10.1148/radiol.2018180910

# Appendix E1

## Section 1: CT Image Acquisition Parameters

### Site 1:

Nonenhanced chest CT was acquired using a multidetector row CT system (in majority cases the manufacturer was either Siemens [Sygno, Siemens AG, Erlangen, Germany] or Philips [iCT, Philips Medical Systems, Cleveland, Ohio]). The acquisition parameters were as follows: 120–140 kVp exposure; 1.2 pitch and matrix, 512 × 512.

### Site 2:

All patients underwent nonenhanced CT of the chest performed by using 16/64 slice CT system (Siemens [SOMATOM Sensation], General Electric [Lightspeed16, GE Medical Systems, Waukesha, Wisconsin], or Toshiba [Aquilion, Tochigi-ken, Japan]). The acquisition parameters were as follows: 120 kVp exposure; 1 pitch and image matrix, 512 × 512.

Precaution was taken to equally distribute cases in training and test set and account for variability in slice thickness and reconstruction kernel, as shown in Table E1.

## Section 2: Peri-nodular Mask

In the cohort of 290 CT scans, the pixel sizes ranged from 0.42 × 0.42 mm to 0.97 × 0.97 mm with an average size of 0.73 × 0.73 mm (see Fig E1).

The peri-nodular mask was dilated a distance of 30 mm by taking into account the individual pixel size of each case. The number of pixels dilated in each peri-nodular mask were calculated as follows:

$$\#\,pixels\,dilated = \frac{30}{pixel\,size\ (in\,mm)}$$

During this peri-nodular texture analysis of the lung parenchyma, care was taken to threshold the Hounsfield units (HU) of the CT scan, to remove air (<-900 HU) and mediastinal muscle pixels (>-100 HU). To avoid any edge artifacts that might arise during feature extraction, the thresholded ‘dead’ pixels of the CT scan were substituted by using an averaging filter across its 9 × 9 neighborhood.

## Section 3: Texture Features Extracted

The following texture features were extracted from the intra-and peri-nodular regions:

• Haralick (13 descriptors): Quantifies the spatial gray-level co-occurrence matrix (GLCM) within local neighborhoods around each pixel in an image, stored in the form of matrices (36).

• Gabor (25 descriptors): Considers oriented textures via changes in direction and scale to capture microarchitectures (37). Each descriptor quantifies response to a given Gabor filter at a specific frequency (f = 0, 2, 4, 8, 16, 32) and orientation ($\theta = \pi/8, \pi/4, 3\pi/8, \pi/2, 3\pi/4$).

• Laws energy (25 descriptors): 5 × 5 masks that are symmetric or antisymmetric to extract level (L), edge (E), spot (S), wave (W), and ripple (R) patterns on an image (38). Convolution of these masks with every image resulted in a total of 25 distinct Laws features for each image for every CT sequence.

## Section 4: Interreader Segmentation Variability

A randomly selected cohort of 60 cases from the training set (30 adenocarcinomas and 30 granulomas) was assessed for interreader variability of manual segmentation using the independent and separate measurements of reader 1 (P.R, a cardiothoracic radiologist with 10 years of experience) and reader 2 (K.B, a physician with 3 years of experience in cardiothoracic radiology research). These annotations were obtained in a single readout session.

The Dice Similarity Coefficient (DSC) score is a statistical measure that validates the performance of both readers and evaluates the reproducibility of their manual segmentations (39). The DSC score range is calculated between 0 to 1, where 0 indicates no spatial overlap between two sets of manual segmentation results and 1 represents a complete overlap. A DSC score of 0.81 was obtained between the two readers in our experiment, which represents a substantial agreement and reproducibility between the annotated regions of interest as previously demonstrated by Zou et al (40).

The impact of interreader variability of manual annotations on the most discriminating intranodular and peri-nodular radiomic features (listed in Table 3) was assessed using the absolute value of the percent coefficient of variation (%COV). %COV is a standardized metric to assess the extent of dispersion with respect to the mean of a given population (41). It is often expressed as a percentage, where a lower value indicates less variability in data and a higher percentage value indicates more variability in the given population.

$$\%\text{COV} = abs\left(\frac{\text{Standard Deviation}}{\text{Mean}} \times 100\right).$$

Figure E2 below shows the %COV across 12 radiomic features (as listed in experiment 1 and experiment2, Table 2 from the main paper) extracted from the largest slice on the nodule for Reader 1 and Reader 2 segmentations. Across the same population, we found that the average %COV for the top radiomic features from the intranodular and peri-nodular region for Reader 1 and Reader 2 was 9.18 and 13.56 respectively. These low %COV strongly suggest that our top performing radiomic features are largely resilient to variations as a result of reader segmentations.

