Supplementary Information

Computed Tomography-derived intratumoral and peritumoral radiomics in predicting EGFR mutation in lung adenocarcinoma

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Supplementary Material 1. CT acquisition and scanning parameters.

For Dataset 1, patients were performed with the following six scanners: GE Discovery CT750 HD, 64-slice LightSpeed VCT, Revolution CT (GE Medical Systems); Somatom Definition flash, Somatom Sensation-16, Somatom Force (Siemens Medical Solutions). For Dataset 2, patients were performed with the following four scanners: Somatom Definition Flash, Siemens, German; uCT780, United Imaging, Shanghai; Somatom Perspective 128, Siemens, German; Somatom Definition Force, Siemens, German. The acquisition parameters were as follows: tube voltage, 120 kVp; tube current, 100-200 mAs; pitch, 0.75–1.5. CT images were acquired in the supine position at full inspiration for all patients. Only plain and thin CT images were used in this study.

Supplementary Material 2. Descriptions of nine machine learning classifiers.

a. Random Forest (RF)

RF is used for both classification and regression tasks. It is an ensemble learning method that combines multiple decision trees to improve the accuracy and generalization of the model. The idea behind the RF algorithm is to create a large number of decision trees, each of which is trained on a random subset of the data and a random subset of the features. The predictions from all of the trees are then aggregated to produce a final output. This approach helps to reduce overfitting and improve the generalization of the model.

One of the key advantages of the RF algorithm is its ability to handle high-dimensional datasets with a large number of features. It is also relatively robust to noisy data and can handle missing values. Rf models are often used in applications such as image classification, text classification, and financial forecasting. They are also a popular choice for feature selection, as they can provide information about which features are the most important for making accurate predictions.

Overall, the RF algorithm is a powerful and versatile machine learning method that is widely used in both research and industry. Its ability to handle complex datasets and produce accurate predictions has made it a popular choice for a wide range of applications.

b. K-nearest neighbors (KNN)

KNN is a non-parametric and instance-based method, meaning that it makes predictions based on the characteristics of the closest training examples in the feature space. The KNN algorithm works by calculating the distance between the query instance and all of the training instances. The K nearest neighbors of the query instance are then identified, and the output of the algorithm is determined based on the majority

class (in classification tasks) or the average of the values (in regression tasks) of these neighbors.

One of the key advantages of the KNN algorithm is its simplicity and ease of implementation. It is also a non-parametric method, which means that it can handle data that does not conform to a specific distribution. KNN is also a very interpretable algorithm, as the predictions are based on the actual data points rather than a black-box model.

However, the KNN algorithm can be sensitive to the choice of K, which can greatly affect the quality of the predictions. It can also be computationally expensive for large datasets, as it requires calculating the distance between the query instance and all of the training instances.

c. Logistic Regression (LR)

LR is a statistical method used for binary classification, where the goal is to predict the probability of an event occurring. It is a type of linear regression that uses a logistic function to transform the output of the linear regression into a probability value between 0 and 1. In LR, the input features are used to calculate a linear combination, which is then transformed by the logistic function to produce the predicted probability of the event. The logistic function is a non-linear function that produces an S-shaped curve, which is useful for mapping the linear combination onto the probability scale.

The LR algorithm is trained using a labeled dataset, where each instance is associated with a binary label indicating the presence or absence of the event. The algorithm estimates the parameters of the logistic function using maximum likelihood estimation, which is a statistical method for finding the parameters that are most likely to have produced the observed data.

One of the key advantages of LR is its interpretability. The output of the algorithm is a probability value, which can be easily understood and interpreted by humans. LR is also computationally efficient and can be trained on large datasets.

LR is commonly used in applications such as credit scoring, fraud detection, and medical diagnosis. It is a simple yet powerful machine learning method that is well-suited to binary classification tasks.

d. Extremely Randomized Trees (ExtraTrees)

A machine learning algorithm that is used for both classification and regression problems. It is a type of ensemble learning method, meaning it combines multiple models together to produce a more accurate final prediction. ExtraTrees is similar to other decision tree-based algorithms, such as Random Forest, but it has some important differences. In ExtraTrees, the trees are built using a random subset of the features, and at each split in the tree, the algorithm randomly selects a subset of candidate thresholds

to determine the best split. These two randomization techniques help to reduce overfitting and improve the robustness of the model to noise and outliers.

ExtraTrees is also computationally efficient, since the trees are built independently of each other, and the randomization reduces the number of candidate thresholds that need to be evaluated. As a result, it can handle large datasets with high-dimensional feature spaces. It is particularly useful in situations where other methods may overfit or struggle with noisy data.

e. CatBoost

CatBoost is an open-source machine learning algorithm that is designed to work well with both categorical and numerical data. It was developed by Yandex, a Russian search engine company, and was first released in 2017.

One of the key features of CatBoost is its ability to handle categorical features with high cardinality, which is a common challenge in many real-world datasets. It does this by using an algorithm called "ordered boosting", which works by constructing decision trees that split on categorical features in a way that preserves the natural ordering of the categories.

In addition to its strong performance on datasets with categorical features, CatBoost also has several other useful features, such as built-in cross-validation, early stopping, and the ability to handle missing values in the data.

f. eXtreme Gradient Boosting (XGBoost)

XGBoost is used for supervised learning tasks, such as classification, regression, and ranking. XGBoost is a type of gradient boosting algorithm, which works by iteratively training a series of weak models (usually decision trees) and combining their predictions to produce a final output. XGBoost uses a regularized version of gradient boosting that includes both L1 and L2 regularization, which helps to prevent overfitting and improve generalization.

One of the key features of XGBoost is its scalability, which allows it to handle very large datasets and train models quickly. It also has built-in cross-validation, early stopping, and support for missing values in the data.

Overall, XGBoost is a powerful and flexible algorithm that has become very popular in the machine learning community, winning many machine learning competitions on platforms such as Kaggle. It is widely used in industry and academia for a wide range of tasks, and is known for its high predictive accuracy and speed.

g. NeuralNetFastAI

NeuralNetFastAI is a machine learning library that provides an easy-to-use interface for building and training neural networks. It is built on top of PyTorch, one of

the most popular deep learning frameworks, and is designed to make it easy for practitioners to build state-of-the-art deep learning models without requiring extensive knowledge of the underlying math and programming.

One of the key features of NeuralNetFastAI is its flexibility, which allows users to customize their neural network architectures and training processes in a variety of ways. NeuralNetFastAI is a powerful and flexible library that is well-suited to a wide range of deep learning tasks, including image and text classification, object detection, and natural language processing.

h. NeuralNetTorch

NeuralNetTorch is a machine learning library that provides an interface for building and training neural networks using PyTorch, one of the most popular deep learning frameworks. It is designed to make it easier for practitioners to build, train, and experiment with neural network models, while also providing flexibility for customizing the architecture and training process.

One of the key features of NeuralNetTorch is its modular design, which allows users to build complex neural network architectures by stacking together a variety of different layer types. Users can choose from a range of activation functions, convolutional layers, recurrent layers, and pooling layers, among other options, to build customized networks that are tailored to their specific needs.

NeuralNetTorch also provides a number of useful tools for working with large datasets, including support for data augmentation and distributed training. It also has built-in functionality for visualizing and interpreting the results of model training, making it easier for practitioners to debug and fine-tune their models.

i. Light Gradient Boosting Machine (LightGBM)

LightGBM is designed to train gradient boosting decision tree models. It was developed by Microsoft and is known for its speed, scalability, and high accuracy.

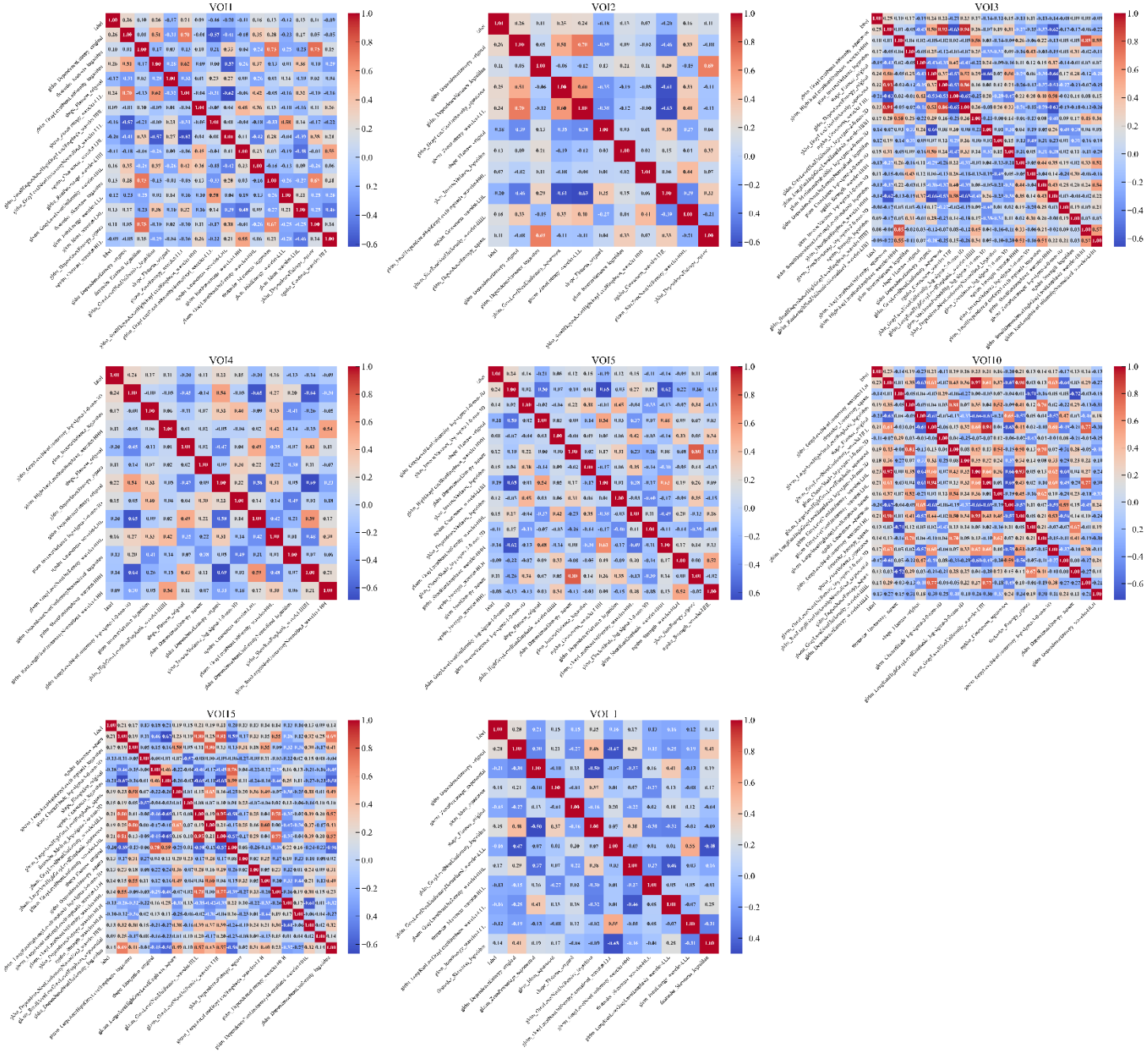
One of the key features of LightGBM is its ability to handle large datasets with high dimensionality. It does this by using a technique called "gradient-based one-side sampling", which samples the data based on the gradients of the loss function and the distribution of the data, resulting in faster and more efficient training.

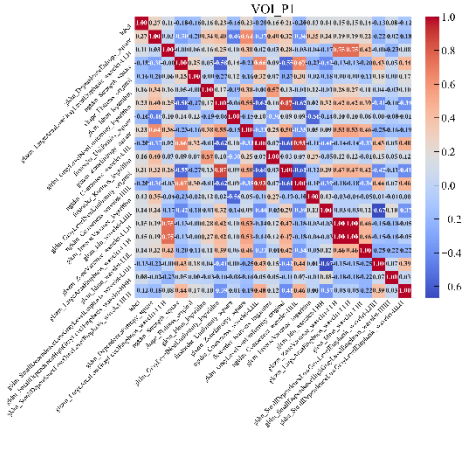
LightGBM also uses a technique called "leaf-wise tree growth", which grows the decision trees in a way that prioritizes the leaf nodes with the most significant gradients, resulting in deeper trees and more accurate predictions.

In addition to its speed and accuracy, LightGBM has a number of other useful features, such as built-in support for categorical features, early stopping, and parallel training on multi-core CPUs.

Supplementary Figures

Supplementary Fig.S1 Use minimum redundancy maximum relevance (mRMR) to identify the most important features on the basis of a heuristic scoring criterion, and only the top ranked features were kept. Clearer images are shown in separate figures (Fig.S1-1, Fig.S1-2)

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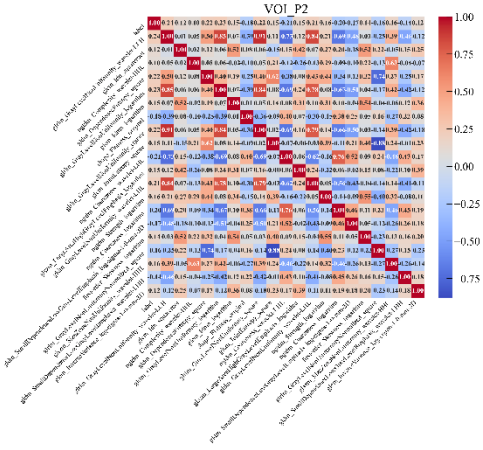
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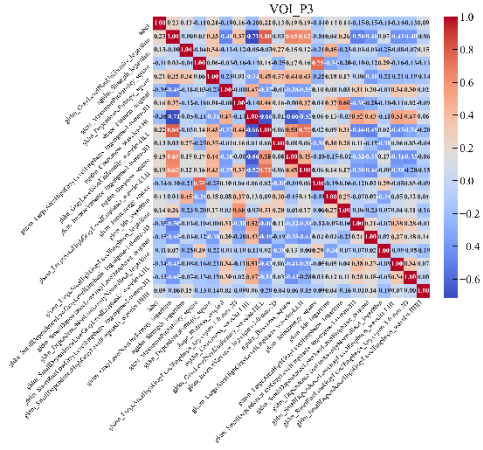
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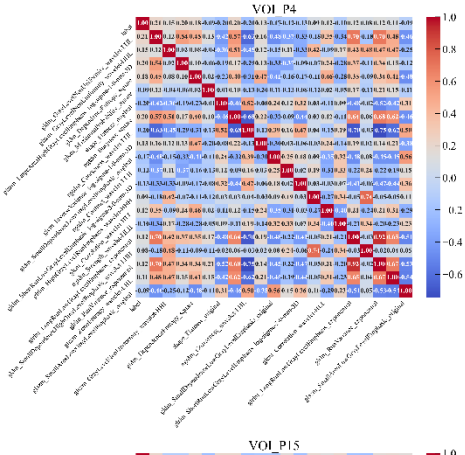
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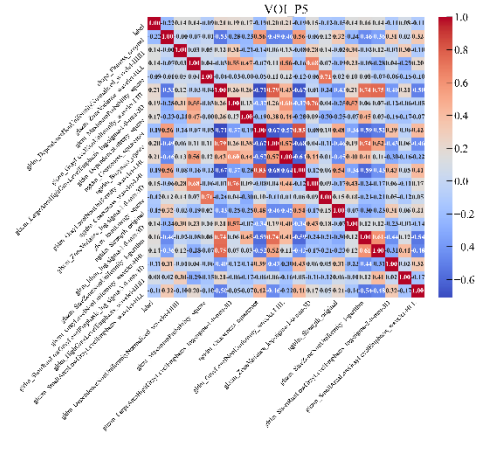
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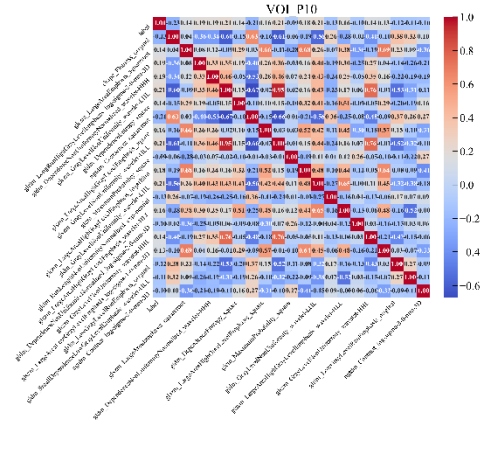
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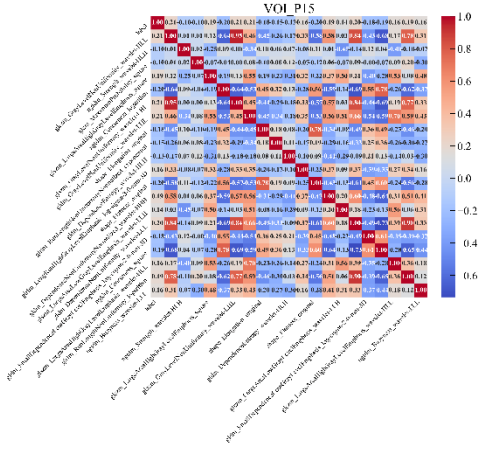
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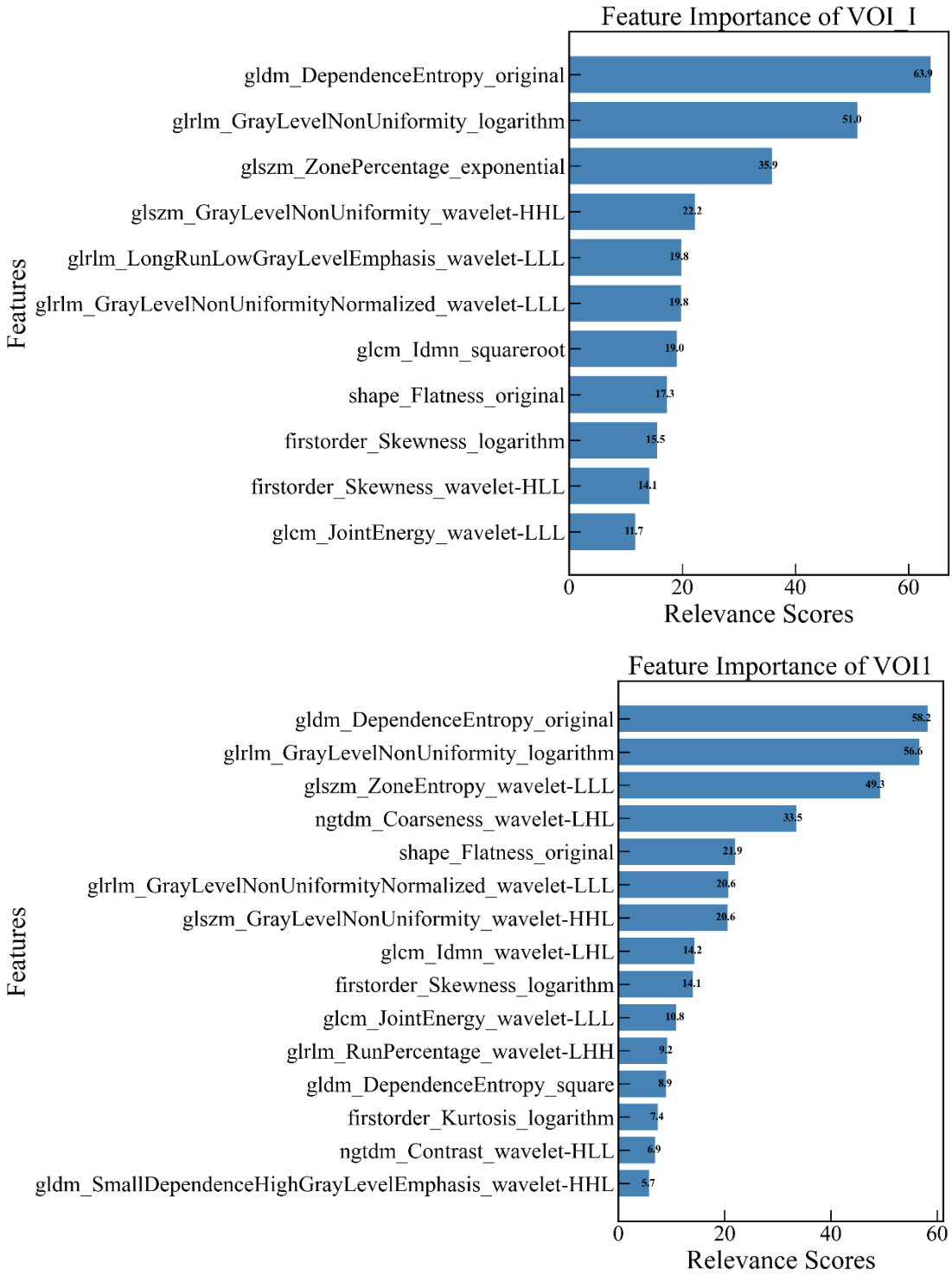
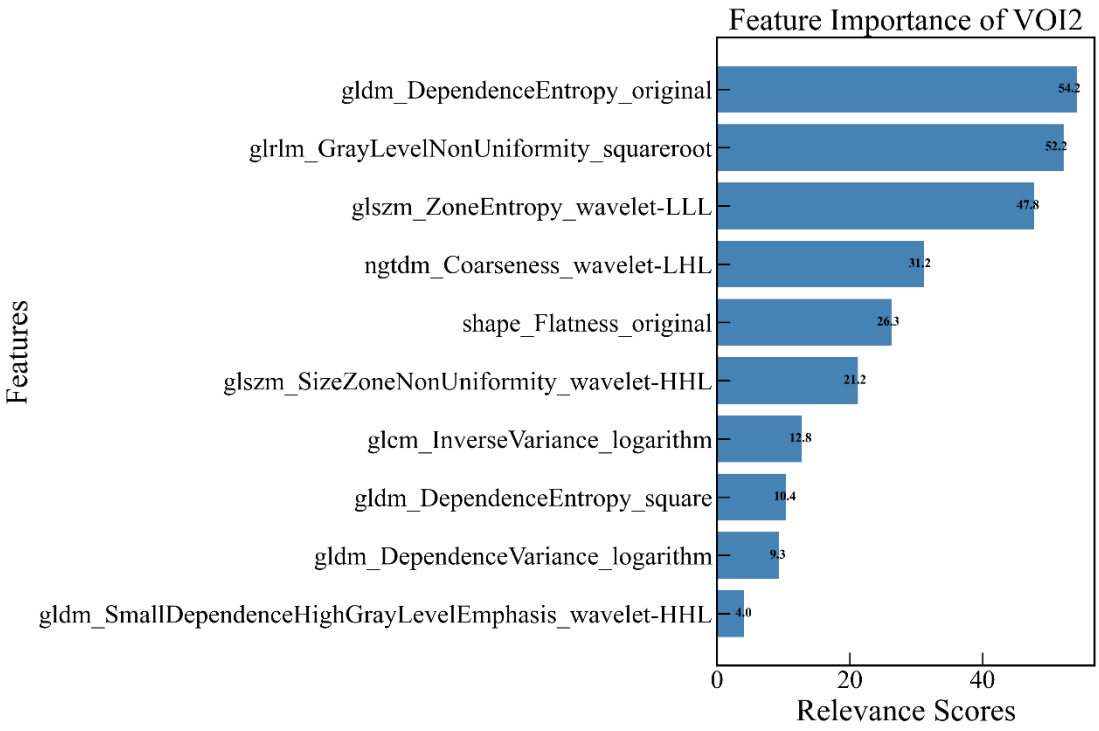
Supplementary Fig.S2. The final selected radiomic features in each VOI.




