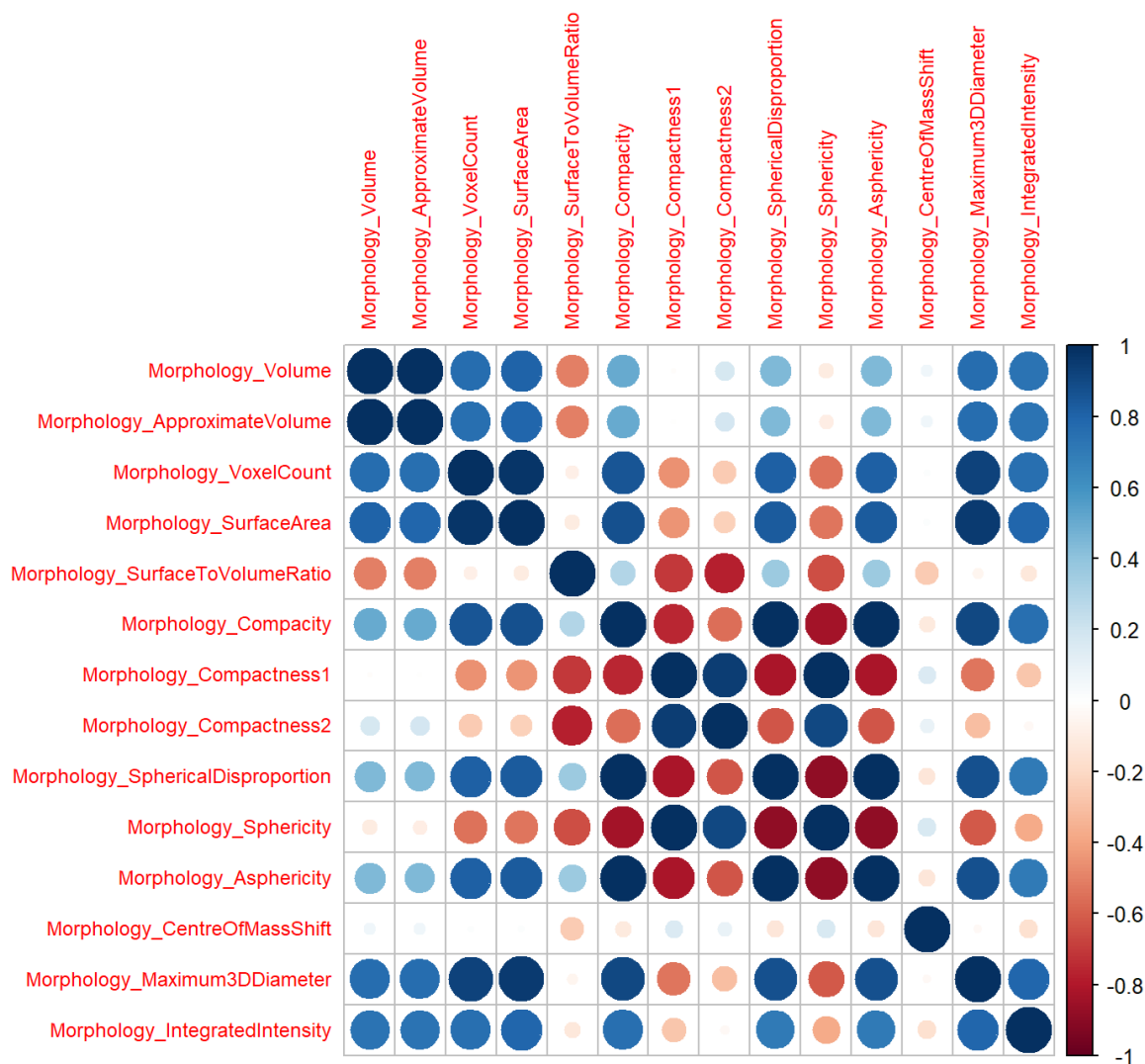
CI=Confidence interval; *cIVH*=cumulative intensity-volume histogram; *GLCM*=grey-level co-occurrence matrix; *GLRLM*=grey-level run-length matrix; *GLSZM*=grey-level size-zone matrix; *NGTDM*=neighboring grey-tone difference matrix.

