**Supplementary Materials**

**Supplementary Table 1**. Index of available patients for experiments in LIDC-IDRI

|  |  |  |  |
| --- | --- | --- | --- |
| LIDC-IDRI-0068 | LIDC-IDRI-0072 | LIDC-IDRI-0088 | LIDC-IDRI-0090 |
| LIDC-IDRI-0091 | LIDC-IDRI-0118 | LIDC-IDRI-0124 | LIDC-IDRI-0129 |
| LIDC-IDRI-0135 | LIDC-IDRI-0137 | LIDC-IDRI-0138 | LIDC-IDRI-0149 |
| LIDC-IDRI-0159 | LIDC-IDRI-0161 | LIDC-IDRI-0162 | LIDC-IDRI-0163 |
| LIDC-IDRI-0164 | LIDC-IDRI-0165 | LIDC-IDRI-0166 | LIDC-IDRI-0167 |
| LIDC-IDRI-0168 | LIDC-IDRI-0169 | LIDC-IDRI-0171 | LIDC-IDRI-0175 |
| LIDC-IDRI-0179 | LIDC-IDRI-0180 | LIDC-IDRI-0181 | LIDC-IDRI-0182 |
| LIDC-IDRI-0183 | LIDC-IDRI-0184 | LIDC-IDRI-0185 | LIDC-IDRI-0186 |
| LIDC-IDRI-0187 | LIDC-IDRI-0188 | LIDC-IDRI-0190 | LIDC-IDRI-0191 |
| LIDC-IDRI-0192 | LIDC-IDRI-0193 | LIDC-IDRI-0194 | LIDC-IDRI-0200 |
| LIDC-IDRI-0203 | LIDC-IDRI-0207 | LIDC-IDRI-0210 | LIDC-IDRI-0220 |
| LIDC-IDRI-0223 | LIDC-IDRI-0233 | LIDC-IDRI-0234 | LIDC-IDRI-0236 |
| LIDC-IDRI-0237 | LIDC-IDRI-0242 | LIDC-IDRI-0244 | LIDC-IDRI-0246 |
| LIDC-IDRI-0247 | LIDC-IDRI-0249 | LIDC-IDRI-0250 | LIDC-IDRI-0252 |
| LIDC-IDRI-0254 | LIDC-IDRI-0255 | LIDC-IDRI-0256 | LIDC-IDRI-0257 |
| LIDC-IDRI-0258 | LIDC-IDRI-0260 | LIDC-IDRI-0264 | LIDC-IDRI-0265 |
| LIDC-IDRI-0266 | LIDC-IDRI-0267 | LIDC-IDRI-0271 | LIDC-IDRI-0273 |
| LIDC-IDRI-0274 | LIDC-IDRI-0276 | LIDC-IDRI-0277 | LIDC-IDRI-0283 |
| LIDC-IDRI-0285 | LIDC-IDRI-0286 | LIDC-IDRI-0289 | LIDC-IDRI-0290 |
| LIDC-IDRI-0314 | LIDC-IDRI-0325 | LIDC-IDRI-0332 | LIDC-IDRI-0377 |
| LIDC-IDRI-0385 | LIDC-IDRI-0399 | LIDC-IDRI-0405 | LIDC-IDRI-0454 |
| LIDC-IDRI-0470 | LIDC-IDRI-0493 | LIDC-IDRI-0510 | LIDC-IDRI-0543 |
| LIDC-IDRI-0559 | LIDC-IDRI-0562 | LIDC-IDRI-0568 | LIDC-IDRI-0580 |
| LIDC-IDRI-0610 | LIDC-IDRI-0624 | LIDC-IDRI-0766 | LIDC-IDRI-0771 |
| LIDC-IDRI-0772 | LIDC-IDRI-0811 | LIDC-IDRI-0875 | LIDC-IDRI-0893 |
| LIDC-IDRI-0905 | LIDC-IDRI-0921 | LIDC-IDRI-0924 | LIDC-IDRI-0939 |
| LIDC-IDRI-0965 | LIDC-IDRI-0994 | LIDC-IDRI-1002 | LIDC-IDRI-1004 |
| LIDC-IDRI-1011 | LIDC-IDRI-0211 |  |  |