Feature Importance of VOI2
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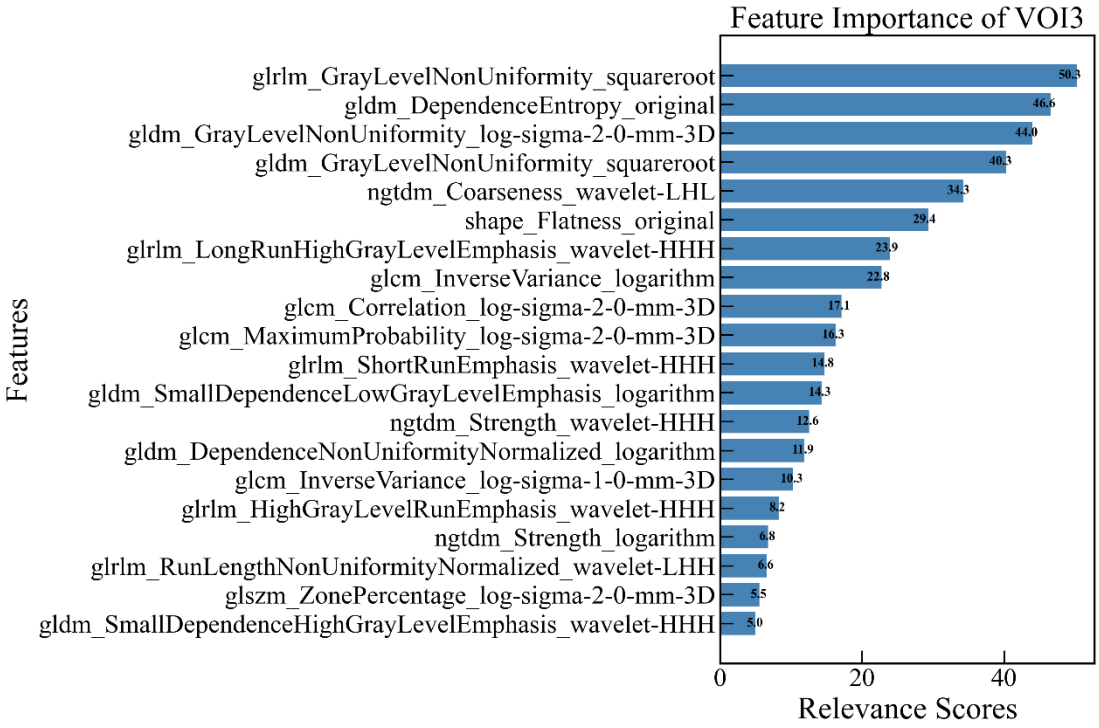
glrlm_GrayLevelNonUniformity_squareroot
glszm_ZoneEntropy_wavelet-LLL
ngtdm_Coarseness_wavelet-LHL
shape_Flatness_original
glszm_SizeZoneNonUniformity_wavelet-HHL
glcm_InverseVariance_logarithm
gldm_DependenceEntropy_square
gldm_DependenceVariance_logarithm
gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-HHL
54.2
52.2
47.8
31.2
26.3
21.2
12.8
10.4
9.3
4.0
Features
0
20
40
Relevance Scores


Feature Importance of VOI3
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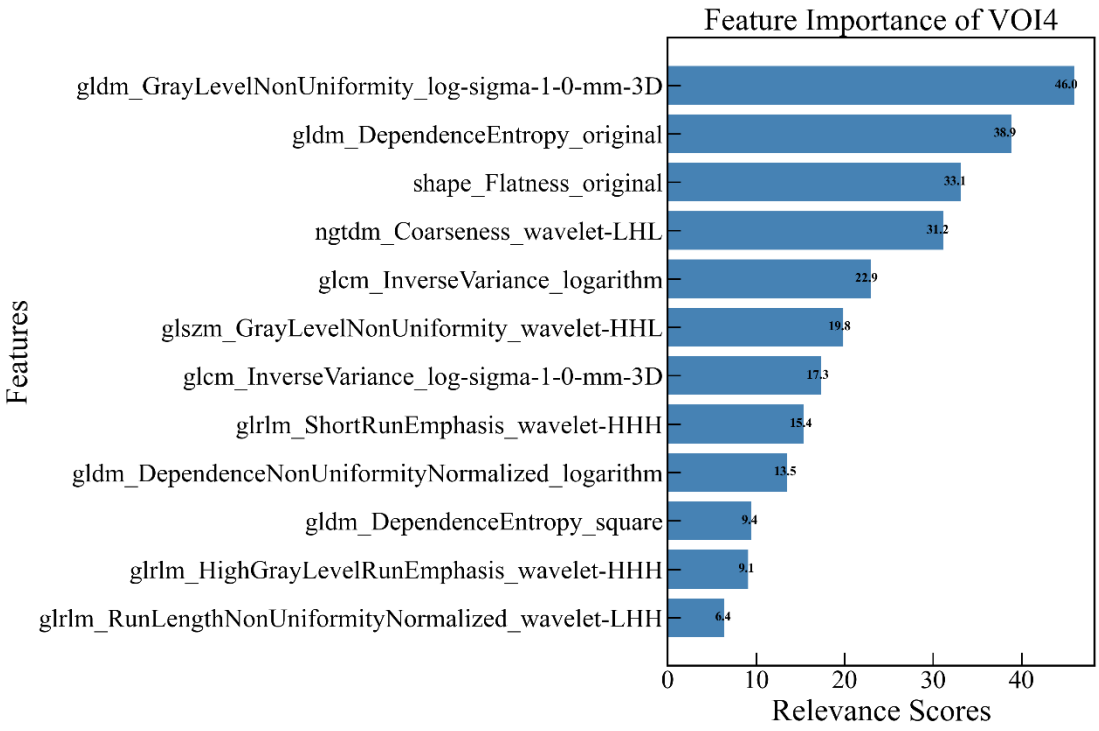
gldm_DependenceEntropy_original
gldm_GrayLevelNonUniformity_log-sigma-2-0-mm-3D
gldm_GrayLevelNonUniformity_squareroot
ngtdm_Coarseness_wavelet-LHL
shape_Flatness_original
glrlm_LongRunHighGrayLevelEmphasis_wavelet-HHH
glcm_InverseVariance_logarithm
glcm_Correlation_log-sigma-2-0-mm-3D
glcm_MaximumProbability_log-sigma-2-0-mm-3D
glrlm_ShortRunEmphasis_wavelet-HHH
gldm_SmallDependenceLowGrayLevelEmphasis_logarithm
ngtdm_Strength_wavelet-HHH
gldm_DependenceNonUniformityNormalized_logarithm
glcm_InverseVariance_log-sigma-1-0-mm-3D
glrlm_HighGrayLevelRunEmphasis_wavelet-HHH
ngtdm_Strength_logarithm
glrlm_RunLengthNonUniformityNormalized_wavelet-LHH
glszm_ZonePercentage_log-sigma-2-0-mm-3D
gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-HHH
50.3
46.6
44.0
40.3
34.3
29.4
23.9
22.8
17.1
16.3
14.8
14.3
12.6
11.9
10.3
8.2
6.8
6.6
5.5
5.0
Features
0
20
40
Relevance Scores


Feature Importance of VOI4
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gldm_DependenceEntropy_original
shape_Flatness_original
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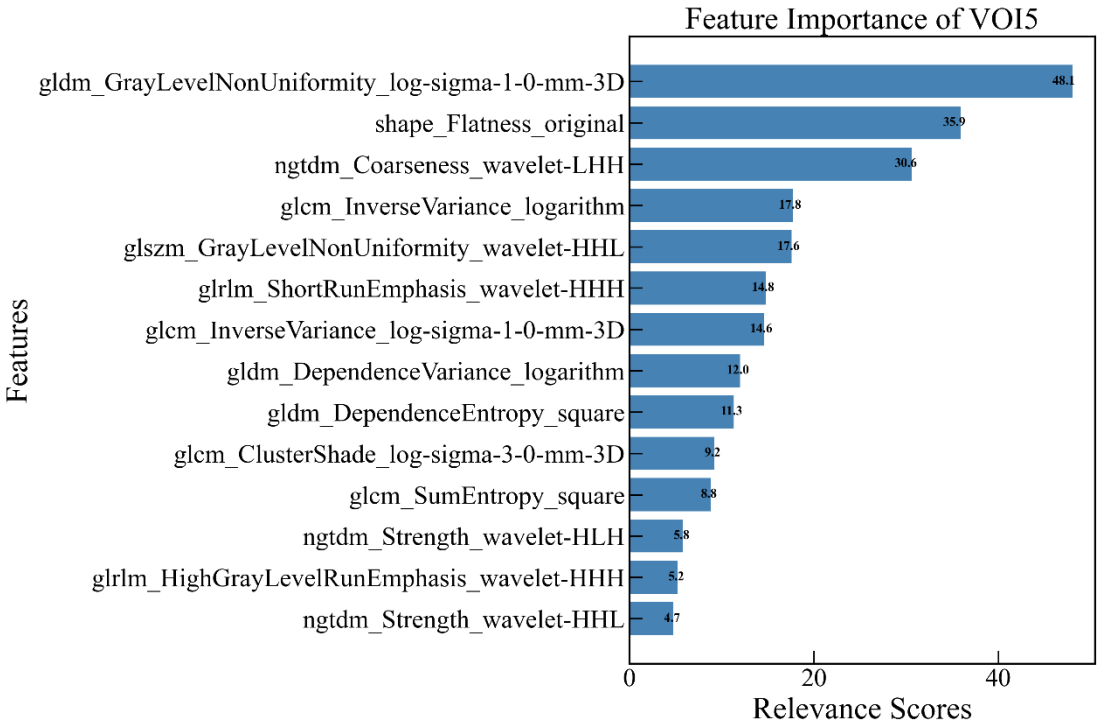
glcm_InverseVariance_logarithm
glszm_GrayLevelNonUniformity_wavelet-HHL
glcm_InverseVariance_log-sigma-1-0-mm-3D
glrlm_ShortRunEmphasis_wavelet-HHH
gldm_DependenceNonUniformityNormalized_logarithm
gldm_DependenceEntropy_square
glrlm_HighGrayLevelRunEmphasis_wavelet-HHH
glrlm_RunLengthNonUniformityNormalized_wavelet-LHH
46.0
38.9
33.1
31.2
22.9
19.8
17.3
15.4
13.5
9.4
9.1
6.4
Features
0
10
20
30
40
Relevance Scores


Feature Importance of VOI5
gldm_GrayLevelNonUniformity_log-sigma-1-0-mm-3D
shape_Flatness_original
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glcm_InverseVariance_logarithm
glszm_GrayLevelNonUniformity_wavelet-HHL
glrlm_ShortRunEmphasis_wavelet-HHH
glcm_InverseVariance_log-sigma-1-0-mm-3D
gldm_DependenceVariance_logarithm
gldm_DependenceEntropy_square
glcm_ClusterShade_log-sigma-3-0-mm-3D
glcm_SumEntropy_square
ngtdm_Strength_wavelet-HLH
glrlm_HighGrayLevelRunEmphasis_wavelet-HHH
ngtdm_Strength_wavelet-HHL
48.1
35.9
30.6
17.8
17.6
14.8
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11.3
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5.2
4.7
Features
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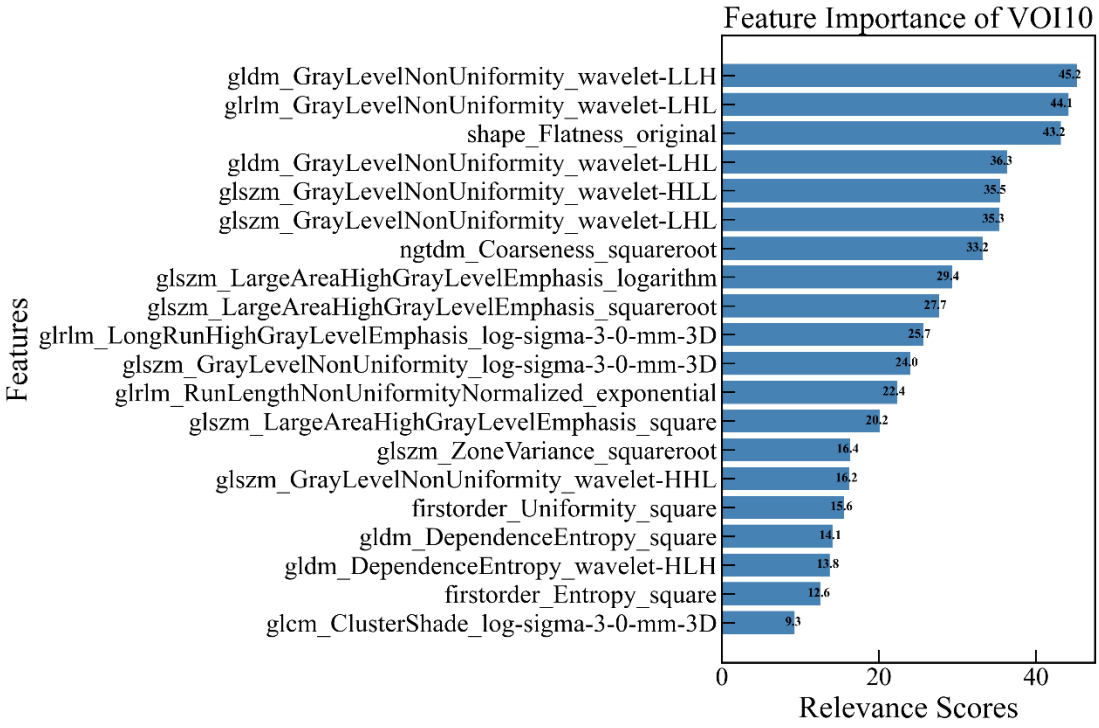
Relevance Scores