Supplementary Figures



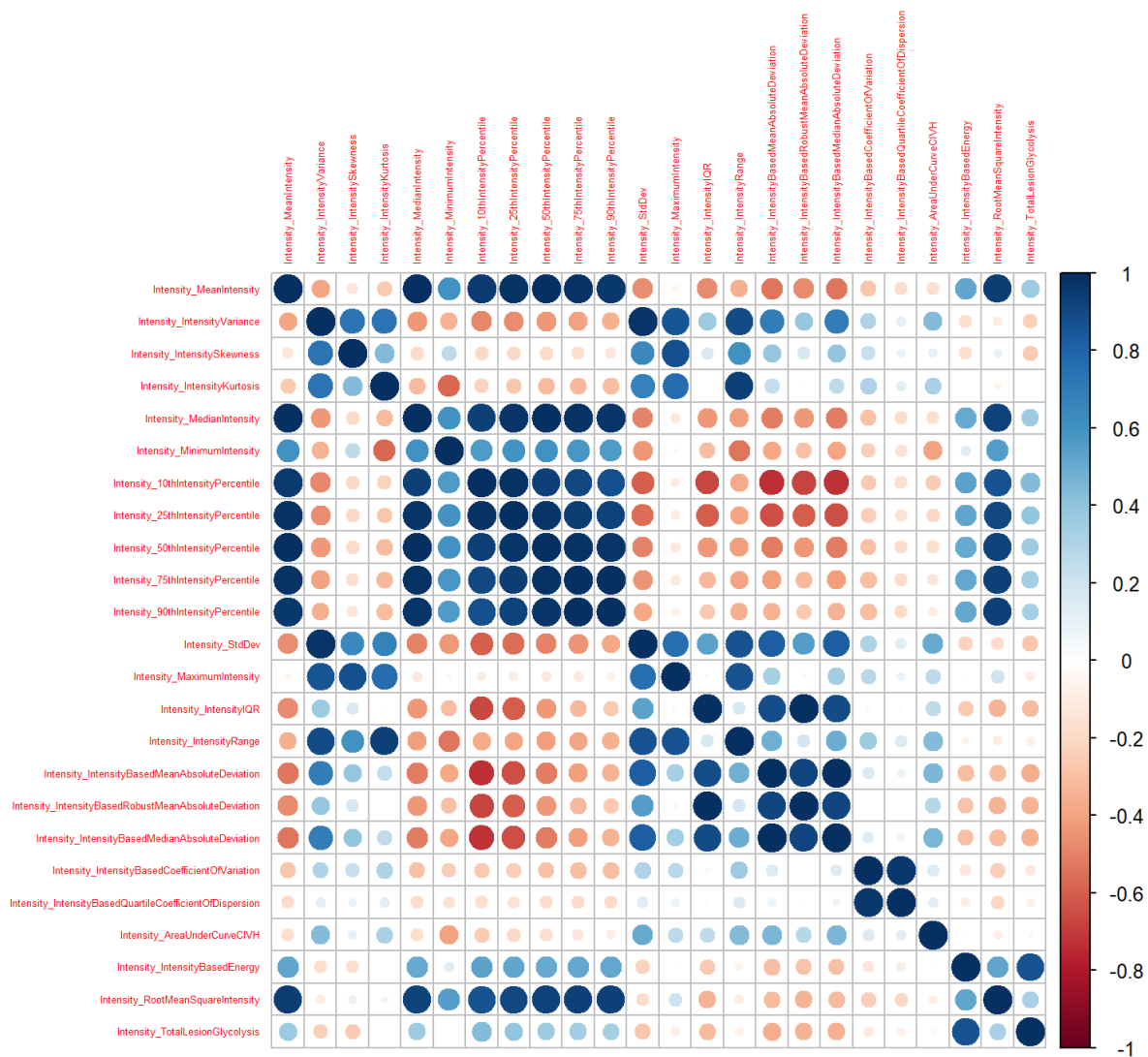
Supplementary Figure 1: Receiver operating characteristic (ROC) curve depicting the performance of elastic net regression models of CT texture parameters for predicting high-grade, high acinar score, high nuclear score and high progesterone receptor (PR) expression among breast lesions secondary to infiltrating ductal carcinoma of breast

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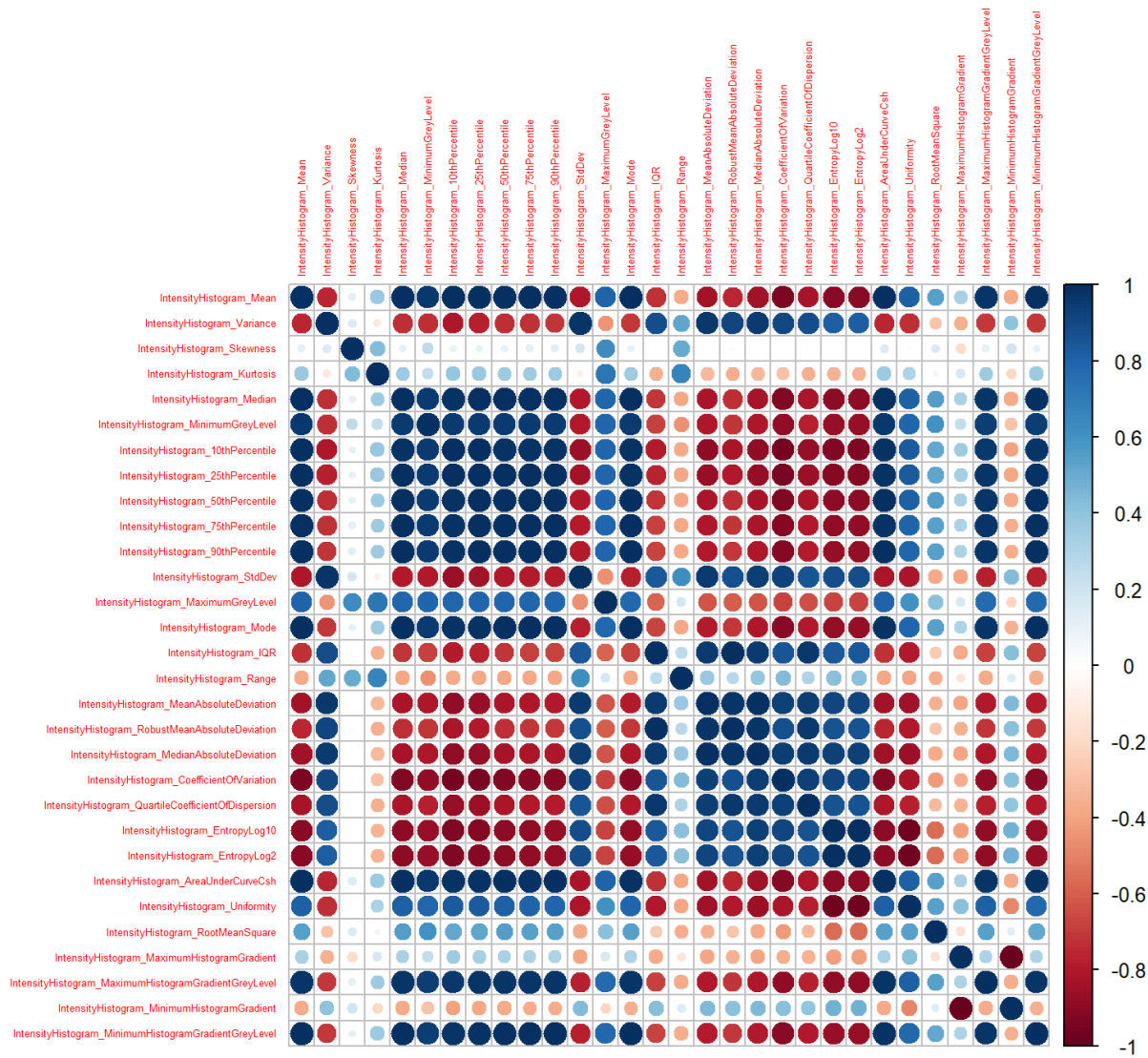
Supplementary Figure 2: Correlation plot depicting the correlations of CT texture parameters pertaining to morphology