**Supplementary Table 2.** Parameters of params.yaml for radiomics extraction

|  |  |
| --- | --- |
| Parameters | Value |
| binWidth | 25 |
| interpolator | 'sitkBSpline' |
| resampledPixelSpacing | [2, 2, 2] |
| padDistance | 10 |
| resegmentRange | [-3, 3] |
| resegmentMode | sigma |
| voxelArrayShift | 1000 |
| label | 1 |

**Supplementary Table 3**. Radiomics features calculated by using Pyradiomics

|  |  |  |  |
| --- | --- | --- | --- |
| Index | Features | Index | Features |
| 1 | original\_shape\_Elongation | 53 | original\_shape\_Flatness |
| 2 | original\_shape\_LeastAxisLength | 54 | original\_shape\_MajorAxisLength |
| 3 | original\_shape\_Maximum2DDiameterColumn | 55 | original\_shape\_Maximum2DDiameterRow |
| 4 | original\_shape\_Maximum2DDiameterSlice | 56 | original\_shape\_MeshVolume |
| 5 | original\_shape\_Maximum3DDiameter | 57 | original\_shape\_MinorAxisLength |
| 6 | original\_shape\_Sphericity | 58 | original\_shape\_SurfaceArea |
| 7 | original\_firstorder\_10Percentile | 59 | original\_glrlm\_LongRunLowGrayLevelEmphasis |
| 8 | original\_firstorder\_90Percentile | 60 | original\_glrlm\_LowGrayLevelRunEmphasis |
| 9 | original\_firstorder\_Energy | 61 | original\_glrlm\_RunEntropy |
| 10 | original\_firstorder\_Entropy | 62 | original\_glrlm\_RunLengthNonUniformity |
| 11 | original\_firstorder\_InterquartileRange | 63 | original\_glrlm\_RunLengthNonUniformityNormalized |
| 12 | original\_firstorder\_Kurtosis | 64 | original\_glrlm\_RunPercentage |
| 13 | original\_firstorder\_Maximum | 65 | original\_glrlm\_RunVariance |
| 14 | original\_firstorder\_Mean | 66 | original\_glrlm\_ShortRunEmphasis |
| 15 | original\_firstorder\_MeanAbsoluteDeviation | 67 | original\_glrlm\_ShortRunHighGrayLevelEmphasis |
| 16 | original\_firstorder\_Median | 68 | original\_glrlm\_ShortRunLowGrayLevelEmphasis |
| 17 | original\_firstorder\_Minimum | 69 | original\_glszm\_GrayLevelNonUniformity |
| 18 | original\_firstorder\_Range | 70 | original\_glszm\_GrayLevelNonUniformityNormalized |
| 19 | original\_firstorder\_RobustMeanAbsoluteDeviation | 71 | original\_glszm\_GrayLevelVariance |
| 20 | original\_firstorder\_RootMeanSquared | 72 | original\_glszm\_HighGrayLevelZoneEmphasis |
| 21 | original\_firstorder\_Skewness | 73 | original\_glszm\_LargeAreaEmphasis |
| 22 | original\_firstorder\_Uniformity | 74 | original\_glszm\_LargeAreaHighGrayLevelEmphasis |
| 23 | original\_firstorder\_Variance | 75 | original\_glszm\_LargeAreaLowGrayLevelEmphasis |
| 24 | original\_glcm\_Autocorrelation | 76 | original\_glszm\_LowGrayLevelZoneEmphasis |
| 25 | original\_glcm\_JointAverage | 77 | original\_glszm\_SizeZoneNonUniformity |
| 26 | original\_glcm\_ClusterProminence | 78 | original\_glszm\_SizeZoneNonUniformityNormalized |
| 27 | original\_glcm\_ClusterShade | 79 | original\_glszm\_SmallAreaEmphasis |
| 28 | original\_glcm\_ClusterTendency | 80 | original\_glszm\_SmallAreaHighGrayLevelEmphasis |