Feature Importance of VOI10
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shape_Flatness_original
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glszm_GrayLevelNonUniformity_wavelet-HLL
glszm_GrayLevelNonUniformity_wavelet-LHL
ngtdm_Coarseness_squareroot
glszm_LargeAreaHighGrayLevelEmphasis_logarithm
glszm_LargeAreaHighGrayLevelEmphasis_squareroot
glrlm_LongRunHighGrayLevelEmphasis_log-sigma-3-0-mm-3D
glszm_GrayLevelNonUniformity_log-sigma-3-0-mm-3D
glrlm_RunLengthNonUniformityNormalized_exponential
glszm_LargeAreaHighGrayLevelEmphasis_square
glszm_ZoneVariance_squareroot
glszm_GrayLevelNonUniformity_wavelet-HHL
firstorder_Uniformity_square
gldm_DependenceEntropy_square
gldm_DependenceEntropy_wavelet-HLH
firstorder_Entropy_square
glcm_ClusterShade_log-sigma-3-0-mm-3D
45.2
44.1
43.2
36.3
35.5
35.3
33.2
29.4
27.7
25.7
24.0
22.4
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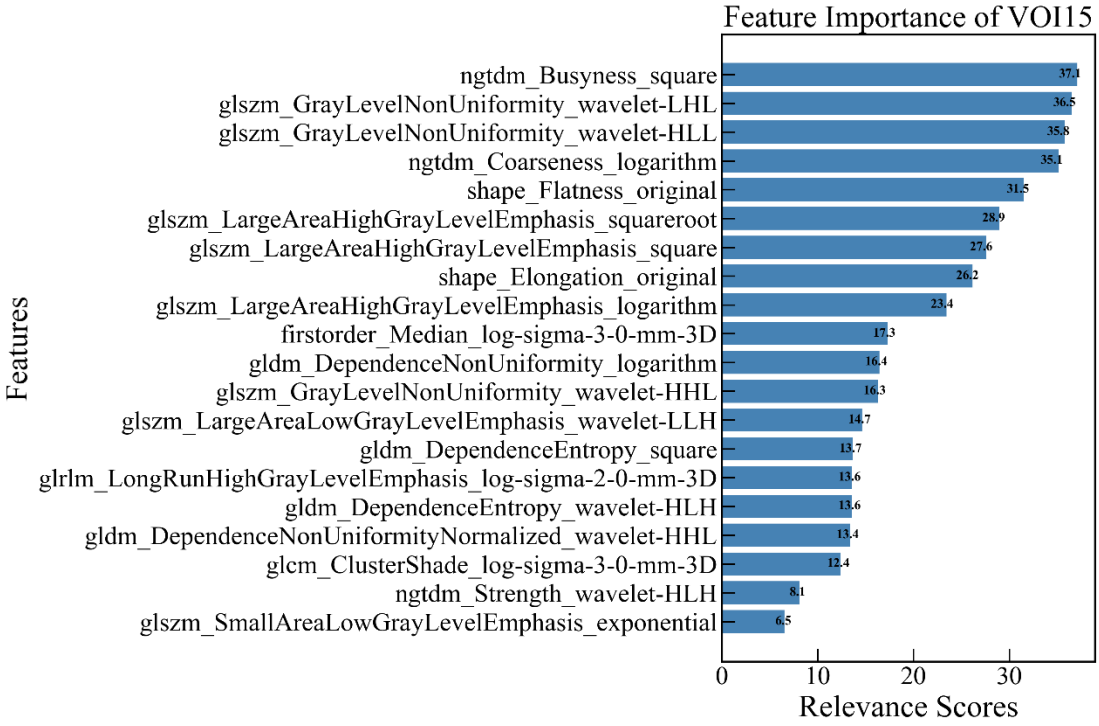
Relevance Scores


Feature Importance of VOI15
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glszm_GrayLevelNonUniformity_wavelet-LHL
glszm_GrayLevelNonUniformity_wavelet-HLL
ngtdm_Coarseness_logarithm
shape_Flatness_original
glszm_LargeAreaHighGrayLevelEmphasis_squareroot
glszm_LargeAreaHighGrayLevelEmphasis_square
shape_Elongation_original
glszm_LargeAreaHighGrayLevelEmphasis_logarithm
firstorder_Median_log-sigma-3-0-mm-3D
gldm_DependenceNonUniformity_logarithm
glszm_GrayLevelNonUniformity_wavelet-HHL
glszm_LargeAreaLowGrayLevelEmphasis_wavelet-LLH
gldm_DependenceEntropy_square
glrlm_LongRunHighGrayLevelEmphasis_log-sigma-2-0-mm-3D
gldm_DependenceEntropy_wavelet-HLH
gldm_DependenceNonUniformityNormalized_wavelet-HHL
glcm_ClusterShade_log-sigma-3-0-mm-3D
ngtdm_Strength_wavelet-HLH
glszm_SmallAreaLowGrayLevelEmphasis_exponential
37.1
36.5
35.8
35.1
31.5
28.9
27.6
26.2
23.4
17.3
16.4
16.3
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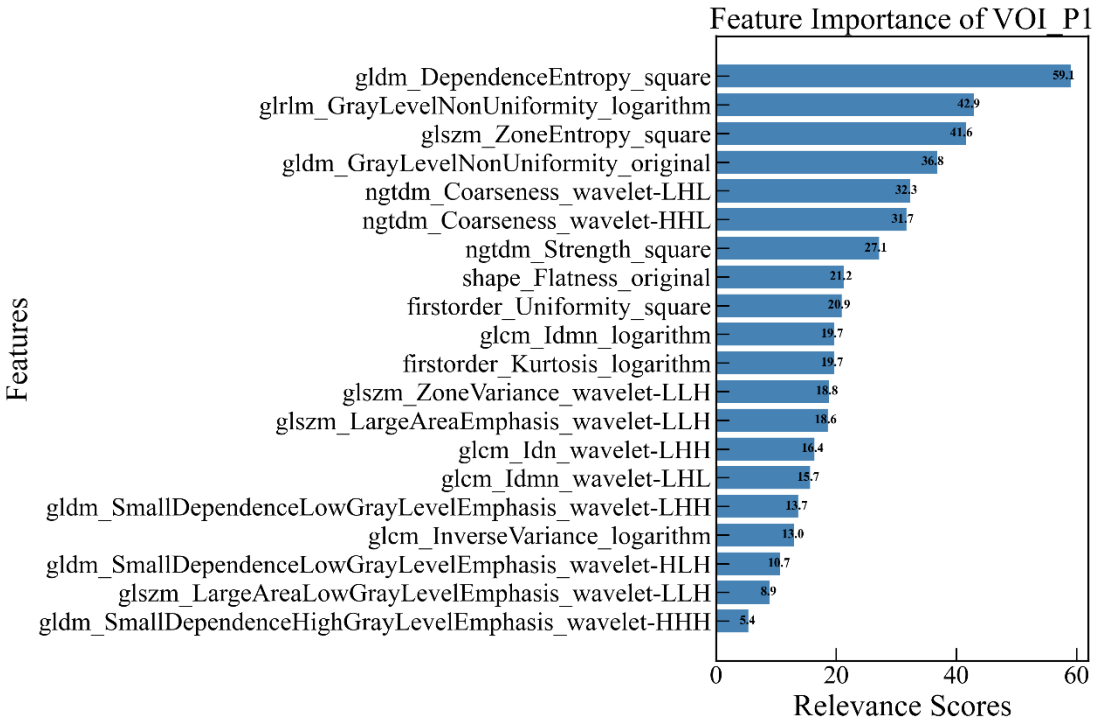
30
Relevance Scores


Feature Importance of VOI_P1
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ngtdm_Coarseness_wavelet-LHL
ngtdm_Coarseness_wavelet-HHL
ngtdm_Strength_square
shape_Flatness_original
firstorder_Uniformity_square
glcm_Idmn_logarithm
firstorder_Kurtosis_logarithm
glszm_ZoneVariance_wavelet-LLH
glszm_LargeAreaEmphasis_wavelet-LLH
glcm_Idn_wavelet-LHH
glcm_Idmn_wavelet-LHL
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-LHH
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gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-HLH
glszm_LargeAreaLowGrayLevelEmphasis_wavelet-LLH
gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-HHH
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18.8
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Features
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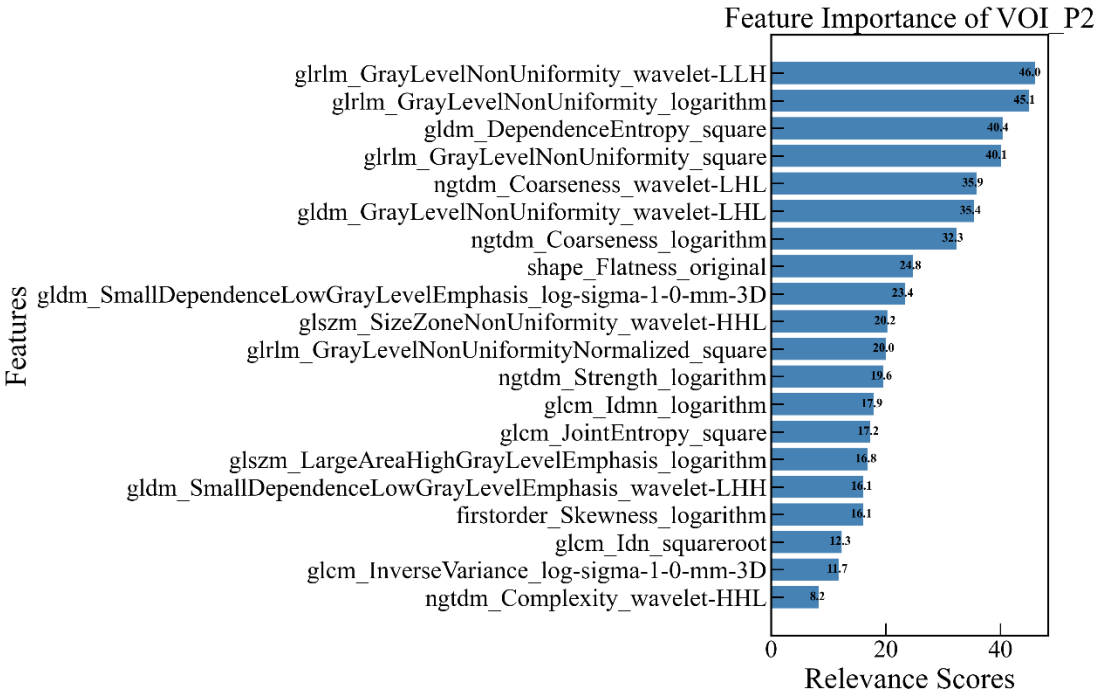
60
Relevance Scores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gldm_GrayLevelNonUniformity_wavelet-LHL
ngtdm_Coarseness_logarithm
shape_Flatness_original
gldm_SmallDependenceLowGrayLevelEmphasis_log-sigma-1-0-mm-3D
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glrlm_GrayLevelNonUniformityNormalized_square
ngtdm_Strength_logarithm
glcm_Idmn_logarithm
glcm_JointEntropy_square
glszm_LargeAreaHighGrayLevelEmphasis_logarithm
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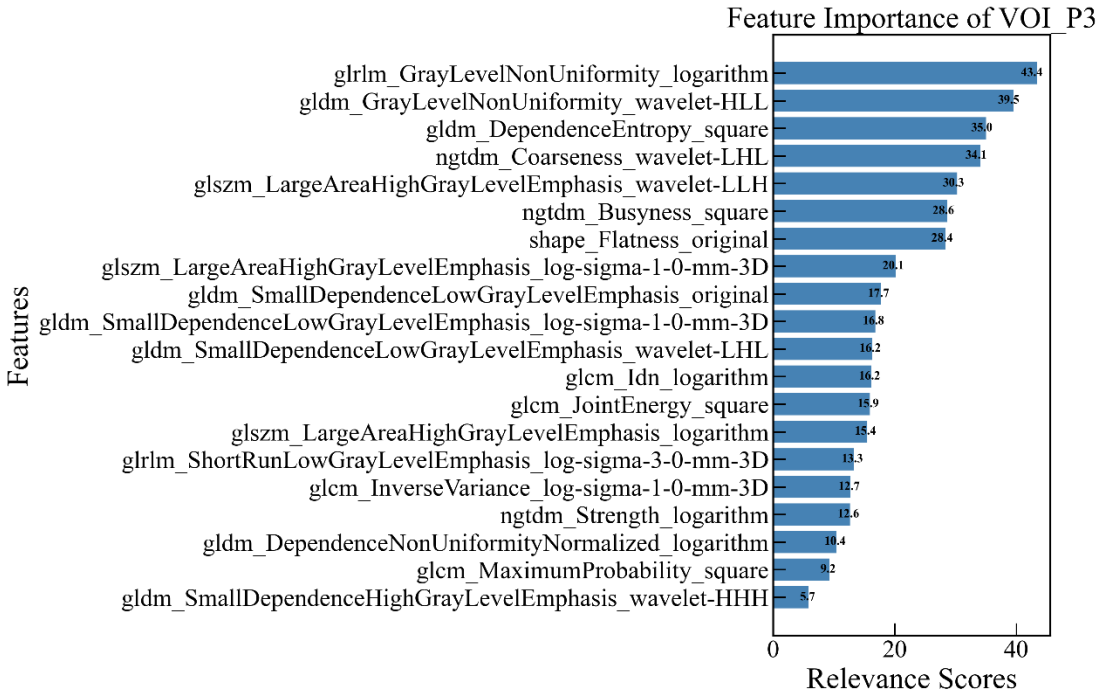
Relevance Scores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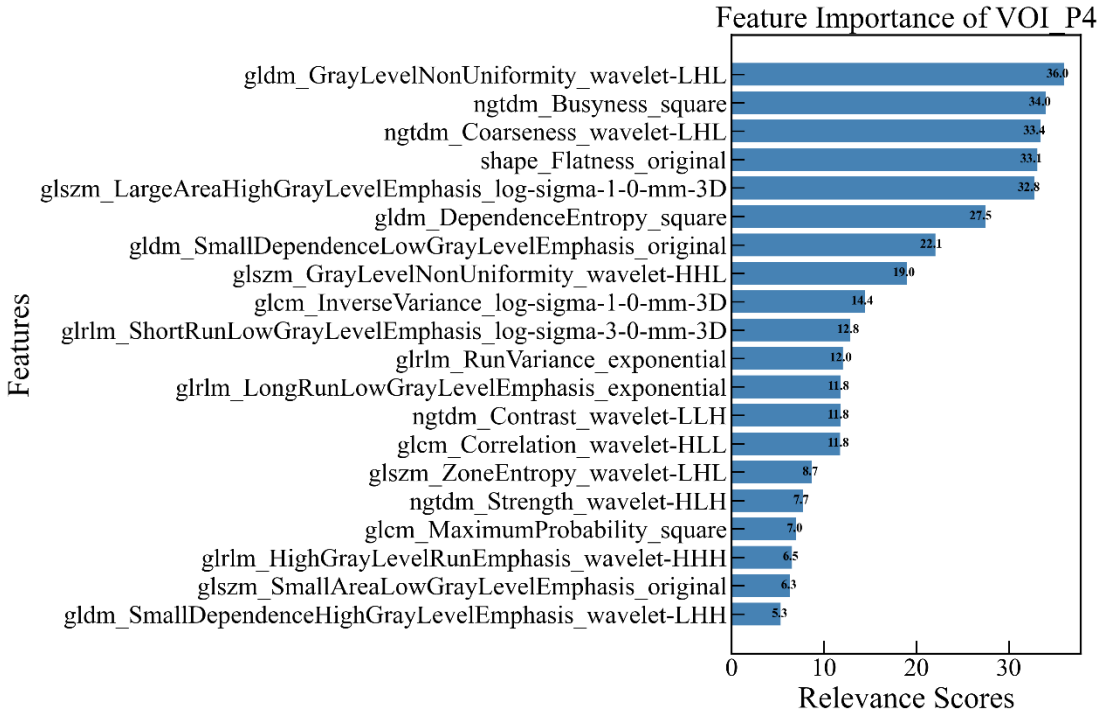
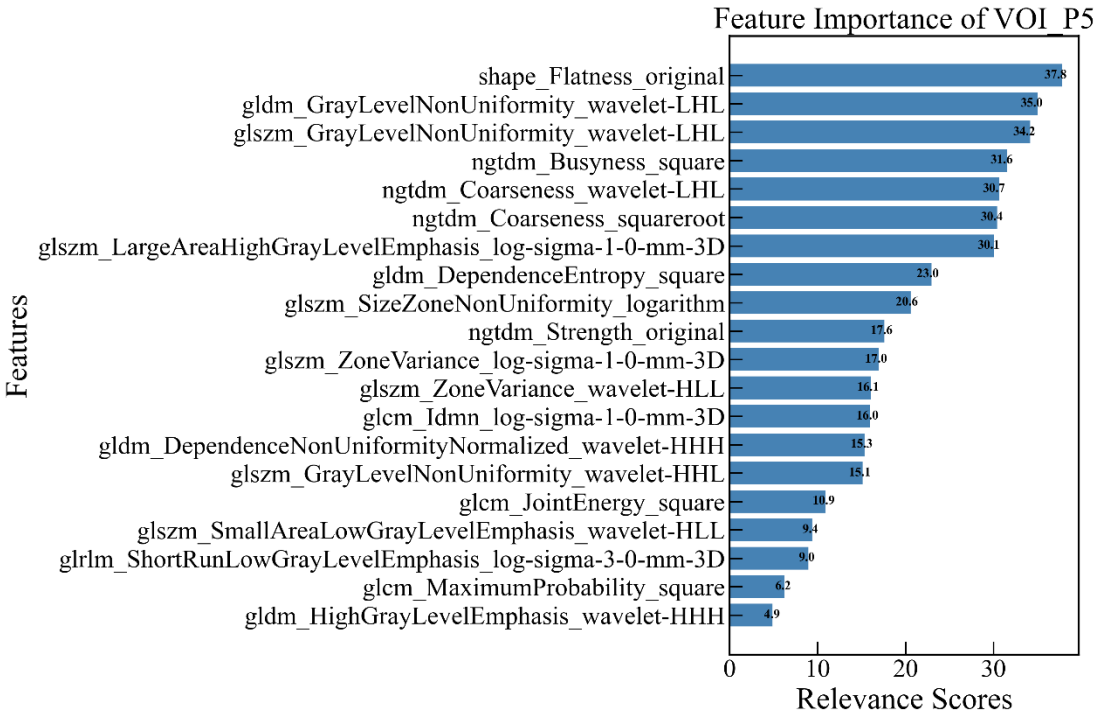
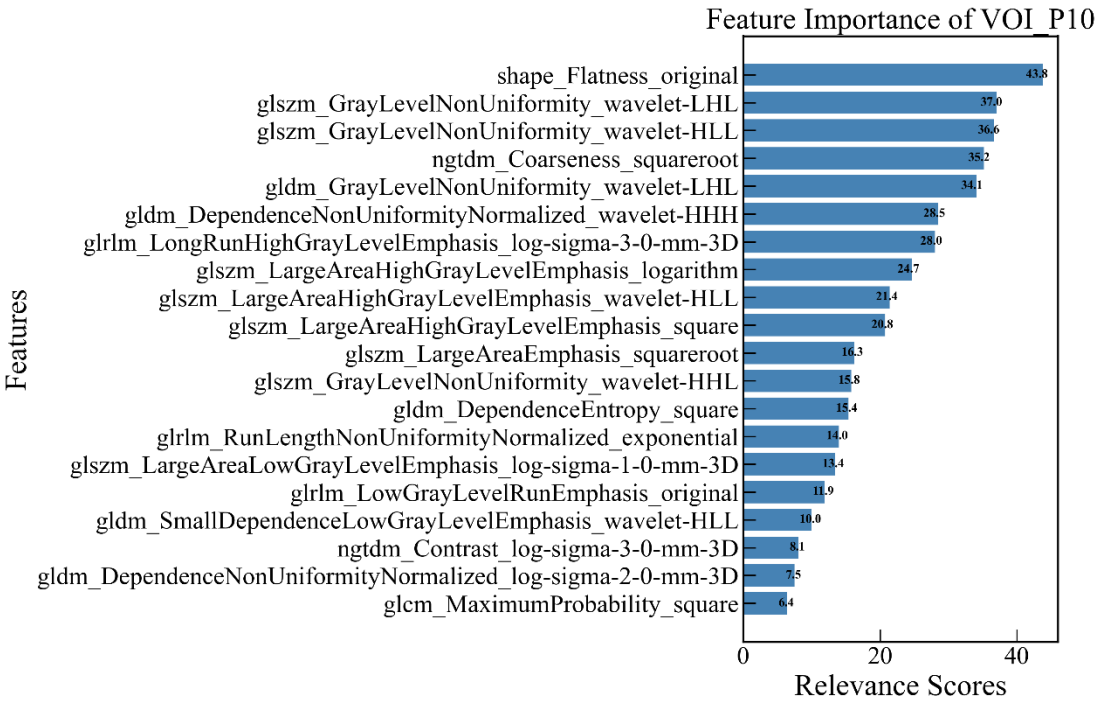
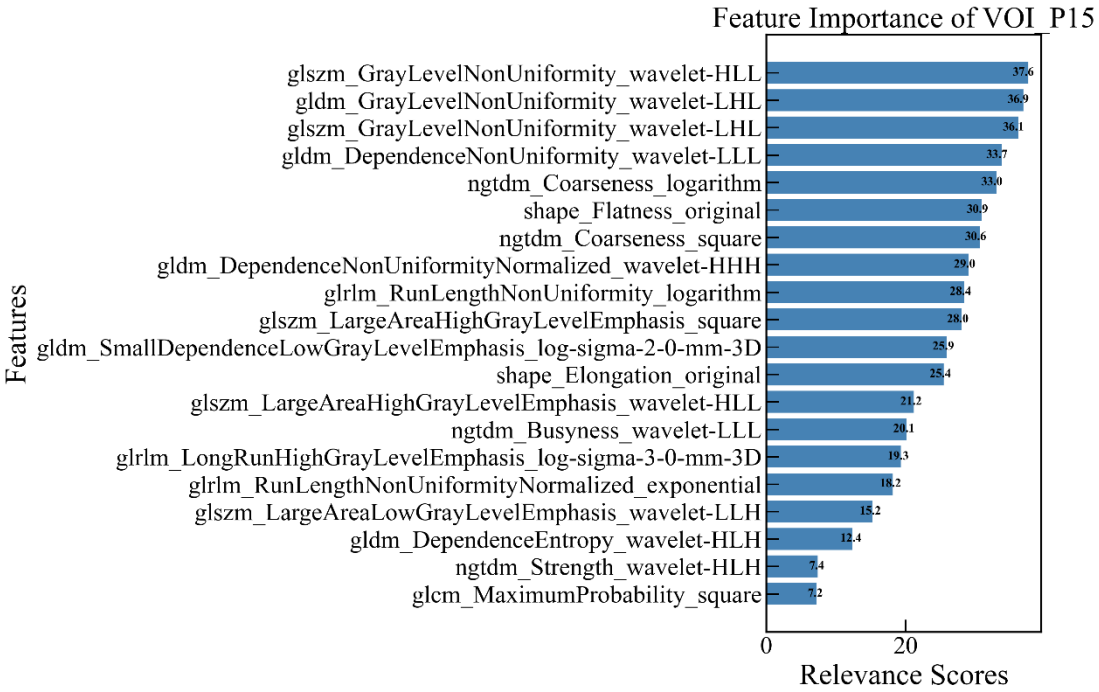
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-LLH
ngtdm_Busyness_square
shape_Flatness_original
glszm_LargeAreaHighGrayLevelEmphasis_log-sigma-1-0-mm-3D
gldm_SmallDependenceLowGrayLevelEmphasis_original
gldm_SmallDependenceLowGrayLevelEmphasis_log-sigma-1-0-mm-3D
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-LHL
glcm_Idn_logarithm
glcm_JointEnergy_square
glszm_LargeAreaHighGrayLevelEmphasis_logarithm
glrlm_ShortRunLowGrayLevelEmphasis_log-sigma-3-0-mm-3D
glcm_InverseVariance_log-sigma-1-0-mm-3D
ngtdm_Strength_logarithm
gldm_DependenceNonUniformityNormalized_logarithm
glcm_MaximumProbability_square
gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-HHH
43.4
39.5
35.0
34.1
30.3
28.6
28.4
20.1
17.7
16.8
16.2
16.2
15.9
15.4
13.3
12.7
12.6
10.4
9.2
5.7
Features
0
20
40
Relevance Scores