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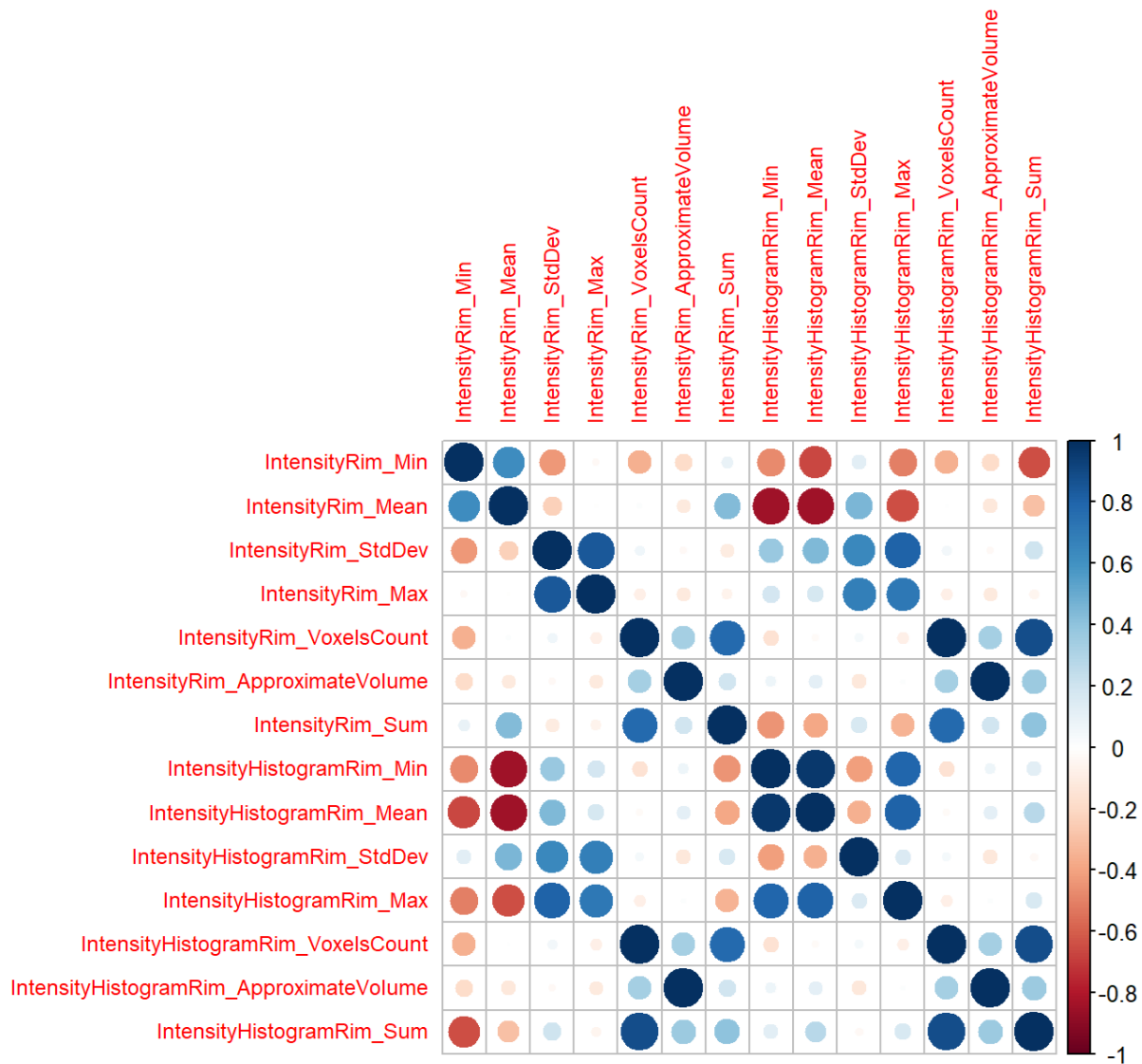


Supplementary Figure 3: Correlation plot depicting the correlations of CT texture parameters pertaining to intensity

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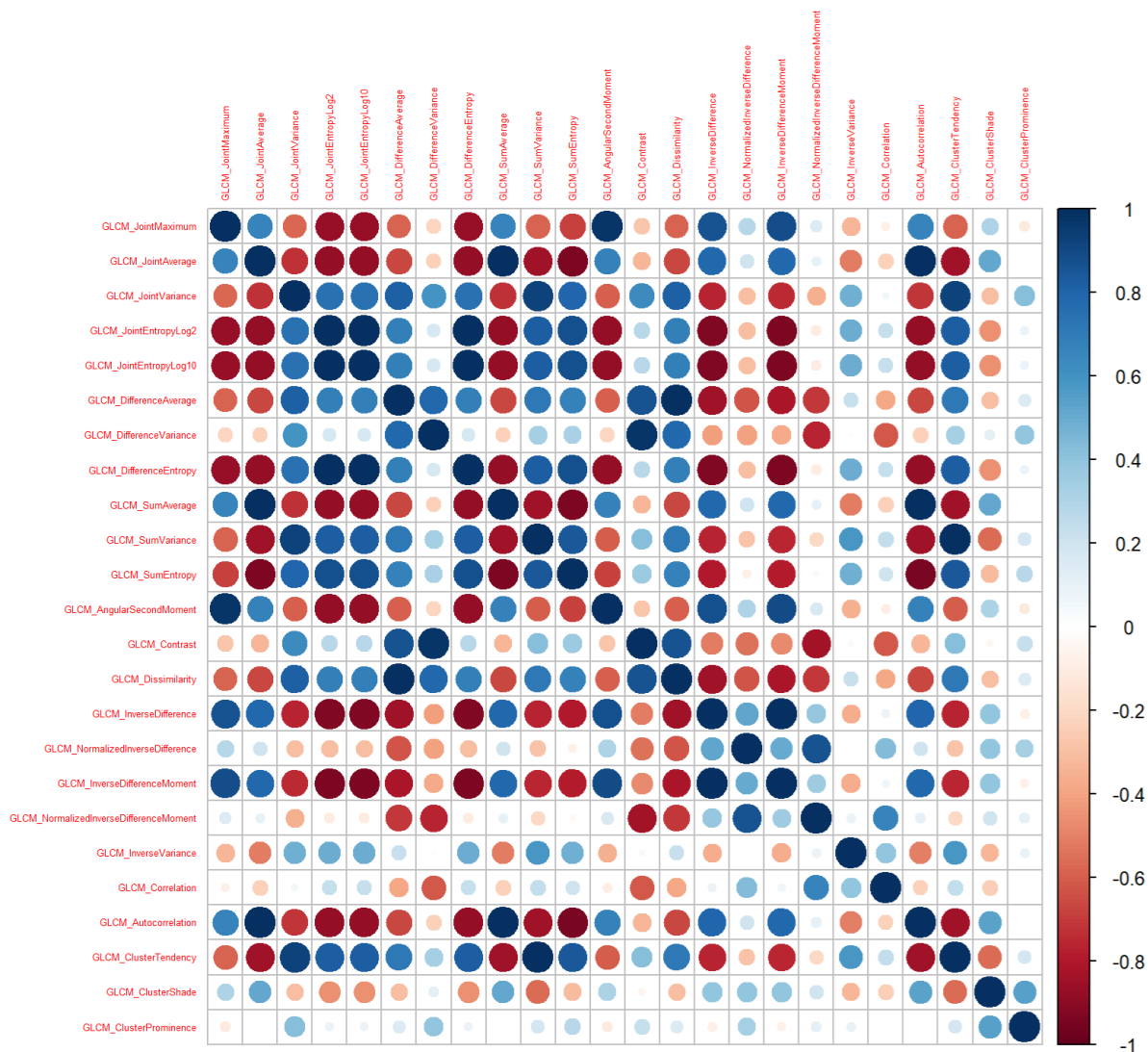