| 29 | original\_glcm\_Contrast | 81 | original\_glszm\_SmallAreaLowGrayLevelEmphasis |
| 30 | original\_glcm\_Correlation | 82 | original\_glszm\_ZoneEntropy |
| 31 | original\_glcm\_DifferenceAverage | 83 | original\_glszm\_ZonePercentage |
| 32 | original\_glcm\_DifferenceEntropy | 84 | original\_glszm\_ZoneVariance |
| 33 | original\_glcm\_DifferenceVariance | 85 | original\_gldm\_DependenceEntropy |
| 34 | original\_glcm\_JointEnergy | 86 | original\_gldm\_DependenceNonUniformity |
| 35 | original\_glcm\_JointEntropy | 87 | original\_gldm\_DependenceNonUniformityNormalized |
| 36 | original\_glcm\_Imc1 | 88 | original\_gldm\_DependenceVariance |
| 37 | original\_glcm\_Imc2 | 89 | original\_gldm\_GrayLevelNonUniformity |
| 38 | original\_glcm\_Idm | 90 | original\_gldm\_GrayLevelVariance |
| 39 | original\_glcm\_Idmn | 91 | original\_gldm\_HighGrayLevelEmphasis |
| 40 | original\_glcm\_Id | 92 | original\_gldm\_LargeDependenceEmphasis |
| 41 | original\_glcm\_Idn | 93 | original\_gldm\_LargeDependenceHighGrayLevelEmphasis |
| 42 | original\_glcm\_InverseVariance | 94 | original\_gldm\_LargeDependenceLowGrayLevelEmphasis |
| 43 | original\_glcm\_MaximumProbability | 95 | original\_gldm\_LowGrayLevelEmphasis |
| 44 | original\_glcm\_SumEntropy | 96 | original\_gldm\_SmallDependenceEmphasis |
| 45 | original\_glcm\_SumSquares | 97 | original\_gldm\_SmallDependenceHighGrayLevelEmphasis |
| 46 | original\_glrlm\_GrayLevelNonUniformity | 98 | original\_gldm\_SmallDependenceLowGrayLevelEmphasis |
| 47 | original\_glrlm\_GrayLevelNonUniformityNormalized | 99 | original\_ngtdm\_Busyness |
| 48 | original\_glrlm\_GrayLevelVariance | 100 | original\_ngtdm\_Coarseness |
| 49 | original\_glrlm\_HighGrayLevelRunEmphasis | 101 | original\_ngtdm\_Complexity |
| 50 | original\_glrlm\_LongRunEmphasis | 102 | original\_ngtdm\_Contrast |
| 51 | original\_glrlm\_LongRunHighGrayLevelEmphasis | 103 | original\_ngtdm\_Strength |
| 52 | original\_shape\_SurfaceVolumeRatio |  |  |

**Supplementary Table 4.** Summary of experimental network

|  |  |  |  |
| --- | --- | --- | --- |
| Layer | Type | Input Size | Output size |
| 1 | Input | -- | 103\*12 |
| 2 | FC + LReLU(Drop=0.5) | 103\*12 | 256\*12 |
| 3 | FC + LReLU(Drop=0.5) | 256\*12 | 128\*12 |
| 4 | FC + LReLU(Drop=0.5) | 128\*12 | 64\*12 |
| 5 | Attention Layer | 64\*12 | 64\*1 |
| 6 | FC+ LReLU | 64\*1 | 32\*1 |
| 7 | Output+ softmax | 32\*1 | 1\*1 |

FC means Full connected layer; LReLU means the activation function of this layer is LReLU; Drop means dropout rate of this layer is 0.5; softmax means the activation function of output layer is softmax.

Chart

Description automatically generated

Supplementary Figure 1. Calibration plots and histogram of output probabilities, 10 running results were used in calibration analysis. (Plots of mi-graph and miVLAD absent due to the absent of output probabilities from source code)