Feature Importance of VOI_P4
gldm_GrayLevelNonUniformity_wavelet-LHL
ngtdm_Busyness_square
ngtdm_Coarseness_wavelet-LHL
shape_Flatness_original
glszm_LargeAreaHighGrayLevelEmphasis_log-sigma-1-0-mm-3D
gldm_DependenceEntropy_square
gldm_SmallDependenceLowGrayLevelEmphasis_original
glszm_GrayLevelNonUniformity_wavelet-HHL
glcm_InverseVariance_log-sigma-1-0-mm-3D
glrlm_ShortRunLowGrayLevelEmphasis_log-sigma-3-0-mm-3D
glrlm_RunVariance_exponential
glrlm_LongRunLowGrayLevelEmphasis_exponential
ngtdm_Contrast_wavelet-LLH
glcm_Correlation_wavelet-HLL
glszm_ZoneEntropy_wavelet-LHL
ngtdm_Strength_wavelet-HLH
glcm_MaximumProbability_square
glrlm_HighGrayLevelRunEmphasis_wavelet-HHH
glszm_SmallAreaLowGrayLevelEmphasis_original
gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-LHH
36.0
34.0
33.4
33.1
32.8
27.5
22.1
19.0
14.4
12.8
12.0
11.8
11.8
11.8
8.7
7.7
7.0
6.5
6.3
5.3
Features
0
10
20
30
Relevance Scores


Feature Importance of VOI_P5
shape_Flatness_original
gldm_GrayLevelNonUniformity_wavelet-LHL
glszm_GrayLevelNonUniformity_wavelet-LHL
ngtdm_Busyness_square
ngtdm_Coarseness_wavelet-LHL
ngtdm_Coarseness_squareroot
glszm_LargeAreaHighGrayLevelEmphasis_log-sigma-1-0-mm-3D
gldm_DependenceEntropy_square
glszm_SizeZoneNonUniformity_logarithm
ngtdm_Strength_original
glszm_ZoneVariance_log-sigma-1-0-mm-3D
glszm_ZoneVariance_wavelet-HLL
glcm_Idmn_log-sigma-1-0-mm-3D
gldm_DependenceNonUniformityNormalized_wavelet-HHH
glszm_GrayLevelNonUniformity_wavelet-HHL
glcm_JointEnergy_square
glszm_SmallAreaLowGrayLevelEmphasis_wavelet-HLL
glrlm_ShortRunLowGrayLevelEmphasis_log-sigma-3-0-mm-3D
glcm_MaximumProbability_square
gldm_HighGrayLevelEmphasis_wavelet-HHH
37.8
35.0
34.2
31.6
30.7
30.4
30.1
23.0
20.6
17.6
17.0
16.1
16.0
15.3
15.1
10.9
9.4
9.0
6.2
4.9
Features
0
10
20
30
Relevance Scores


Feature Importance of VOI_P10
shape_Flatness_original
glszm_GrayLevelNonUniformity_wavelet-LHL
glszm_GrayLevelNonUniformity_wavelet-HLL
ngtdm_Coarseness_squareroot
gldm_GrayLevelNonUniformity_wavelet-LHL
gldm_DependenceNonUniformityNormalized_wavelet-HHH
glrlm_LongRunHighGrayLevelEmphasis_log-sigma-3-0-mm-3D
glszm_LargeAreaHighGrayLevelEmphasis_logarithm
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-HLL
glszm_LargeAreaHighGrayLevelEmphasis_square
glszm_LargeAreaEmphasis_squareroot
glszm_GrayLevelNonUniformity_wavelet-HHL
gldm_DependenceEntropy_square
glrlm_RunLengthNonUniformityNormalized_exponential
glszm_LargeAreaLowGrayLevelEmphasis_log-sigma-1-0-mm-3D
glrlm_LowGrayLevelRunEmphasis_original
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-HLL
ngtdm_Contrast_log-sigma-3-0-mm-3D
gldm_DependenceNonUniformityNormalized_log-sigma-2-0-mm-3D
glcm_MaximumProbability_square
43.8
37.0
36.6
35.2
34.1
28.5
28.0
24.7
21.4
20.8
16.3
15.8
15.4
14.0
13.4
11.9
10.0
8.1
7.5
6.4
Features
0
20
40
Relevance Scores


Feature Importance of VOI_P15
Features
glszm_GrayLevelNonUniformity_wavelet-HLL
gldm_GrayLevelNonUniformity_wavelet-LHL
glszm_GrayLevelNonUniformity_wavelet-LHL
gldm_DependenceNonUniformity_wavelet-LLL
ngtdm_Coarseness_logarithm
shape_Flatness_original
ngtdm_Coarseness_square
gldm_DependenceNonUniformityNormalized_wavelet-HHH
glrlm_RunLengthNonUniformity_logarithm
glszm_LargeAreaHighGrayLevelEmphasis_square
gldm_SmallDependenceLowGrayLevelEmphasis_log-sigma-2-0-mm-3D
shape_Elongation_original
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-HLL
ngtdm_Busyness_wavelet-LLL
glrlm_LongRunHighGrayLevelEmphasis_log-sigma-3-0-mm-3D
glrlm_RunLengthNonUniformityNormalized_exponential
glszm_LargeAreaLowGrayLevelEmphasis_wavelet-LLH
gldm_DependenceEntropy_wavelet-HLH
ngtdm_Strength_wavelet-HLH
glcm_MaximumProbability_square
37.6
36.9
36.1
33.7
33.0
30.9
30.6
29.0
28.4
28.0
25.9
25.4
21.2
20.1
19.3
18.2
15.2
12.4
7.4
7.2
0
20
Relevance Scores

Supplementary Tables

Supplementary Table S1. The optimal classifier corresponding to each VOI.

*VOI	The optimal model
VOI_I	NeuralNetFastAI
VOI_P1	ExtraTrees
VOI_P2	CatBoost
VOI_P3	XGBoost
VOI_P4	ExtraTrees
VOI_P5	XGBoost
VOI_P10	XGBoost
VOI_P15	CatBoost
VOI1	NeuralNetTorch
VOI2	ExtraTrees
VOI3	ExtraTrees
VOI4	LightGBM
VOI5	NeuralNetTorch
VOI10	NeuralNetTorch
VOI15	CatBoost

*VOI, volume of interest

Supplementary Table S2. Difference of AUC between VOI_I model and combined models in the internal testing set.

	*VOI_I	VOI1	VOI2	VOI3	VOI4	VOI5	VOI10	VOI15
VOI_I	1.000	0.833	0.830	0.940	0.401	0.719	0.609	0.843
VOI1	0.833	1.000	1.000	0.765	0.338	0.855	0.666	0.721
VOI2	0.830	1.000	1.000	0.697	0.285	0.843	0.662	0.696
VOI3	0.940	0.765	0.697	1.000	0.357	0.581	0.473	0.863
VOI4	0.401	0.338	0.285	0.357	1.000	0.206	0.246	0.658
VOI5	0.719	0.855	0.843	0.581	0.206	1.000	0.793	0.641
VOI10	0.609	0.666	0.662	0.473	0.246	0.793	1.000	0.415
VOI15	0.843	0.721	0.696	0.863	0.658	0.641	0.415	1.000

*VOI, volume of interest

Supplementary Table S3. Difference of AUC between VOI_I model and combined models in the external testing set.

	*VOI_I	VOI1	VOI2	VOI3	VOI4	VOI5	VOI10	VOI15
VOI_I	1.000	0.971	0.629	0.002	0.000	0.597	0.008	0.001
VOI1	0.971	1.000	0.597	0.001	0.000	0.574	0.007	0.001
VOI2	0.629	0.597	1.000	0.001	0.000	0.308	0.003	0.000
VOI3	0.003	0.001	0.001	1.000	0.502	0.005	0.409	0.917
VOI4	0.001	0.000	0.000	0.502	1.000	0.001	0.231	0.708
VOI5	0.597	0.574	0.308	0.004	0.001	1.000	0.020	0.002
VOI10	0.010	0.008	0.005	0.409	0.231	0.020	1.000	0.445
VOI15	0.001	0.001	0.001	0.917	0.708	0.002	0.445	1.000

*VOI, volume of interest

Supplementary Table S4. Difference of AUC between VOI_I model and VOI_P models in the internal testing set.

	*VOI_P1	VOI_P2	VOI_P3	VOI_P4	VOI_P5	VOI_P10	VOI_P15	VOI_I
VOI_P1	1.000	0.663	0.610	0.289	0.103	0.938	0.654	0.953
VOI_P2	0.663	1.000	0.950	0.769	0.548	0.721	0.489	0.776
VOI_P3	0.610	0.950	1.000	0.636	0.255	0.710	0.412	0.792
VOI_P4	0.289	0.769	0.636	1.000	0.631	0.482	0.234	0.529
VOI_P5	0.103	0.548	0.255	0.631	1.000	0.292	0.068	0.375
VOI_P10	0.938	0.721	0.710	0.482	0.292	1.000	0.712	0.918
VOI_P15	0.654	0.489	0.412	0.234	0.068	0.712	1.000	0.693
VOI1_I	0.953	0.776	0.792	0.529	0.375	0.918	0.693	1.000

*VOI, volume of interest

Supplementary Table S5. Difference of AUC between VOI_I model and VOI_P models in the external testing set.

	*VOI_P1	VOI_P2	VOI_P3	VOI_P4	VOI_P5	VOI_P10	VOI_P15	VOI_I
VOI_P1	1.000	0.521	0.191	0.571	0.239	0.276	0.323	0.968
VOI_P2	0.521	1.000	0.098	0.255	0.140	0.162	0.689	0.547
VOI_P3	0.191	0.098	1.000	0.430	0.931	0.932	0.077	0.381
VOI_P4	0.571	0.255	0.430	1.000	0.503	0.490	0.142	0.731
VOI_P5	0.239	0.140	0.931	0.503	1.000	0.847	0.048	0.398
VOI_P10	0.276	0.162	0.932	0.490	0.847	1.000	0.021	0.363
VOI_P15	0.323	0.689	0.077	0.142	0.048	0.021	1.000	0.346
VOI1_I	0.968	0.547	0.381	0.731	0.398	0.363	0.346	1.000

*VOI, volume of interest

Supplementary Table S6. 1454 radiomic features extracted from each VOI, including 288 first-order features, 14 shape features, and 1152 texture features.

Shape features	
shape_Elongation_original	shape_Flatness_original
shape_LeastAxisLength_original	shape_MajorAxisLength_original
shape_Maximum2DDiameterColumn_original	shape_Maximum2DDiameterRow_original
shape_Maximum2DDiameterSlice_original	shape_Maximum3DDiameter_original
shape_MeshVolume_original	shape_MinorAxisLength_original
shape_Sphericity_original	shape_SurfaceArea_original
shape_SurfaceVolumeRatio_original	shape_VoxelVolume_original
First-order features	
firstorder_10Percentile_original	firstorder_90Percentile_original
firstorder_Energy_original	firstorder_Entropy_original
firstorder_InterquartileRange_original	firstorder_Kurtosis_original
firstorder_Maximum_original	firstorder_MeanAbsoluteDeviation_original
firstorder_Mean_original	firstorder_Median_original
firstorder_Minimum_original	firstorder_Range_original
firstorder_RobustMeanAbsoluteDeviation_original	firstorder_RootMeanSquared_original
firstorder_Skewness_original	firstorder_TotalEnergy_original
firstorder_Uniformity_original	firstorder_Variance_original
firstorder_10Percentile_log-sigma-1-0-mm-3D	firstorder_90Percentile_log-sigma-1-0-mm-3D
firstorder_Energy_log-sigma-1-0-mm-3D	firstorder_Entropy_log-sigma-1-0-mm-3D
firstorder_InterquartileRange_log-sigma-1-0-mm-3D	firstorder_Kurtosis_log-sigma-1-0-mm-3D
firstorder_Maximum_log-sigma-1-0-mm-3D	firstorder_MeanAbsoluteDeviation_log-sigma-1-0-mm-3D
firstorder_Mean_log-sigma-1-0-mm-3D	firstorder_Median_log-sigma-1-0-mm-3D
firstorder_Minimum_log-sigma-1-0-mm-3D	firstorder_Range_log-sigma-1-0-mm-3D
firstorder_RobustMeanAbsoluteDeviation_log-sigma-1-0-mm-3D	firstorder_RootMeanSquared_log-sigma-1-0-mm-3D
firstorder_Skewness_log-sigma-1-0-mm-3D	firstorder_TotalEnergy_log-sigma-1-0-mm-3D
firstorder_Uniformity_log-sigma-1-0-mm-3D	firstorder_Variance_log-sigma-1-0-mm-3D
firstorder_10Percentile_log-sigma-3-0-mm-3D	firstorder_90Percentile_log-sigma-3-0-mm-3D
firstorder_Energy_log-sigma-3-0-mm-3D	firstorder_Entropy_log-sigma-3-0-mm-3D
firstorder_InterquartileRange_log-sigma-3-0-mm-3D	firstorder_Kurtosis_log-sigma-3-0-mm-3D
firstorder_Maximum_log-sigma-3-0-mm-3D	firstorder_MeanAbsoluteDeviation_log-sigma-3-0-mm-3D
firstorder_Mean_log-sigma-3-0-mm-3D	firstorder_Median_log-sigma-3-0-mm-3D
firstorder_Minimum_log-sigma-3-0-mm-3D	firstorder_Range_log-sigma-3-0-mm-3D
firstorder_RobustMeanAbsoluteDeviation_log-sigma-3-0-mm-3D	firstorder_RootMeanSquared_log-sigma-3-0-mm-3D
firstorder_Skewness_log-sigma-3-0-mm-3D	firstorder_TotalEnergy_log-sigma-3-0-mm-3D
firstorder_Uniformity_log-sigma-3-0-mm-3D	firstorder_Variance_log-sigma-3-0-mm-3D
firstorder_10Percentile_log-sigma-2-0-mm-3D	firstorder_90Percentile_log-sigma-2-0-mm-3D
firstorder_Energy_log-sigma-2-0-mm-3D	firstorder_Entropy_log-sigma-2-0-mm-3D
firstorder_InterquartileRange_log-sigma-2-0-mm-3D	firstorder_Kurtosis_log-sigma-2-0-mm-3D
firstorder_Maximum_log-sigma-2-0-mm-3D	firstorder_MeanAbsoluteDeviation_log-sigma-2-0-mm-3D