Supplementary Figure 4: Correlation plot depicting the correlations of CT texture parameters derived from intensity histogram



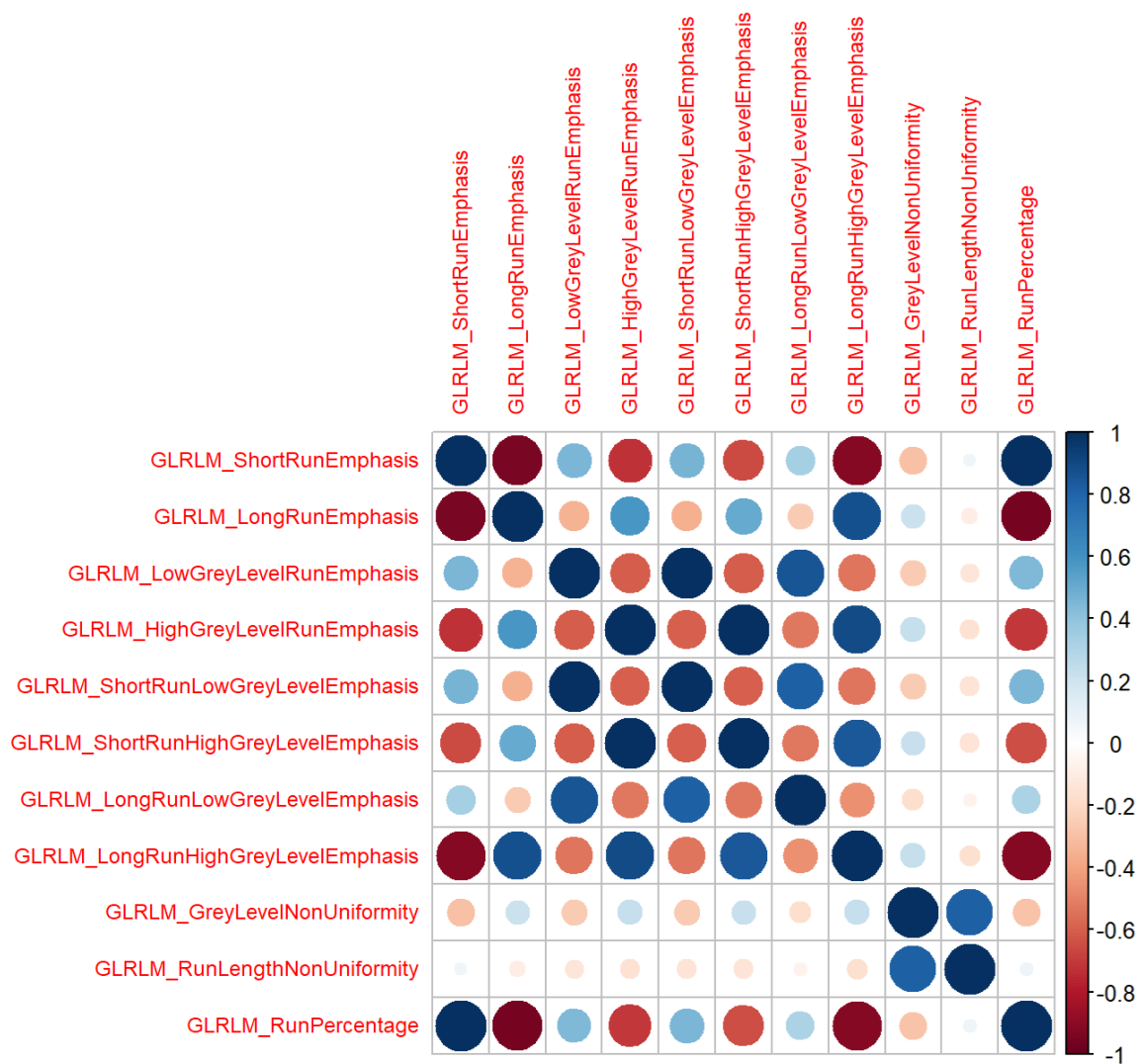
Supplementary Figure 5: Correlation plot depicting the correlations of CT texture parameters derived from intensity rim and intensity histogram rim