firstorder_Mean_log-sigma-2-0-mm-3D	firstorder_Median_log-sigma-2-0-mm-3D
firstorder_Minimum_log-sigma-2-0-mm-3D	firstorder_Range_log-sigma-2-0-mm-3D
firstorder_RobustMeanAbsoluteDeviation_log-sigma-2-0-mm-3D	firstorder_RootMeanSquared_log-sigma-2-0-mm-3D
firstorder_Skewness_log-sigma-2-0-mm-3D	firstorder_TotalEnergy_log-sigma-2-0-mm-3D
firstorder_Uniformity_log-sigma-2-0-mm-3D	firstorder_Variance_log-sigma-2-0-mm-3D
firstorder_10Percentile_wavelet-LLH	firstorder_90Percentile_wavelet-LLH
firstorder_Energy_wavelet-LLH	firstorder_Entropy_wavelet-LLH
firstorder_InterquartileRange_wavelet-LLH	firstorder_Kurtosis_wavelet-LLH
firstorder_Maximum_wavelet-LLH	firstorder_MeanAbsoluteDeviation_wavelet-LLH
firstorder_Mean_wavelet-LLH	firstorder_Median_wavelet-LLH
firstorder_Minimum_wavelet-LLH	firstorder_Range_wavelet-LLH
firstorder_RobustMeanAbsoluteDeviation_wavelet-LLH	firstorder_RootMeanSquared_wavelet-LLH
firstorder_Skewness_wavelet-LLH	firstorder_TotalEnergy_wavelet-LLH
firstorder_Uniformity_wavelet-LLH	firstorder_Variance_wavelet-LLH
firstorder_10Percentile_wavelet-HLL	firstorder_90Percentile_wavelet-HLL
firstorder_Energy_wavelet-HLL	firstorder_Entropy_wavelet-HLL
firstorder_InterquartileRange_wavelet-HLL	firstorder_Kurtosis_wavelet-HLL
firstorder_Maximum_wavelet-HLL	firstorder_MeanAbsoluteDeviation_wavelet-HLL
firstorder_Mean_wavelet-HLL	firstorder_Median_wavelet-HLL
firstorder_Minimum_wavelet-HLL	firstorder_Range_wavelet-HLL
firstorder_RobustMeanAbsoluteDeviation_wavelet-HLL	firstorder_RootMeanSquared_wavelet-HLL
firstorder_Skewness_wavelet-HLL	firstorder_TotalEnergy_wavelet-HLL
firstorder_Uniformity_wavelet-HLL	firstorder_Variance_wavelet-HLL
firstorder_10Percentile_wavelet-LHL	firstorder_90Percentile_wavelet-LHL
firstorder_Energy_wavelet-LHL	firstorder_Entropy_wavelet-LHL
firstorder_InterquartileRange_wavelet-LHL	firstorder_Kurtosis_wavelet-LHL
firstorder_Maximum_wavelet-LHL	firstorder_MeanAbsoluteDeviation_wavelet-LHL
firstorder_Mean_wavelet-LHL	firstorder_Median_wavelet-LHL
firstorder_Minimum_wavelet-LHL	firstorder_Range_wavelet-LHL
firstorder_RobustMeanAbsoluteDeviation_wavelet-LHL	firstorder_RootMeanSquared_wavelet-LHL
firstorder_Skewness_wavelet-LHL	firstorder_TotalEnergy_wavelet-LHL
firstorder_Uniformity_wavelet-LHL	firstorder_Variance_wavelet-LHL
firstorder_10Percentile_wavelet-LHH	firstorder_90Percentile_wavelet-LHH
firstorder_Energy_wavelet-LHH	firstorder_Entropy_wavelet-LHH
firstorder_InterquartileRange_wavelet-LHH	firstorder_Kurtosis_wavelet-LHH
firstorder_Maximum_wavelet-LHH	firstorder_MeanAbsoluteDeviation_wavelet-LHH
firstorder_Mean_wavelet-LHH	firstorder_Median_wavelet-LHH
firstorder_Minimum_wavelet-LHH	firstorder_Range_wavelet-LHH
firstorder_RobustMeanAbsoluteDeviation_wavelet-LHH	firstorder_RootMeanSquared_wavelet-LHH
firstorder_Skewness_wavelet-LHH	firstorder_TotalEnergy_wavelet-LHH
firstorder_Uniformity_wavelet-LHH	firstorder_Variance_wavelet-LHH
firstorder_10Percentile_wavelet-HLH	firstorder_90Percentile_wavelet-HLH
firstorder_Energy_wavelet-HLH	firstorder_Entropy_wavelet-HLH

firstorder_InterquartileRange_wavelet-HLH	firstorder_Kurtosis_wavelet-HLH
firstorder_Maximum_wavelet-HLH	firstorder_MeanAbsoluteDeviation_wavelet-HLH
firstorder_Mean_wavelet-HLH	firstorder_Median_wavelet-HLH
firstorder_Minimum_wavelet-HLH	firstorder_Range_wavelet-HLH
firstorder_RobustMeanAbsoluteDeviation_wavelet-HLH	firstorder_RootMeanSquared_wavelet-HLH
firstorder_Skewness_wavelet-HLH	firstorder_TotalEnergy_wavelet-HLH
firstorder_Uniformity_wavelet-HLH	firstorder_Variance_wavelet-HLH
firstorder_10Percentile_wavelet-HHL	firstorder_90Percentile_wavelet-HHL
firstorder_Energy_wavelet-HHL	firstorder_Entropy_wavelet-HHL
firstorder_InterquartileRange_wavelet-HHL	firstorder_Kurtosis_wavelet-HHL
firstorder_Maximum_wavelet-HHL	firstorder_MeanAbsoluteDeviation_wavelet-HHL
firstorder_Mean_wavelet-HHL	firstorder_Median_wavelet-HHL
firstorder_Minimum_wavelet-HHL	firstorder_Range_wavelet-HHL
firstorder_RobustMeanAbsoluteDeviation_wavelet-HHL	firstorder_RootMeanSquared_wavelet-HHL
firstorder_Skewness_wavelet-HHL	firstorder_TotalEnergy_wavelet-HHL
firstorder_Uniformity_wavelet-HHL	firstorder_Variance_wavelet-HHL
firstorder_10Percentile_wavelet-HHH	firstorder_90Percentile_wavelet-HHH
firstorder_Energy_wavelet-HHH	firstorder_Entropy_wavelet-HHH
firstorder_InterquartileRange_wavelet-HHH	firstorder_Kurtosis_wavelet-HHH
firstorder_Maximum_wavelet-HHH	firstorder_MeanAbsoluteDeviation_wavelet-HHH
firstorder_Mean_wavelet-HHH	firstorder_Median_wavelet-HHH
firstorder_Minimum_wavelet-HHH	firstorder_Range_wavelet-HHH
firstorder_RobustMeanAbsoluteDeviation_wavelet-HHH	firstorder_RootMeanSquared_wavelet-HHH
firstorder_Skewness_wavelet-HHH	firstorder_TotalEnergy_wavelet-HHH
firstorder_Uniformity_wavelet-HHH	firstorder_Variance_wavelet-HHH
firstorder_10Percentile_square	firstorder_90Percentile_square
firstorder_Energy_square	firstorder_Entropy_square
firstorder_InterquartileRange_square	firstorder_Kurtosis_square
firstorder_Maximum_square	firstorder_MeanAbsoluteDeviation_square
firstorder_Mean_square	firstorder_Median_square
firstorder_Minimum_square	firstorder_Range_square
firstorder_RobustMeanAbsoluteDeviation_square	firstorder_RootMeanSquared_square
firstorder_Skewness_square	firstorder_TotalEnergy_square
firstorder_Uniformity_square	firstorder_Variance_square
firstorder_10Percentile_squareroot	firstorder_90Percentile_squareroot
firstorder_Energy_squareroot	firstorder_Entropy_squareroot
firstorder_InterquartileRange_squareroot	firstorder_Kurtosis_squareroot
firstorder_Maximum_squareroot	firstorder_MeanAbsoluteDeviation_squareroot
firstorder_Mean_squareroot	firstorder_Median_squareroot
firstorder_Minimum_squareroot	firstorder_Range_squareroot
firstorder_RobustMeanAbsoluteDeviation_squareroot	firstorder_RootMeanSquared_squareroot
firstorder_Skewness_squareroot	firstorder_TotalEnergy_squareroot
firstorder_Uniformity_squareroot	firstorder_Variance_squareroot

firstorder_10Percentile_logarithm	firstorder_90Percentile_logarithm
firstorder_Energy_logarithm	firstorder_Entropy_logarithm
firstorder_InterquartileRange_logarithm	firstorder_Kurtosis_logarithm
firstorder_Maximum_logarithm	firstorder_MeanAbsoluteDeviation_logarithm
firstorder_Mean_logarithm	firstorder_Median_logarithm
firstorder_Minimum_logarithm	firstorder_Range_logarithm
firstorder_RobustMeanAbsoluteDeviation_logarithm	firstorder_RootMeanSquared_logarithm
firstorder_Skewness_logarithm	firstorder_TotalEnergy_logarithm
firstorder_Uniformity_logarithm	firstorder_Variance_logarithm
Texture features	
glcm_Autocorrelation_original	glcm_JointAverage_original
glcm_ClusterProminence_original	glcm_ClusterShade_original
glcm_ClusterTendency_original	glcm_Contrast_original
glcm_Correlation_original	glcm_DifferenceAverage_original
glcm_DifferenceEntropy_original	glcm_DifferenceVariance_original
glcm_JointEnergy_original	glcm_JointEntropy_original
glcm_Imc1_original	glcm_Imc2_original
glcm_Idm_original	glcm_Idmn_original
glcm_Id_original	glcm_Idn_original
glcm_InverseVariance_original	glcm_MaximumProbability_original
glcm_SumEntropy_original	gldm_DependenceEntropy_original
gldm_DependenceNonUniformity_original	gldm_DependenceNonUniformityNormalized_original
gldm_DependenceVariance_original	gldm_GrayLevelNonUniformity_original
gldm_GrayLevelVariance_original	gldm_HighGrayLevelEmphasis_original
gldm_LargeDependenceEmphasis_original	gldm_LargeDependenceHighGrayLevelEmphasis_original
gldm_LargeDependenceLowGrayLevelEmphasis_original	gldm_LowGrayLevelEmphasis_original
gldm_SmallDependenceEmphasis_original	gldm_SmallDependenceHighGrayLevelEmphasis_original
gldm_SmallDependenceLowGrayLevelEmphasis_original	glrlm_GrayLevelNonUniformity_original
glrlm_GrayLevelNonUniformityNormalized_original	glrlm_GrayLevelVariance_original
glrlm_HighGrayLevelRunEmphasis_original	glrlm_LongRunEmphasis_original
glrlm_LongRunHighGrayLevelEmphasis_original	glrlm_LongRunLowGrayLevelEmphasis_original
glrlm_LowGrayLevelRunEmphasis_original	glrlm_RunEntropy_original
glrlm_RunLengthNonUniformity_original	glrlm_RunLengthNonUniformityNormalized_original
glrlm_RunPercentage_original	glrlm_RunVariance_original
glrlm_ShortRunEmphasis_original	glrlm_ShortRunHighGrayLevelEmphasis_original
glrlm_ShortRunLowGrayLevelEmphasis_original	glszm_GrayLevelNonUniformity_original
glszm_GrayLevelNonUniformityNormalized_original	glszm_GrayLevelVariance_original
glszm_HighGrayLevelZoneEmphasis_original	glszm_LargeAreaEmphasis_original
glszm_LargeAreaHighGrayLevelEmphasis_original	glszm_LargeAreaLowGrayLevelEmphasis_original
glszm_LowGrayLevelZoneEmphasis_original	glszm_SizeZoneNonUniformity_original
glszm_SizeZoneNonUniformityNormalized_original	glszm_SmallAreaEmphasis_original
glszm_SmallAreaHighGrayLevelEmphasis_original	glszm_SmallAreaLowGrayLevelEmphasis_original
glszm_ZoneEntropy_original	glszm_ZonePercentage_original

glszm_ZoneVariance_original	ngtdm_Busyness_original
ngtdm_Coarseness_original	ngtdm_Complexity_original
ngtdm_Contrast_original	ngtdm_Strength_original
glcm_Autocorrelation_log-sigma-1-0-mm-3D	glcm_JointAverage_log-sigma-1-0-mm-3D
glcm_ClusterProminence_log-sigma-1-0-mm-3D	glcm_ClusterShade_log-sigma-1-0-mm-3D
glcm_ClusterTendency_log-sigma-1-0-mm-3D	glcm_Contrast_log-sigma-1-0-mm-3D
glcm_Correlation_log-sigma-1-0-mm-3D	glcm_DifferenceAverage_log-sigma-1-0-mm-3D
glcm_DifferenceEntropy_log-sigma-1-0-mm-3D	glcm_DifferenceVariance_log-sigma-1-0-mm-3D
glcm_JointEnergy_log-sigma-1-0-mm-3D	glcm_JointEntropy_log-sigma-1-0-mm-3D
glcm_Imc1_log-sigma-1-0-mm-3D	glcm_Imc2_log-sigma-1-0-mm-3D
glcm_Idm_log-sigma-1-0-mm-3D	glcm_Idmn_log-sigma-1-0-mm-3D
glcm_Id_log-sigma-1-0-mm-3D	glcm_Idn_log-sigma-1-0-mm-3D
glcm_InverseVariance_log-sigma-1-0-mm-3D	glcm_MaximumProbability_log-sigma-1-0-mm-3D
glcm_SumEntropy_log-sigma-1-0-mm-3D	gldm_DependenceEntropy_log-sigma-1-0-mm-3D
gldm_DependenceNonUniformity_log-sigma-1-0-mm-3D	gldm_DependenceNonUniformityNormalized_log-sigma-1-0-mm-3D
gldm_DependenceVariance_log-sigma-1-0-mm-3D	gldm_GrayLevelNonUniformity_log-sigma-1-0-mm-3D
gldm_GrayLevelVariance_log-sigma-1-0-mm-3D	gldm_HighGrayLevelEmphasis_log-sigma-1-0-mm-3D
gldm_LargeDependenceEmphasis_log-sigma-1-0-mm-3D	gldm_LargeDependenceHighGrayLevelEmphasis_log-sigma-1-0-mm-3D
gldm_LargeDependenceLowGrayLevelEmphasis_log-sigma-1-0-mm-3D	gldm_LowGrayLevelEmphasis_log-sigma-1-0-mm-3D
gldm_SmallDependenceEmphasis_log-sigma-1-0-mm-3D	gldm_SmallDependenceHighGrayLevelEmphasis_log-sigma-1-0-mm-3D
gldm_SmallDependenceLowGrayLevelEmphasis_log-sigma-1-0-mm-3D	glrlm_GrayLevelNonUniformity_log-sigma-1-0-mm-3D
glrlm_GrayLevelNonUniformityNormalized_log-sigma-1-0-mm-3D	glrlm_GrayLevelVariance_log-sigma-1-0-mm-3D
glrlm_HighGrayLevelRunEmphasis_log-sigma-1-0-mm-3D	glrlm_LongRunEmphasis_log-sigma-1-0-mm-3D
glrlm_LongRunHighGrayLevelEmphasis_log-sigma-1-0-mm-3D	glrlm_LongRunLowGrayLevelEmphasis_log-sigma-1-0-mm-3D
glrlm_LowGrayLevelRunEmphasis_log-sigma-1-0-mm-3D	glrlm_RunEntropy_log-sigma-1-0-mm-3D
glrlm_RunLengthNonUniformity_log-sigma-1-0-mm-3D	glrlm_RunLengthNonUniformityNormalized_log-sigma-1-0-mm-3D
glrlm_RunPercentage_log-sigma-1-0-mm-3D	glrlm_RunVariance_log-sigma-1-0-mm-3D
glrlm_ShortRunEmphasis_log-sigma-1-0-mm-3D	glrlm_ShortRunHighGrayLevelEmphasis_log-sigma-1-0-mm-3D
glrlm_ShortRunLowGrayLevelEmphasis_log-sigma-1-0-mm-3D	glszm_GrayLevelNonUniformity_log-sigma-1-0-mm-3D
glszm_GrayLevelNonUniformityNormalized_log-sigma-1-0-mm-3D	glszm_GrayLevelVariance_log-sigma-1-0-mm-3D
glszm_HighGrayLevelZoneEmphasis_log-sigma-1-0-mm-3D	glszm_LargeAreaEmphasis_log-sigma-1-0-mm-3D
glszm_LargeAreaHighGrayLevelEmphasis_log-sigma-1-0-mm-3D	glszm_LargeAreaLowGrayLevelEmphasis_log-sigma-1-0-mm-3D
glszm_LowGrayLevelZoneEmphasis_log-sigma-1-0-mm-3D	glszm_SizeZoneNonUniformity_log-sigma-1-0-mm-3D
glszm_SizeZoneNonUniformityNormalized_log-sigma-1-0-mm-3D	glszm_SmallAreaEmphasis_log-sigma-1-0-mm-3D
glszm_SmallAreaHighGrayLevelEmphasis_log-sigma-1-0-mm-3D	glszm_SmallAreaLowGrayLevelEmphasis_log-sigma-1-0-mm-3D
glszm_ZoneEntropy_log-sigma-1-0-mm-3D	glszm_ZonePercentage_log-sigma-1-0-mm-3D
glszm_ZoneVariance_log-sigma-1-0-mm-3D	ngtdm_Busyness_log-sigma-1-0-mm-3D
ngtdm_Coarseness_log-sigma-1-0-mm-3D	ngtdm_Complexity_log-sigma-1-0-mm-3D
ngtdm_Contrast_log-sigma-1-0-mm-3D	ngtdm_Strength_log-sigma-1-0-mm-3D
glcm_Autocorrelation_log-sigma-2-0-mm-3D	glcm_JointAverage_log-sigma-2-0-mm-3D
glcm_ClusterProminence_log-sigma-2-0-mm-3D	glcm_ClusterShade_log-sigma-2-0-mm-3D
glcm_ClusterTendency_log-sigma-2-0-mm-3D	glcm_Contrast_log-sigma-2-0-mm-3D
glcm_Correlation_log-sigma-2-0-mm-3D	glcm_DifferenceAverage_log-sigma-2-0-mm-3D

glcm_DifferenceEntropy_log-sigma-2-0-mm-3D	glcm_DifferenceVariance_log-sigma-2-0-mm-3D
glcm_JointEnergy_log-sigma-2-0-mm-3D	glcm_JointEntropy_log-sigma-2-0-mm-3D
glcm_Imc1_log-sigma-2-0-mm-3D	glcm_Imc2_log-sigma-2-0-mm-3D
glcm_Idm_log-sigma-2-0-mm-3D	glcm_Idmn_log-sigma-2-0-mm-3D
glcm_Id_log-sigma-2-0-mm-3D	glcm_Idn_log-sigma-2-0-mm-3D
glcm_InverseVariance_log-sigma-2-0-mm-3D	glcm_MaximumProbability_log-sigma-2-0-mm-3D
glcm_SumEntropy_log-sigma-2-0-mm-3D	gldm_DependenceEntropy_log-sigma-2-0-mm-3D
gldm_DependenceNonUniformity_log-sigma-2-0-mm-3D	gldm_DependenceNonUniformityNormalized_log-sigma-2-0-mm-3D
gldm_DependenceVariance_log-sigma-2-0-mm-3D	gldm_GrayLevelNonUniformity_log-sigma-2-0-mm-3D
gldm_GrayLevelVariance_log-sigma-2-0-mm-3D	gldm_HighGrayLevelEmphasis_log-sigma-2-0-mm-3D
gldm_LargeDependenceEmphasis_log-sigma-2-0-mm-3D	gldm_LargeDependenceHighGrayLevelEmphasis_log-sigma-2-0-mm-3D
gldm_LargeDependenceLowGrayLevelEmphasis_log-sigma-2-0-mm-3D	gldm_LowGrayLevelEmphasis_log-sigma-2-0-mm-3D
gldm_SmallDependenceEmphasis_log-sigma-2-0-mm-3D	gldm_SmallDependenceHighGrayLevelEmphasis_log-sigma-2-0-mm-3D
gldm_SmallDependenceLowGrayLevelEmphasis_log-sigma-2-0-mm-3D	glrlm_GrayLevelNonUniformity_log-sigma-2-0-mm-3D
glrlm_GrayLevelNonUniformityNormalized_log-sigma-2-0-mm-3D	glrlm_GrayLevelVariance_log-sigma-2-0-mm-3D
glrlm_HighGrayLevelRunEmphasis_log-sigma-2-0-mm-3D	glrlm_LongRunEmphasis_log-sigma-2-0-mm-3D
glrlm_LongRunHighGrayLevelEmphasis_log-sigma-2-0-mm-3D	glrlm_LongRunLowGrayLevelEmphasis_log-sigma-2-0-mm-3D
glrlm_LowGrayLevelRunEmphasis_log-sigma-2-0-mm-3D	glrlm_RunEntropy_log-sigma-2-0-mm-3D
glrlm_RunLengthNonUniformity_log-sigma-2-0-mm-3D	glrlm_RunLengthNonUniformityNormalized_log-sigma-2-0-mm-3D
glrlm_RunPercentage_log-sigma-2-0-mm-3D	glrlm_RunVariance_log-sigma-2-0-mm-3D
glrlm_ShortRunEmphasis_log-sigma-2-0-mm-3D	glrlm_ShortRunHighGrayLevelEmphasis_log-sigma-2-0-mm-3D
glrlm_ShortRunLowGrayLevelEmphasis_log-sigma-2-0-mm-3D	glszm_GrayLevelNonUniformity_log-sigma-2-0-mm-3D
glszm_GrayLevelNonUniformityNormalized_log-sigma-2-0-mm-3D	glszm_GrayLevelVariance_log-sigma-2-0-mm-3D
glszm_HighGrayLevelZoneEmphasis_log-sigma-2-0-mm-3D	glszm_LargeAreaEmphasis_log-sigma-2-0-mm-3D
glszm_LargeAreaHighGrayLevelEmphasis_log-sigma-2-0-mm-3D	glszm_LargeAreaLowGrayLevelEmphasis_log-sigma-2-0-mm-3D
glszm_LowGrayLevelZoneEmphasis_log-sigma-2-0-mm-3D	glszm_SizeZoneNonUniformity_log-sigma-2-0-mm-3D
glszm_SizeZoneNonUniformityNormalized_log-sigma-2-0-mm-3D	glszm_SmallAreaEmphasis_log-sigma-2-0-mm-3D
glszm_SmallAreaHighGrayLevelEmphasis_log-sigma-2-0-mm-3D	glszm_SmallAreaLowGrayLevelEmphasis_log-sigma-2-0-mm-3D
glszm_ZoneEntropy_log-sigma-2-0-mm-3D	glszm_ZonePercentage_log-sigma-2-0-mm-3D
glszm_ZoneVariance_log-sigma-2-0-mm-3D	ngtdm_Busyness_log-sigma-2-0-mm-3D
ngtdm_Coarseness_log-sigma-2-0-mm-3D	ngtdm_Complexity_log-sigma-2-0-mm-3D
ngtdm_Contrast_log-sigma-2-0-mm-3D	ngtdm_Strength_log-sigma-2-0-mm-3D
glcm_Autocorrelation_log-sigma-3-0-mm-3D	glcm_JointAverage_log-sigma-3-0-mm-3D
glcm_ClusterProminence_log-sigma-3-0-mm-3D	glcm_ClusterShade_log-sigma-3-0-mm-3D
glcm_ClusterTendency_log-sigma-3-0-mm-3D	glcm_Contrast_log-sigma-3-0-mm-3D
glcm_Correlation_log-sigma-3-0-mm-3D	glcm_DifferenceAverage_log-sigma-3-0-mm-3D
glcm_DifferenceEntropy_log-sigma-3-0-mm-3D	glcm_DifferenceVariance_log-sigma-3-0-mm-3D
glcm_JointEnergy_log-sigma-3-0-mm-3D	glcm_JointEntropy_log-sigma-3-0-mm-3D
glcm_Imc1_log-sigma-3-0-mm-3D	glcm_Imc2_log-sigma-3-0-mm-3D
glcm_Idm_log-sigma-3-0-mm-3D	glcm_Idmn_log-sigma-3-0-mm-3D
glcm_Id_log-sigma-3-0-mm-3D	glcm_Idn_log-sigma-3-0-mm-3D
glcm_InverseVariance_log-sigma-3-0-mm-3D	glcm_MaximumProbability_log-sigma-3-0-mm-3D
glcm_SumEntropy_log-sigma-3-0-mm-3D	gldm_DependenceEntropy_log-sigma-3-0-mm-3D

gldm_DependenceNonUniformity_log-sigma-3-0-mm-3D	gldm_DependenceNonUniformityNormalized_log-sigma-3-0-mm-3D
gldm_DependenceVariance_log-sigma-3-0-mm-3D	gldm_GrayLevelNonUniformity_log-sigma-3-0-mm-3D
gldm_GrayLevelVariance_log-sigma-3-0-mm-3D	gldm_HighGrayLevelEmphasis_log-sigma-3-0-mm-3D
gldm_LargeDependenceEmphasis_log-sigma-3-0-mm-3D	gldm_LargeDependenceHighGrayLevelEmphasis_log-sigma-3-0-mm-3D
gldm_LargeDependenceLowGrayLevelEmphasis_log-sigma-3-0-mm-3D	gldm_LowGrayLevelEmphasis_log-sigma-3-0-mm-3D
gldm_SmallDependenceEmphasis_log-sigma-3-0-mm-3D	gldm_SmallDependenceHighGrayLevelEmphasis_log-sigma-3-0-mm-3D
gldm_SmallDependenceLowGrayLevelEmphasis_log-sigma-3-0-mm-3D	glrlm_GrayLevelNonUniformity_log-sigma-3-0-mm-3D
glrlm_GrayLevelNonUniformityNormalized_log-sigma-3-0-mm-3D	glrlm_GrayLevelVariance_log-sigma-3-0-mm-3D
glrlm_HighGrayLevelRunEmphasis_log-sigma-3-0-mm-3D	glrlm_LongRunEmphasis_log-sigma-3-0-mm-3D
glrlm_LongRunHighGrayLevelEmphasis_log-sigma-3-0-mm-3D	glrlm_LongRunLowGrayLevelEmphasis_log-sigma-3-0-mm-3D
glrlm_LowGrayLevelRunEmphasis_log-sigma-3-0-mm-3D	glrlm_RunEntropy_log-sigma-3-0-mm-3D
glrlm_RunLengthNonUniformity_log-sigma-3-0-mm-3D	glrlm_RunLengthNonUniformityNormalized_log-sigma-3-0-mm-3D
glrlm_RunPercentage_log-sigma-3-0-mm-3D	glrlm_RunVariance_log-sigma-3-0-mm-3D
glrlm_ShortRunEmphasis_log-sigma-3-0-mm-3D	glrlm_ShortRunHighGrayLevelEmphasis_log-sigma-3-0-mm-3D
glrlm_ShortRunLowGrayLevelEmphasis_log-sigma-3-0-mm-3D	glszm_GrayLevelNonUniformity_log-sigma-3-0-mm-3D
glszm_GrayLevelNonUniformityNormalized_log-sigma-3-0-mm-3D	glszm_GrayLevelVariance_log-sigma-3-0-mm-3D
glszm_HighGrayLevelZoneEmphasis_log-sigma-3-0-mm-3D	glszm_LargeAreaEmphasis_log-sigma-3-0-mm-3D
glszm_LargeAreaHighGrayLevelEmphasis_log-sigma-3-0-mm-3D	glszm_LargeAreaLowGrayLevelEmphasis_log-sigma-3-0-mm-3D
glszm_LowGrayLevelZoneEmphasis_log-sigma-3-0-mm-3D	glszm_SizeZoneNonUniformity_log-sigma-3-0-mm-3D
glszm_SizeZoneNonUniformityNormalized_log-sigma-3-0-mm-3D	glszm_SmallAreaEmphasis_log-sigma-3-0-mm-3D
glszm_SmallAreaHighGrayLevelEmphasis_log-sigma-3-0-mm-3D	glszm_SmallAreaLowGrayLevelEmphasis_log-sigma-3-0-mm-3D
glszm_ZoneEntropy_log-sigma-3-0-mm-3D	glszm_ZonePercentage_log-sigma-3-0-mm-3D
glszm_ZoneVariance_log-sigma-3-0-mm-3D	ngtdm_Busyness_log-sigma-3-0-mm-3D
ngtdm_Coarseness_log-sigma-3-0-mm-3D	ngtdm_Complexity_log-sigma-3-0-mm-3D
ngtdm_Contrast_log-sigma-3-0-mm-3D	ngtdm_Strength_log-sigma-3-0-mm-3D
glcm_Autocorrelation_wavelet-LLH	glcm_JointAverage_wavelet-LLH
glcm_ClusterProminence_wavelet-LLH	glcm_ClusterShade_wavelet-LLH
glcm_ClusterTendency_wavelet-LLH	glcm_Contrast_wavelet-LLH
glcm_Correlation_wavelet-LLH	glcm_DifferenceAverage_wavelet-LLH
glcm_DifferenceEntropy_wavelet-LLH	glcm_DifferenceVariance_wavelet-LLH
glcm_JointEnergy_wavelet-LLH	glcm_JointEntropy_wavelet-LLH
glcm_Imc1_wavelet-LLH	glcm_Imc2_wavelet-LLH
glcm_Idm_wavelet-LLH	glcm_Idmn_wavelet-LLH
glcm_Id_wavelet-LLH	glcm_Idn_wavelet-LLH
glcm_InverseVariance_wavelet-LLH	glcm_MaximumProbability_wavelet-LLH
glcm_SumEntropy_wavelet-LLH	gldm_DependenceEntropy_wavelet-LLH
gldm_DependenceNonUniformity_wavelet-LLH	gldm_DependenceNonUniformityNormalized_wavelet-LLH
gldm_DependenceVariance_wavelet-LLH	gldm_GrayLevelNonUniformity_wavelet-LLH
gldm_GrayLevelVariance_wavelet-LLH	gldm_HighGrayLevelEmphasis_wavelet-LLH
gldm_LargeDependenceEmphasis_wavelet-LLH	gldm_LargeDependenceHighGrayLevelEmphasis_wavelet-LLH
gldm_LargeDependenceLowGrayLevelEmphasis_wavelet-LLH	gldm_LowGrayLevelEmphasis_wavelet-LLH
gldm_SmallDependenceEmphasis_wavelet-LLH	gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-LLH
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-LLH	glrlm_GrayLevelNonUniformity_wavelet-LLH

glrlm_GrayLevelNonUniformityNormalized_wavelet-LLH	glrlm_GrayLevelVariance_wavelet-LLH
glrlm_HighGrayLevelRunEmphasis_wavelet-LLH	glrlm_LongRunEmphasis_wavelet-LLH
glrlm_LongRunHighGrayLevelEmphasis_wavelet-LLH	glrlm_LongRunLowGrayLevelEmphasis_wavelet-LLH
glrlm_LowGrayLevelRunEmphasis_wavelet-LLH	glrlm_RunEntropy_wavelet-LLH
glrlm_RunLengthNonUniformity_wavelet-LLH	glrlm_RunLengthNonUniformityNormalized_wavelet-LLH
glrlm_RunPercentage_wavelet-LLH	glrlm_RunVariance_wavelet-LLH
glrlm_ShortRunEmphasis_wavelet-LLH	glrlm_ShortRunHighGrayLevelEmphasis_wavelet-LLH
glrlm_ShortRunLowGrayLevelEmphasis_wavelet-LLH	glszm_GrayLevelNonUniformity_wavelet-LLH
glszm_GrayLevelNonUniformityNormalized_wavelet-LLH	glszm_GrayLevelVariance_wavelet-LLH
glszm_HighGrayLevelZoneEmphasis_wavelet-LLH	glszm_LargeAreaEmphasis_wavelet-LLH
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-LLH	glszm_LargeAreaLowGrayLevelEmphasis_wavelet-LLH
glszm_LowGrayLevelZoneEmphasis_wavelet-LLH	glszm_SizeZoneNonUniformity_wavelet-LLH
glszm_SizeZoneNonUniformityNormalized_wavelet-LLH	glszm_SmallAreaEmphasis_wavelet-LLH
glszm_SmallAreaHighGrayLevelEmphasis_wavelet-LLH	glszm_SmallAreaLowGrayLevelEmphasis_wavelet-LLH
glszm_ZoneEntropy_wavelet-LLH	glszm_ZonePercentage_wavelet-LLH
glszm_ZoneVariance_wavelet-LLH	ngtdm_Busyness_wavelet-LLH
ngtdm_Coarseness_wavelet-LLH	ngtdm_Complexity_wavelet-LLH
ngtdm_Contrast_wavelet-LLH	ngtdm_Strength_wavelet-LLH
glcm_Autocorrelation_wavelet-LHL	glcm_JointAverage_wavelet-LHL
glcm_ClusterProminence_wavelet-LHL	glcm_ClusterShade_wavelet-LHL
glcm_ClusterTendency_wavelet-LHL	glcm_Contrast_wavelet-LHL
glcm_Correlation_wavelet-LHL	glcm_DifferenceAverage_wavelet-LHL
glcm_DifferenceEntropy_wavelet-LHL	glcm_DifferenceVariance_wavelet-LHL
glcm_JointEnergy_wavelet-LHL	glcm_JointEntropy_wavelet-LHL
glcm_Imc1_wavelet-LHL	glcm_Imc2_wavelet-LHL
glcm_Idm_wavelet-LHL	glcm_Idmn_wavelet-LHL
glcm_Id_wavelet-LHL	glcm_Idn_wavelet-LHL
glcm_InverseVariance_wavelet-LHL	glcm_MaximumProbability_wavelet-LHL
glcm_SumEntropy_wavelet-LHL	gldm_DependenceEntropy_wavelet-LHL
gldm_DependenceNonUniformity_wavelet-LHL	gldm_DependenceNonUniformityNormalized_wavelet-LHL
gldm_DependenceVariance_wavelet-LHL	gldm_GrayLevelNonUniformity_wavelet-LHL
gldm_GrayLevelVariance_wavelet-LHL	gldm_HighGrayLevelEmphasis_wavelet-LHL
gldm_LargeDependenceEmphasis_wavelet-LHL	gldm_LargeDependenceHighGrayLevelEmphasis_wavelet-LHL
gldm_LargeDependenceLowGrayLevelEmphasis_wavelet-LHL	gldm_LowGrayLevelEmphasis_wavelet-LHL
gldm_SmallDependenceEmphasis_wavelet-LHL	gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-LHL
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-LHL	glrlm_GrayLevelNonUniformity_wavelet-LHL
glrlm_GrayLevelNonUniformityNormalized_wavelet-LHL	glrlm_GrayLevelVariance_wavelet-LHL
glrlm_HighGrayLevelRunEmphasis_wavelet-LHL	glrlm_LongRunEmphasis_wavelet-LHL
glrlm_LongRunHighGrayLevelEmphasis_wavelet-LHL	glrlm_LongRunLowGrayLevelEmphasis_wavelet-LHL
glrlm_LowGrayLevelRunEmphasis_wavelet-LHL	glrlm_RunEntropy_wavelet-LHL
glrlm_RunLengthNonUniformity_wavelet-LHL	glrlm_RunLengthNonUniformityNormalized_wavelet-LHL
glrlm_RunPercentage_wavelet-LHL	glrlm_RunVariance_wavelet-LHL
glrlm_ShortRunEmphasis_wavelet-LHL	glrlm_ShortRunHighGrayLevelEmphasis_wavelet-LHL

glrlm_ShortRunLowGrayLevelEmphasis_wavelet-LHL	glszm_GrayLevelNonUniformity_wavelet-LHL
glszm_GrayLevelNonUniformityNormalized_wavelet-LHL	glszm_GrayLevelVariance_wavelet-LHL
glszm_HighGrayLevelZoneEmphasis_wavelet-LHL	glszm_LargeAreaEmphasis_wavelet-LHL
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-LHL	glszm_LargeAreaLowGrayLevelEmphasis_wavelet-LHL
glszm_LowGrayLevelZoneEmphasis_wavelet-LHL	glszm_SizeZoneNonUniformity_wavelet-LHL
glszm_SizeZoneNonUniformityNormalized_wavelet-LHL	glszm_SmallAreaEmphasis_wavelet-LHL
glszm_SmallAreaHighGrayLevelEmphasis_wavelet-LHL	glszm_SmallAreaLowGrayLevelEmphasis_wavelet-LHL
glszm_ZoneEntropy_wavelet-LHL	glszm_ZonePercentage_wavelet-LHL
glszm_ZoneVariance_wavelet-LHL	ngtdm_Busyness_wavelet-LHL
ngtdm_Coarseness_wavelet-LHL	ngtdm_Complexity_wavelet-LHL
ngtdm_Contrast_wavelet-LHL	ngtdm_Strength_wavelet-LHL
glcm_Autocorrelation_wavelet-LHH	glcm_JointAverage_wavelet-LHH
glcm_ClusterProminence_wavelet-LHH	glcm_ClusterShade_wavelet-LHH
glcm_ClusterTendency_wavelet-LHH	glcm_Contrast_wavelet-LHH
glcm_Correlation_wavelet-LHH	glcm_DifferenceAverage_wavelet-LHH
glcm_DifferenceEntropy_wavelet-LHH	glcm_DifferenceVariance_wavelet-LHH
glcm_JointEnergy_wavelet-LHH	glcm_JointEntropy_wavelet-LHH
glcm_Imc1_wavelet-LHH	glcm_Imc2_wavelet-LHH
glcm_Idm_wavelet-LHH	glcm_Idmn_wavelet-LHH
glcm_Id_wavelet-LHH	glcm_Idn_wavelet-LHH
glcm_InverseVariance_wavelet-LHH	glcm_MaximumProbability_wavelet-LHH
glcm_SumEntropy_wavelet-LHH	gldm_DependenceEntropy_wavelet-LHH
gldm_DependenceNonUniformity_wavelet-LHH	gldm_DependenceNonUniformityNormalized_wavelet-LHH
gldm_DependenceVariance_wavelet-LHH	gldm_GrayLevelNonUniformity_wavelet-LHH
gldm_GrayLevelVariance_wavelet-LHH	gldm_HighGrayLevelEmphasis_wavelet-LHH
gldm_LargeDependenceEmphasis_wavelet-LHH	gldm_LargeDependenceHighGrayLevelEmphasis_wavelet-LHH
gldm_LargeDependenceLowGrayLevelEmphasis_wavelet-LHH	gldm_LowGrayLevelEmphasis_wavelet-LHH
gldm_SmallDependenceEmphasis_wavelet-LHH	gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-LHH
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-LHH	glrlm_GrayLevelNonUniformity_wavelet-LHH
glrlm_GrayLevelNonUniformityNormalized_wavelet-LHH	glrlm_GrayLevelVariance_wavelet-LHH
glrlm_HighGrayLevelRunEmphasis_wavelet-LHH	glrlm_LongRunEmphasis_wavelet-LHH
glrlm_LongRunHighGrayLevelEmphasis_wavelet-LHH	glrlm_LongRunLowGrayLevelEmphasis_wavelet-LHH
glrlm_LowGrayLevelRunEmphasis_wavelet-LHH	glrlm_RunEntropy_wavelet-LHH
glrlm_RunLengthNonUniformity_wavelet-LHH	glrlm_RunLengthNonUniformityNormalized_wavelet-LHH
glrlm_RunPercentage_wavelet-LHH	glrlm_RunVariance_wavelet-LHH
glrlm_ShortRunEmphasis_wavelet-LHH	glrlm_ShortRunHighGrayLevelEmphasis_wavelet-LHH
glrlm_ShortRunLowGrayLevelEmphasis_wavelet-LHH	glszm_GrayLevelNonUniformity_wavelet-LHH
glszm_GrayLevelNonUniformityNormalized_wavelet-LHH	glszm_GrayLevelVariance_wavelet-LHH
glszm_HighGrayLevelZoneEmphasis_wavelet-LHH	glszm_LargeAreaEmphasis_wavelet-LHH
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-LHH	glszm_LargeAreaLowGrayLevelEmphasis_wavelet-LHH
glszm_LowGrayLevelZoneEmphasis_wavelet-LHH	glszm_SizeZoneNonUniformity_wavelet-LHH
glszm_SizeZoneNonUniformityNormalized_wavelet-LHH	glszm_SmallAreaEmphasis_wavelet-LHH
glszm_SmallAreaHighGrayLevelEmphasis_wavelet-LHH	glszm_SmallAreaLowGrayLevelEmphasis_wavelet-LHH