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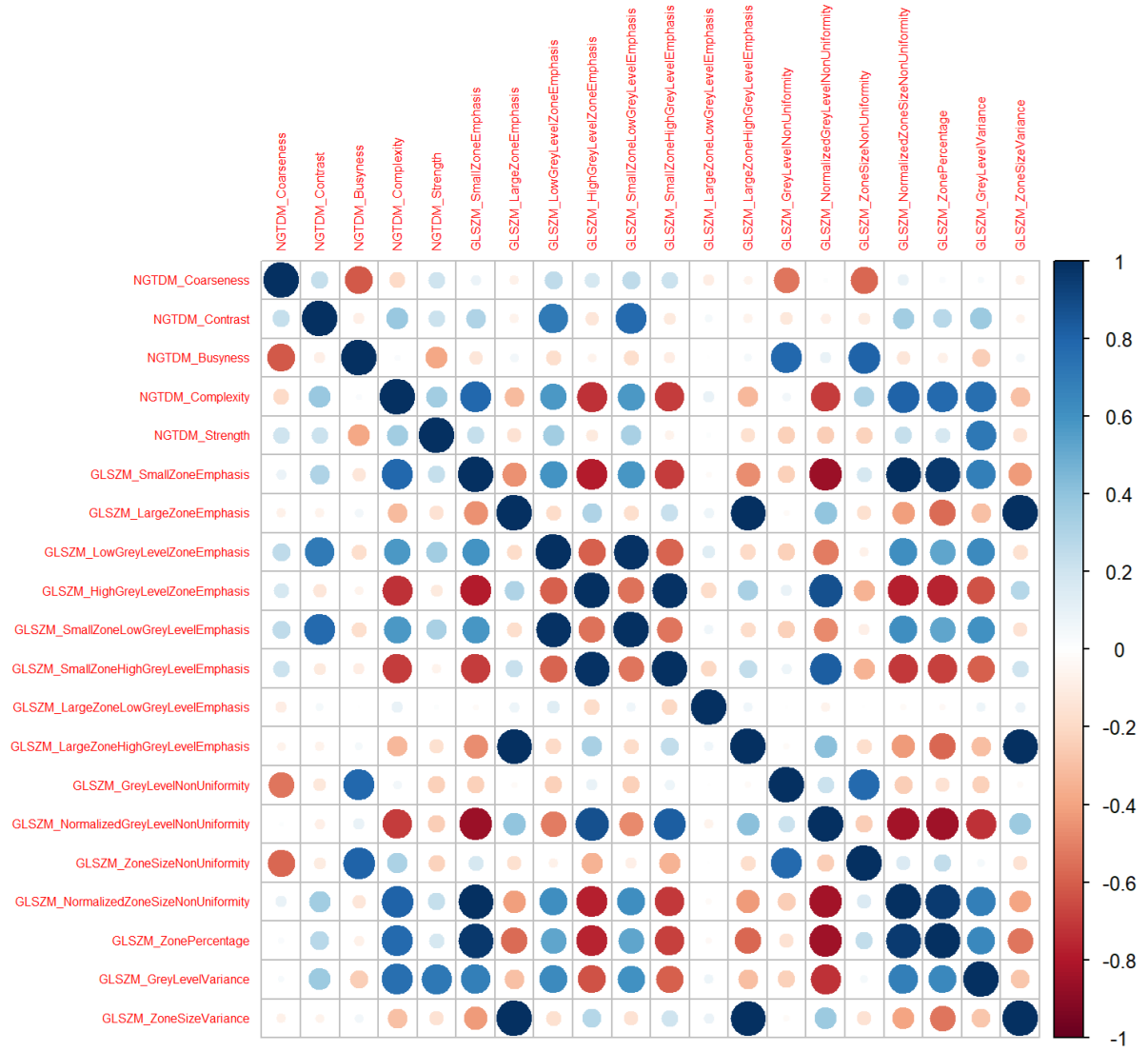
Supplementary Figure 6: Correlation plot depicting the correlations of CT texture parameters derived from GLCM (grey level co-occurrence matrix)

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Supplementary Figure 7: Correlation plot depicting the correlations of CT texture parameters derived from GLRLM (grey level run-length matrix)

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Supplementary Figure 8: Correlation plot depicting the correlations of CT texture parameters derived from NGTDM (neighboring grey tone difference matrix) and GLSZM (grey level-size zone matrix)