glszm_ZoneEntropy_wavelet-LHH	glszm_ZonePercentage_wavelet-LHH
glszm_ZoneVariance_wavelet-LHH	ngtdm_Busyness_wavelet-LHH
ngtdm_Coarseness_wavelet-LHH	ngtdm_Complexity_wavelet-LHH
ngtdm_Contrast_wavelet-LHH	ngtdm_Strength_wavelet-LHH
glcm_Autocorrelation_wavelet-HLL	glcm_JointAverage_wavelet-HLL
glcm_ClusterProminence_wavelet-HLL	glcm_ClusterShade_wavelet-HLL
glcm_ClusterTendency_wavelet-HLL	glcm_Contrast_wavelet-HLL
glcm_Correlation_wavelet-HLL	glcm_DifferenceAverage_wavelet-HLL
glcm_DifferenceEntropy_wavelet-HLL	glcm_DifferenceVariance_wavelet-HLL
glcm_JointEnergy_wavelet-HLL	glcm_JointEntropy_wavelet-HLL
glcm_Imc1_wavelet-HLL	glcm_Imc2_wavelet-HLL
glcm_Idm_wavelet-HLL	glcm_Idmn_wavelet-HLL
glcm_Id_wavelet-HLL	glcm_Idn_wavelet-HLL
glcm_InverseVariance_wavelet-HLL	glcm_MaximumProbability_wavelet-HLL
glcm_SumEntropy_wavelet-HLL	gldm_DependenceEntropy_wavelet-HLL
gldm_DependenceNonUniformity_wavelet-HLL	gldm_DependenceNonUniformityNormalized_wavelet-HLL
gldm_DependenceVariance_wavelet-HLL	gldm_GrayLevelNonUniformity_wavelet-HLL
gldm_GrayLevelVariance_wavelet-HLL	gldm_HighGrayLevelEmphasis_wavelet-HLL
gldm_LargeDependenceEmphasis_wavelet-HLL	gldm_LargeDependenceHighGrayLevelEmphasis_wavelet-HLL
gldm_LargeDependenceLowGrayLevelEmphasis_wavelet-HLL	gldm_LowGrayLevelEmphasis_wavelet-HLL
gldm_SmallDependenceEmphasis_wavelet-HLL	gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-HLL
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-HLL	glrlm_GrayLevelNonUniformity_wavelet-HLL
glrlm_GrayLevelNonUniformityNormalized_wavelet-HLL	glrlm_GrayLevelVariance_wavelet-HLL
glrlm_HighGrayLevelRunEmphasis_wavelet-HLL	glrlm_LongRunEmphasis_wavelet-HLL
glrlm_LongRunHighGrayLevelEmphasis_wavelet-HLL	glrlm_LongRunLowGrayLevelEmphasis_wavelet-HLL
glrlm_LowGrayLevelRunEmphasis_wavelet-HLL	glrlm_RunEntropy_wavelet-HLL
glrlm_RunLengthNonUniformity_wavelet-HLL	glrlm_RunLengthNonUniformityNormalized_wavelet-HLL
glrlm_RunPercentage_wavelet-HLL	glrlm_RunVariance_wavelet-HLL
glrlm_ShortRunEmphasis_wavelet-HLL	glrlm_ShortRunHighGrayLevelEmphasis_wavelet-HLL
glrlm_ShortRunLowGrayLevelEmphasis_wavelet-HLL	glszm_GrayLevelNonUniformity_wavelet-HLL
glszm_GrayLevelNonUniformityNormalized_wavelet-HLL	glszm_GrayLevelVariance_wavelet-HLL
glszm_HighGrayLevelZoneEmphasis_wavelet-HLL	glszm_LargeAreaEmphasis_wavelet-HLL
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-HLL	glszm_LargeAreaLowGrayLevelEmphasis_wavelet-HLL
glszm_LowGrayLevelZoneEmphasis_wavelet-HLL	glszm_SizeZoneNonUniformity_wavelet-HLL
glszm_SizeZoneNonUniformityNormalized_wavelet-HLL	glszm_SmallAreaEmphasis_wavelet-HLL
glszm_SmallAreaHighGrayLevelEmphasis_wavelet-HLL	glszm_SmallAreaLowGrayLevelEmphasis_wavelet-HLL
glszm_ZoneEntropy_wavelet-HLL	glszm_ZonePercentage_wavelet-HLL
glszm_ZoneVariance_wavelet-HLL	ngtdm_Busyness_wavelet-HLL
ngtdm_Coarseness_wavelet-HLL	ngtdm_Complexity_wavelet-HLL
ngtdm_Contrast_wavelet-HLL	ngtdm_Strength_wavelet-HLL
glcm_Autocorrelation_wavelet-HLH	glcm_JointAverage_wavelet-HLH
glcm_ClusterProminence_wavelet-HLH	glcm_ClusterShade_wavelet-HLH
glcm_ClusterTendency_wavelet-HLH	glcm_Contrast_wavelet-HLH

glcm_Correlation_wavelet-HLH	glcm_DifferenceAverage_wavelet-HLH
glcm_DifferenceEntropy_wavelet-HLH	glcm_DifferenceVariance_wavelet-HLH
glcm_JointEnergy_wavelet-HLH	glcm_JointEntropy_wavelet-HLH
glcm_Imc1_wavelet-HLH	glcm_Imc2_wavelet-HLH
glcm_Idm_wavelet-HLH	glcm_Idmn_wavelet-HLH
glcm_Id_wavelet-HLH	glcm_Idn_wavelet-HLH
glcm_InverseVariance_wavelet-HLH	glcm_MaximumProbability_wavelet-HLH
glcm_SumEntropy_wavelet-HLH	gldm_DependenceEntropy_wavelet-HLH
gldm_DependenceNonUniformity_wavelet-HLH	gldm_DependenceNonUniformityNormalized_wavelet-HLH
gldm_DependenceVariance_wavelet-HLH	gldm_GrayLevelNonUniformity_wavelet-HLH
gldm_GrayLevelVariance_wavelet-HLH	gldm_HighGrayLevelEmphasis_wavelet-HLH
gldm_LargeDependenceEmphasis_wavelet-HLH	gldm_LargeDependenceHighGrayLevelEmphasis_wavelet-HLH
gldm_LargeDependenceLowGrayLevelEmphasis_wavelet-HLH	gldm_LowGrayLevelEmphasis_wavelet-HLH
gldm_SmallDependenceEmphasis_wavelet-HLH	gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-HLH
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-HLH	glrlm_GrayLevelNonUniformity_wavelet-HLH
glrlm_GrayLevelNonUniformityNormalized_wavelet-HLH	glrlm_GrayLevelVariance_wavelet-HLH
glrlm_HighGrayLevelRunEmphasis_wavelet-HLH	glrlm_LongRunEmphasis_wavelet-HLH
glrlm_LongRunHighGrayLevelEmphasis_wavelet-HLH	glrlm_LongRunLowGrayLevelEmphasis_wavelet-HLH
glrlm_LowGrayLevelRunEmphasis_wavelet-HLH	glrlm_RunEntropy_wavelet-HLH
glrlm_RunLengthNonUniformity_wavelet-HLH	glrlm_RunLengthNonUniformityNormalized_wavelet-HLH
glrlm_RunPercentage_wavelet-HLH	glrlm_RunVariance_wavelet-HLH
glrlm_ShortRunEmphasis_wavelet-HLH	glrlm_ShortRunHighGrayLevelEmphasis_wavelet-HLH
glrlm_ShortRunLowGrayLevelEmphasis_wavelet-HLH	glszm_GrayLevelNonUniformity_wavelet-HLH
glszm_GrayLevelNonUniformityNormalized_wavelet-HLH	glszm_GrayLevelVariance_wavelet-HLH
glszm_HighGrayLevelZoneEmphasis_wavelet-HLH	glszm_LargeAreaEmphasis_wavelet-HLH
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-HLH	glszm_LargeAreaLowGrayLevelEmphasis_wavelet-HLH
glszm_LowGrayLevelZoneEmphasis_wavelet-HLH	glszm_SizeZoneNonUniformity_wavelet-HLH
glszm_SizeZoneNonUniformityNormalized_wavelet-HLH	glszm_SmallAreaEmphasis_wavelet-HLH
glszm_SmallAreaHighGrayLevelEmphasis_wavelet-HLH	glszm_SmallAreaLowGrayLevelEmphasis_wavelet-HLH
glszm_ZoneEntropy_wavelet-HLH	glszm_ZonePercentage_wavelet-HLH
glszm_ZoneVariance_wavelet-HLH	ngtdm_Busyness_wavelet-HLH
ngtdm_Coarseness_wavelet-HLH	ngtdm_Complexity_wavelet-HLH
ngtdm_Contrast_wavelet-HLH	ngtdm_Strength_wavelet-HLH
glcm_Autocorrelation_wavelet-HHL	glcm_JointAverage_wavelet-HHL
glcm_ClusterProminence_wavelet-HHL	glcm_ClusterShade_wavelet-HHL
glcm_ClusterTendency_wavelet-HHL	glcm_Contrast_wavelet-HHL
glcm_Correlation_wavelet-HHL	glcm_DifferenceAverage_wavelet-HHL
glcm_DifferenceEntropy_wavelet-HHL	glcm_DifferenceVariance_wavelet-HHL
glcm_JointEnergy_wavelet-HHL	glcm_JointEntropy_wavelet-HHL
glcm_Imc1_wavelet-HHL	glcm_Imc2_wavelet-HHL
glcm_Idm_wavelet-HHL	glcm_Idmn_wavelet-HHL
glcm_Id_wavelet-HHL	glcm_Idn_wavelet-HHL
glcm_InverseVariance_wavelet-HHL	glcm_MaximumProbability_wavelet-HHL

glcm_SumEntropy_wavelet-HHL	gldm_DependenceEntropy_wavelet-HHL
gldm_DependenceNonUniformity_wavelet-HHL	gldm_DependenceNonUniformityNormalized_wavelet-HHL
gldm_DependenceVariance_wavelet-HHL	gldm_GrayLevelNonUniformity_wavelet-HHL
gldm_GrayLevelVariance_wavelet-HHL	gldm_HighGrayLevelEmphasis_wavelet-HHL
gldm_LargeDependenceEmphasis_wavelet-HHL	gldm_LargeDependenceHighGrayLevelEmphasis_wavelet-HHL
gldm_LargeDependenceLowGrayLevelEmphasis_wavelet-HHL	gldm_LowGrayLevelEmphasis_wavelet-HHL
gldm_SmallDependenceEmphasis_wavelet-HHL	gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-HHL
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-HHL	glrlm_GrayLevelNonUniformity_wavelet-HHL
glrlm_GrayLevelNonUniformityNormalized_wavelet-HHL	glrlm_GrayLevelVariance_wavelet-HHL
glrlm_HighGrayLevelRunEmphasis_wavelet-HHL	glrlm_LongRunEmphasis_wavelet-HHL
glrlm_LongRunHighGrayLevelEmphasis_wavelet-HHL	glrlm_LongRunLowGrayLevelEmphasis_wavelet-HHL
glrlm_LowGrayLevelRunEmphasis_wavelet-HHL	glrlm_RunEntropy_wavelet-HHL
glrlm_RunLengthNonUniformity_wavelet-HHL	glrlm_RunLengthNonUniformityNormalized_wavelet-HHL
glrlm_RunPercentage_wavelet-HHL	glrlm_RunVariance_wavelet-HHL
glrlm_ShortRunEmphasis_wavelet-HHL	glrlm_ShortRunHighGrayLevelEmphasis_wavelet-HHL
glrlm_ShortRunLowGrayLevelEmphasis_wavelet-HHL	glszm_GrayLevelNonUniformity_wavelet-HHL
glszm_GrayLevelNonUniformityNormalized_wavelet-HHL	glszm_GrayLevelVariance_wavelet-HHL
glszm_HighGrayLevelZoneEmphasis_wavelet-HHL	glszm_LargeAreaEmphasis_wavelet-HHL
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-HHL	glszm_LargeAreaLowGrayLevelEmphasis_wavelet-HHL
glszm_LowGrayLevelZoneEmphasis_wavelet-HHL	glszm_SizeZoneNonUniformity_wavelet-HHL
glszm_SizeZoneNonUniformityNormalized_wavelet-HHL	glszm_SmallAreaEmphasis_wavelet-HHL
glszm_SmallAreaHighGrayLevelEmphasis_wavelet-HHL	glszm_SmallAreaLowGrayLevelEmphasis_wavelet-HHL
glszm_ZoneEntropy_wavelet-HHL	glszm_ZonePercentage_wavelet-HHL
glszm_ZoneVariance_wavelet-HHL	ngtdm_Busyness_wavelet-HHL
ngtdm_Coarseness_wavelet-HHL	ngtdm_Complexity_wavelet-HHL
ngtdm_Contrast_wavelet-HHL	ngtdm_Strength_wavelet-HHL
glcm_Autocorrelation_wavelet-HHH	glcm_JointAverage_wavelet-HHH
glcm_ClusterProminence_wavelet-HHH	glcm_ClusterShade_wavelet-HHH
glcm_ClusterTendency_wavelet-HHH	glcm_Contrast_wavelet-HHH
glcm_Correlation_wavelet-HHH	glcm_DifferenceAverage_wavelet-HHH
glcm_DifferenceEntropy_wavelet-HHH	glcm_DifferenceVariance_wavelet-HHH
glcm_JointEnergy_wavelet-HHH	glcm_JointEntropy_wavelet-HHH
glcm_Imc1_wavelet-HHH	glcm_Imc2_wavelet-HHH
glcm_Idm_wavelet-HHH	glcm_Idmn_wavelet-HHH
glcm_Id_wavelet-HHH	glcm_Idn_wavelet-HHH
glcm_InverseVariance_wavelet-HHH	glcm_MaximumProbability_wavelet-HHH
glcm_SumEntropy_wavelet-HHH	gldm_DependenceEntropy_wavelet-HHH
gldm_DependenceNonUniformity_wavelet-HHH	gldm_DependenceNonUniformityNormalized_wavelet-HHH
gldm_DependenceVariance_wavelet-HHH	gldm_GrayLevelNonUniformity_wavelet-HHH
gldm_GrayLevelVariance_wavelet-HHH	gldm_HighGrayLevelEmphasis_wavelet-HHH
gldm_LargeDependenceEmphasis_wavelet-HHH	gldm_LargeDependenceHighGrayLevelEmphasis_wavelet-HHH
gldm_LargeDependenceLowGrayLevelEmphasis_wavelet-HHH	gldm_LowGrayLevelEmphasis_wavelet-HHH
gldm_SmallDependenceEmphasis_wavelet-HHH	gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-HHH

gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-HHH	glrlm_GrayLevelNonUniformity_wavelet-HHH
glrlm_GrayLevelNonUniformityNormalized_wavelet-HHH	glrlm_GrayLevelVariance_wavelet-HHH
glrlm_HighGrayLevelRunEmphasis_wavelet-HHH	glrlm_LongRunEmphasis_wavelet-HHH
glrlm_LongRunHighGrayLevelEmphasis_wavelet-HHH	glrlm_LongRunLowGrayLevelEmphasis_wavelet-HHH
glrlm_LowGrayLevelRunEmphasis_wavelet-HHH	glrlm_RunEntropy_wavelet-HHH
glrlm_RunLengthNonUniformity_wavelet-HHH	glrlm_RunLengthNonUniformityNormalized_wavelet-HHH
glrlm_RunPercentage_wavelet-HHH	glrlm_RunVariance_wavelet-HHH
glrlm_ShortRunEmphasis_wavelet-HHH	glrlm_ShortRunHighGrayLevelEmphasis_wavelet-HHH
glrlm_ShortRunLowGrayLevelEmphasis_wavelet-HHH	glszm_GrayLevelNonUniformity_wavelet-HHH
glszm_GrayLevelNonUniformityNormalized_wavelet-HHH	glszm_GrayLevelVariance_wavelet-HHH
glszm_HighGrayLevelZoneEmphasis_wavelet-HHH	glszm_LargeAreaEmphasis_wavelet-HHH
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-HHH	glszm_LargeAreaLowGrayLevelEmphasis_wavelet-HHH
glszm_LowGrayLevelZoneEmphasis_wavelet-HHH	glszm_SizeZoneNonUniformity_wavelet-HHH
glszm_SizeZoneNonUniformityNormalized_wavelet-HHH	glszm_SmallAreaEmphasis_wavelet-HHH
glszm_SmallAreaHighGrayLevelEmphasis_wavelet-HHH	glszm_SmallAreaLowGrayLevelEmphasis_wavelet-HHH
glszm_ZoneEntropy_wavelet-HHH	glszm_ZonePercentage_wavelet-HHH
glszm_ZoneVariance_wavelet-HHH	ngtdm_Busyness_wavelet-HHH
ngtdm_Coarseness_wavelet-HHH	ngtdm_Complexity_wavelet-HHH
ngtdm_Contrast_wavelet-HHH	ngtdm_Strength_wavelet-HHH
firstorder_10Percentile_wavelet-LLL	firstorder_90Percentile_wavelet-LLL
firstorder_Energy_wavelet-LLL	firstorder_Entropy_wavelet-LLL
firstorder_InterquartileRange_wavelet-LLL	firstorder_Kurtosis_wavelet-LLL
firstorder_Maximum_wavelet-LLL	firstorder_MeanAbsoluteDeviation_wavelet-LLL
firstorder_Mean_wavelet-LLL	firstorder_Median_wavelet-LLL
firstorder_Minimum_wavelet-LLL	firstorder_Range_wavelet-LLL
firstorder_RobustMeanAbsoluteDeviation_wavelet-LLL	firstorder_RootMeanSquared_wavelet-LLL
firstorder_Skewness_wavelet-LLL	firstorder_TotalEnergy_wavelet-LLL
firstorder_Uniformity_wavelet-LLL	firstorder_Variance_wavelet-LLL
glcm_Autocorrelation_wavelet-LLL	glcm_JointAverage_wavelet-LLL
glcm_ClusterProminence_wavelet-LLL	glcm_ClusterShade_wavelet-LLL
glcm_ClusterTendency_wavelet-LLL	glcm_Contrast_wavelet-LLL
glcm_Correlation_wavelet-LLL	glcm_DifferenceAverage_wavelet-LLL
glcm_DifferenceEntropy_wavelet-LLL	glcm_DifferenceVariance_wavelet-LLL
glcm_JointEnergy_wavelet-LLL	glcm_JointEntropy_wavelet-LLL
glcm_Imc1_wavelet-LLL	glcm_Imc2_wavelet-LLL
glcm_Idm_wavelet-LLL	glcm_Idmn_wavelet-LLL
glcm_Id_wavelet-LLL	glcm_Idn_wavelet-LLL
glcm_InverseVariance_wavelet-LLL	glcm_MaximumProbability_wavelet-LLL
glcm_SumEntropy_wavelet-LLL	gldm_DependenceEntropy_wavelet-LLL
gldm_DependenceNonUniformity_wavelet-LLL	gldm_DependenceNonUniformityNormalized_wavelet-LLL
gldm_DependenceVariance_wavelet-LLL	gldm_GrayLevelNonUniformity_wavelet-LLL
gldm_GrayLevelVariance_wavelet-LLL	gldm_HighGrayLevelEmphasis_wavelet-LLL
gldm_LargeDependenceEmphasis_wavelet-LLL	gldm_LargeDependenceHighGrayLevelEmphasis_wavelet-LLL

gldm_LargeDependenceLowGrayLevelEmphasis_wavelet-LLL	gldm_LowGrayLevelEmphasis_wavelet-LLL
gldm_SmallDependenceEmphasis_wavelet-LLL	gldm_SmallDependenceHighGrayLevelEmphasis_wavelet-LLL
gldm_SmallDependenceLowGrayLevelEmphasis_wavelet-LLL	glrlm_GrayLevelNonUniformity_wavelet-LLL
glrlm_GrayLevelNonUniformityNormalized_wavelet-LLL	glrlm_GrayLevelVariance_wavelet-LLL
glrlm_HighGrayLevelRunEmphasis_wavelet-LLL	glrlm_LongRunEmphasis_wavelet-LLL
glrlm_LongRunHighGrayLevelEmphasis_wavelet-LLL	glrlm_LongRunLowGrayLevelEmphasis_wavelet-LLL
glrlm_LowGrayLevelRunEmphasis_wavelet-LLL	glrlm_RunEntropy_wavelet-LLL
glrlm_RunLengthNonUniformity_wavelet-LLL	glrlm_RunLengthNonUniformityNormalized_wavelet-LLL
glrlm_RunPercentage_wavelet-LLL	glrlm_RunVariance_wavelet-LLL
glrlm_ShortRunEmphasis_wavelet-LLL	glrlm_ShortRunHighGrayLevelEmphasis_wavelet-LLL
glrlm_ShortRunLowGrayLevelEmphasis_wavelet-LLL	glszm_GrayLevelNonUniformity_wavelet-LLL
glszm_GrayLevelNonUniformityNormalized_wavelet-LLL	glszm_GrayLevelVariance_wavelet-LLL
glszm_HighGrayLevelZoneEmphasis_wavelet-LLL	glszm_LargeAreaEmphasis_wavelet-LLL
glszm_LargeAreaHighGrayLevelEmphasis_wavelet-LLL	glszm_LargeAreaLowGrayLevelEmphasis_wavelet-LLL
glszm_LowGrayLevelZoneEmphasis_wavelet-LLL	glszm_SizeZoneNonUniformity_wavelet-LLL
glszm_SizeZoneNonUniformityNormalized_wavelet-LLL	glszm_SmallAreaEmphasis_wavelet-LLL
glszm_SmallAreaHighGrayLevelEmphasis_wavelet-LLL	glszm_SmallAreaLowGrayLevelEmphasis_wavelet-LLL
glszm_ZoneEntropy_wavelet-LLL	glszm_ZonePercentage_wavelet-LLL
glszm_ZoneVariance_wavelet-LLL	ngtdm_Busyness_wavelet-LLL
ngtdm_Coarseness_wavelet-LLL	ngtdm_Complexity_wavelet-LLL
ngtdm_Contrast_wavelet-LLL	ngtdm_Strength_wavelet-LLL
glcm_Autocorrelation_square	glcm_JointAverage_square
glcm_ClusterProminence_square	glcm_ClusterShade_square
glcm_ClusterTendency_square	glcm_Contrast_square
glcm_Correlation_square	glcm_DifferenceAverage_square
glcm_DifferenceEntropy_square	glcm_DifferenceVariance_square
glcm_JointEnergy_square	glcm_JointEntropy_square
glcm_Imc1_square	glcm_Imc2_square
glcm_Idm_square	glcm_Idmn_square
glcm_Id_square	glcm_Idn_square
glcm_InverseVariance_square	glcm_MaximumProbability_square
glcm_SumEntropy_square	gldm_DependenceEntropy_square
gldm_DependenceNonUniformity_square	gldm_DependenceNonUniformityNormalized_square
gldm_DependenceVariance_square	gldm_GrayLevelNonUniformity_square
gldm_GrayLevelVariance_square	gldm_HighGrayLevelEmphasis_square
gldm_LargeDependenceEmphasis_square	gldm_LargeDependenceHighGrayLevelEmphasis_square
gldm_LargeDependenceLowGrayLevelEmphasis_square	gldm_LowGrayLevelEmphasis_square
gldm_SmallDependenceEmphasis_square	gldm_SmallDependenceHighGrayLevelEmphasis_square
gldm_SmallDependenceLowGrayLevelEmphasis_square	glrlm_GrayLevelNonUniformity_square
glrlm_GrayLevelNonUniformityNormalized_square	glrlm_GrayLevelVariance_square
glrlm_HighGrayLevelRunEmphasis_square	glrlm_LongRunEmphasis_square
glrlm_LongRunHighGrayLevelEmphasis_square	glrlm_LongRunLowGrayLevelEmphasis_square
glrlm_LowGrayLevelRunEmphasis_square	glrlm_RunEntropy_square

glrlm_RunLengthNonUniformity_square	glrlm_RunLengthNonUniformityNormalized_square
glrlm_RunPercentage_square	glrlm_RunVariance_square
glrlm_ShortRunEmphasis_square	glrlm_ShortRunHighGrayLevelEmphasis_square
glrlm_ShortRunLowGrayLevelEmphasis_square	glszm_GrayLevelNonUniformity_square
glszm_GrayLevelNonUniformityNormalized_square	glszm_GrayLevelVariance_square
glszm_HighGrayLevelZoneEmphasis_square	glszm_LargeAreaEmphasis_square
glszm_LargeAreaHighGrayLevelEmphasis_square	glszm_LargeAreaLowGrayLevelEmphasis_square
glszm_LowGrayLevelZoneEmphasis_square	glszm_SizeZoneNonUniformity_square
glszm_SizeZoneNonUniformityNormalized_square	glszm_SmallAreaEmphasis_square
glszm_SmallAreaHighGrayLevelEmphasis_square	glszm_SmallAreaLowGrayLevelEmphasis_square
glszm_ZoneEntropy_square	glszm_ZonePercentage_square
glszm_ZoneVariance_square	ngtdm_Busyness_square
ngtdm_Coarseness_square	ngtdm_Complexity_square
ngtdm_Contrast_square	ngtdm_Strength_square
glcm_Autocorrelation_squareroot	glcm_JointAverage_squareroot
glcm_ClusterProminence_squareroot	glcm_ClusterShade_squareroot
glcm_ClusterTendency_squareroot	glcm_Contrast_squareroot
glcm_Correlation_squareroot	glcm_DifferenceAverage_squareroot
glcm_DifferenceEntropy_squareroot	glcm_DifferenceVariance_squareroot
glcm_JointEnergy_squareroot	glcm_JointEntropy_squareroot
glcm_Imc1_squareroot	glcm_Imc2_squareroot
glcm_Idm_squareroot	glcm_Idmn_squareroot
glcm_Id_squareroot	glcm_Idn_squareroot
glcm_InverseVariance_squareroot	glcm_MaximumProbability_squareroot
glcm_SumEntropy_squareroot	gldm_DependenceEntropy_squareroot
gldm_DependenceNonUniformity_squareroot	gldm_DependenceNonUniformityNormalized_squareroot
gldm_DependenceVariance_squareroot	gldm_GrayLevelNonUniformity_squareroot
gldm_GrayLevelVariance_squareroot	gldm_HighGrayLevelEmphasis_squareroot
gldm_LargeDependenceEmphasis_squareroot	gldm_LargeDependenceHighGrayLevelEmphasis_squareroot
gldm_LargeDependenceLowGrayLevelEmphasis_squareroot	gldm_LowGrayLevelEmphasis_squareroot
gldm_SmallDependenceEmphasis_squareroot	gldm_SmallDependenceHighGrayLevelEmphasis_squareroot
gldm_SmallDependenceLowGrayLevelEmphasis_squareroot	glrlm_GrayLevelNonUniformity_squareroot
glrlm_GrayLevelNonUniformityNormalized_squareroot	glrlm_GrayLevelVariance_squareroot
glrlm_HighGrayLevelRunEmphasis_squareroot	glrlm_LongRunEmphasis_squareroot
glrlm_LongRunHighGrayLevelEmphasis_squareroot	glrlm_LongRunLowGrayLevelEmphasis_squareroot
glrlm_LowGrayLevelRunEmphasis_squareroot	glrlm_RunEntropy_squareroot
glrlm_RunLengthNonUniformity_squareroot	glrlm_RunLengthNonUniformityNormalized_squareroot
glrlm_RunPercentage_squareroot	glrlm_RunVariance_squareroot
glrlm_ShortRunEmphasis_squareroot	glrlm_ShortRunHighGrayLevelEmphasis_squareroot
glrlm_ShortRunLowGrayLevelEmphasis_squareroot	glszm_GrayLevelNonUniformity_squareroot
glszm_GrayLevelNonUniformityNormalized_squareroot	glszm_GrayLevelVariance_squareroot
glszm_HighGrayLevelZoneEmphasis_squareroot	glszm_LargeAreaEmphasis_squareroot
glszm_LargeAreaHighGrayLevelEmphasis_squareroot	glszm_LargeAreaLowGrayLevelEmphasis_squareroot

glszm_LowGrayLevelZoneEmphasis_squareroot	glszm_SizeZoneNonUniformity_squareroot
glszm_SizeZoneNonUniformityNormalized_squareroot	glszm_SmallAreaEmphasis_squareroot
glszm_SmallAreaHighGrayLevelEmphasis_squareroot	glszm_SmallAreaLowGrayLevelEmphasis_squareroot
glszm_ZoneEntropy_squareroot	glszm_ZonePercentage_squareroot
glszm_ZoneVariance_squareroot	ngtdm_Busyness_squareroot
ngtdm_Coarseness_squareroot	ngtdm_Complexity_squareroot
ngtdm_Contrast_squareroot	ngtdm_Strength_squareroot
glcm_Autocorrelation_logarithm	glcm_JointAverage_logarithm
glcm_ClusterProminence_logarithm	glcm_ClusterShade_logarithm
glcm_ClusterTendency_logarithm	glcm_Contrast_logarithm
glcm_Correlation_logarithm	glcm_DifferenceAverage_logarithm
glcm_DifferenceEntropy_logarithm	glcm_DifferenceVariance_logarithm
glcm_JointEnergy_logarithm	glcm_JointEntropy_logarithm
glcm_Imc1_logarithm	glcm_Imc2_logarithm
glcm_Idm_logarithm	glcm_Idmn_logarithm
glcm_Id_logarithm	glcm_Idn_logarithm
glcm_InverseVariance_logarithm	glcm_MaximumProbability_logarithm
glcm_SumEntropy_logarithm	gldm_DependenceEntropy_logarithm
gldm_DependenceNonUniformity_logarithm	gldm_DependenceNonUniformityNormalized_logarithm
gldm_DependenceVariance_logarithm	gldm_GrayLevelNonUniformity_logarithm
gldm_GrayLevelVariance_logarithm	gldm_HighGrayLevelEmphasis_logarithm
gldm_LargeDependenceEmphasis_logarithm	gldm_LargeDependenceHighGrayLevelEmphasis_logarithm
gldm_LargeDependenceLowGrayLevelEmphasis_logarithm	gldm_LowGrayLevelEmphasis_logarithm
gldm_SmallDependenceEmphasis_logarithm	gldm_SmallDependenceHighGrayLevelEmphasis_logarithm
gldm_SmallDependenceLowGrayLevelEmphasis_logarithm	glrlm_GrayLevelNonUniformity_logarithm
glrlm_GrayLevelNonUniformityNormalized_logarithm	glrlm_GrayLevelVariance_logarithm
glrlm_HighGrayLevelRunEmphasis_logarithm	glrlm_LongRunEmphasis_logarithm
glrlm_LongRunHighGrayLevelEmphasis_logarithm	glrlm_LongRunLowGrayLevelEmphasis_logarithm
glrlm_LowGrayLevelRunEmphasis_logarithm	glrlm_RunEntropy_logarithm
glrlm_RunLengthNonUniformity_logarithm	glrlm_RunLengthNonUniformityNormalized_logarithm
glrlm_RunPercentage_logarithm	glrlm_RunVariance_logarithm
glrlm_ShortRunEmphasis_logarithm	glrlm_ShortRunHighGrayLevelEmphasis_logarithm
glrlm_ShortRunLowGrayLevelEmphasis_logarithm	glszm_GrayLevelNonUniformity_logarithm
glszm_GrayLevelNonUniformityNormalized_logarithm	glszm_GrayLevelVariance_logarithm
glszm_HighGrayLevelZoneEmphasis_logarithm	glszm_LargeAreaEmphasis_logarithm
glszm_LargeAreaHighGrayLevelEmphasis_logarithm	glszm_LargeAreaLowGrayLevelEmphasis_logarithm
glszm_LowGrayLevelZoneEmphasis_logarithm	glszm_SizeZoneNonUniformity_logarithm
glszm_SizeZoneNonUniformityNormalized_logarithm	glszm_SmallAreaEmphasis_logarithm
glszm_SmallAreaHighGrayLevelEmphasis_logarithm	glszm_SmallAreaLowGrayLevelEmphasis_logarithm
glszm_ZoneEntropy_logarithm	glszm_ZonePercentage_logarithm
glszm_ZoneVariance_logarithm	ngtdm_Busyness_logarithm
ngtdm_Coarseness_logarithm	ngtdm_Complexity_logarithm
ngtdm_Contrast_logarithm	ngtdm_Strength_logarithm

firstorder_10Percentile_exponential	firstorder_90Percentile_exponential
firstorder_Energy_exponential	firstorder_Entropy_exponential
firstorder_InterquartileRange_exponential	firstorder_Kurtosis_exponential
firstorder_Maximum_exponential	firstorder_MeanAbsoluteDeviation_exponential
firstorder_Mean_exponential	firstorder_Median_exponential
firstorder_Minimum_exponential	firstorder_Range_exponential
firstorder_RobustMeanAbsoluteDeviation_exponential	firstorder_RootMeanSquared_exponential
firstorder_Skewness_exponential	firstorder_TotalEnergy_exponential
firstorder_Uniformity_exponential	firstorder_Variance_exponential
glcm_Autocorrelation_exponential	glcm_JointAverage_exponential
glcm_ClusterProminence_exponential	glcm_ClusterShade_exponential
glcm_ClusterTendency_exponential	glcm_Contrast_exponential
glcm_Correlation_exponential	glcm_DifferenceAverage_exponential
glcm_DifferenceEntropy_exponential	glcm_DifferenceVariance_exponential
glcm_JointEnergy_exponential	glcm_JointEntropy_exponential
glcm_Imc1_exponential	glcm_Imc2_exponential
glcm_Idm_exponential	glcm_Idmn_exponential
glcm_Id_exponential	glcm_Idn_exponential
glcm_InverseVariance_exponential	glcm_MaximumProbability_exponential
glcm_SumEntropy_exponential	gldm_DependenceEntropy_exponential
gldm_DependenceNonUniformity_exponential	gldm_DependenceNonUniformityNormalized_exponential
gldm_DependenceVariance_exponential	gldm_GrayLevelNonUniformity_exponential
gldm_GrayLevelVariance_exponential	gldm_HighGrayLevelEmphasis_exponential
gldm_LargeDependenceEmphasis_exponential	gldm_LargeDependenceHighGrayLevelEmphasis_exponential
gldm_LargeDependenceLowGrayLevelEmphasis_exponential	gldm_LowGrayLevelEmphasis_exponential
gldm_SmallDependenceEmphasis_exponential	gldm_SmallDependenceHighGrayLevelEmphasis_exponential
gldm_SmallDependenceLowGrayLevelEmphasis_exponential	glrlm_GrayLevelNonUniformity_exponential
glrlm_GrayLevelNonUniformityNormalized_exponential	glrlm_GrayLevelVariance_exponential
glrlm_HighGrayLevelRunEmphasis_exponential	glrlm_LongRunEmphasis_exponential
glrlm_LongRunHighGrayLevelEmphasis_exponential	glrlm_LongRunLowGrayLevelEmphasis_exponential
glrlm_LowGrayLevelRunEmphasis_exponential	glrlm_RunEntropy_exponential
glrlm_RunLengthNonUniformity_exponential	glrlm_RunLengthNonUniformityNormalized_exponential
glrlm_RunPercentage_exponential	glrlm_RunVariance_exponential
glrlm_ShortRunEmphasis_exponential	glrlm_ShortRunHighGrayLevelEmphasis_exponential
glrlm_ShortRunLowGrayLevelEmphasis_exponential	glszm_GrayLevelNonUniformity_exponential
glszm_GrayLevelNonUniformityNormalized_exponential	glszm_GrayLevelVariance_exponential
glszm_HighGrayLevelZoneEmphasis_exponential	glszm_LargeAreaEmphasis_exponential
glszm_LargeAreaHighGrayLevelEmphasis_exponential	glszm_LargeAreaLowGrayLevelEmphasis_exponential
glszm_LowGrayLevelZoneEmphasis_exponential	glszm_SizeZoneNonUniformity_exponential
glszm_SizeZoneNonUniformityNormalized_exponential	glszm_SmallAreaEmphasis_exponential
glszm_SmallAreaHighGrayLevelEmphasis_exponential	glszm_SmallAreaLowGrayLevelEmphasis_exponential
glszm_ZoneEntropy_exponential	glszm_ZonePercentage_exponential
glszm_ZoneVariance_exponential	ngtdm_Busyness_exponential

ngtdm_Coarseness_exponential	ngtdm_Complexity_exponential
ngtdm_Contrast_exponential	ngtdm_Strength_exponential