## Section 5: Intranodular Radiomic Classifier

To determine intranodular imaging features that best discriminated adenocarcinomas from granulomas in CT, *t* test selection was implemented to pick the top 12 features with the lowest *P* value. In a supervised setting, these top features were used to train Linear Discriminant Analysis (LDA), Quadratic Discriminant Analysis (QDA), Support Vector Machines (SVM-linear and RBF kernels) and Random Forest classifiers. The classifiers were then validated on an independent set ($n = 145$) and the associated performance was assessed using the Area Under the Curve (AUC).

The top 12 radiomic feature set obtained from the training set after via the *t* test based feature selection are listed in Table E5. Gabor features were most frequently represented, occupying ten of the top 12 features (Figure E3). Using these top twelve features, highest AUC on the test set was obtained using for the SVM classifier with a linear kernel. This classifier yielded an AUC of 0.75, accuracy of 0.65, sensitivity of 0.75 and specificity of 0.61 at the operating point on the ROC curve (see Figure E6). Table E7 lists the AUCs for the other machine learning classifiers.

## Section 6: Deep Learning Model

As seen in Figure E7, our convolutional neural network architecture, consisted of two sets of convolutional, activation (ReLU), and pooling layers, followed by a fully-connected layer, activation, another fully-connected, and finally a softmax classifier (Table E6). A simple patch-based classification approach was implemented where the softmax classifier returned a probability of each patch belonging to either of the two classes of interest (adenocarcinoma or granuloma). The model was trained over 100 epochs after which the weights were locked down. The performance metric across the training runs are shown in Figure E8. The learned weights were then used on the independent validation set of 145 studies, and the predicted probabilities were utilized to generate the receiver operating characteristic curve.

Using the same training and testing sets as in the previous experiments, with LeNet model accuracy approaches 1 as number of epochs increases, and plateaus over 80 epochs (see Figure E8). The weights after 100 epochs were locked down and used on the test set. The testing AUC was computed to be 0.76. At the operating point, the corresponding accuracy was computed to be 0.737.

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## Table E1: CT Image Acquisition Parameter Distribution over Training Set and Independent Test Validation

| | Training Set | | | Independent Validation Set | | |
|---|---|---|---|---|---|---|
| | **Adenocarcinoma** | **Granuloma** | **Total** | **Adenocarcinoma** | **Granuloma** | **Total** |
| Patients | 73 | 72 | **145** | 72 | 73 | **145** |
| **Scanner Type** | | | | | | |
| GE Medical Systems | 0 | 3 | 3 | 0 | 1 | 1 |
| Siemens | 44 | 49 | 93 | 53 | 32 | 85 |
| Philips | 28 | 18 | 46 | 19 | 39 | 58 |
| Toshiba | 1 | 2 | 3 | 0 | 1 | 1 |
| **Slice Thickness (mm)** | | | | | | |
| 1 | 8 | 5 | 13 | 9 | 1 | 10 |
| 1.5 | 0 | 1 | 1 | 0 | 0 | 0 |
| 2 | 42 | 38 | 80 | 40 | 54 | 94 |
| 2.5 | 0 | 0 | 0 | 0 | 1 | 1 |
| 3 | 10 | 15 | 25 | 12 | 4 | 16 |
| 3.2 | 9 | 0 | 6 | 0 | 0 | 0 |
| 3.35 | 0 | 1 | 1 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 1 | 1 |
| 5 | 5 | 11 | 16 | 10 | 12 | 22 |
| 6 | 1 | 1 | 2 | 0 | 0 | 0 |
| 6.5 | 1 | 0 | 1 | 1 | 0 | 1 |
| **Reconstruction Kernel** | | | | | | |
| *GE Medical Systems* | | | | | | |
| Standard | 0 | 1 | 1 | 0 | 1 | 1 |
| *SIEMENS* | | | | | | |
| B20f | 0 | 1 | 1 | 0 | 1 | 1 |
| BZOs | 0 | 1 | 1 | 0 | 0 | 1 |
| B30f | 10 | 8 | 18 | 5 | 6 | 11 |
| B30S | 0 | 5 | 5 | 1 | 2 | 3 |
| B3Lf | 9 | 4 | 13 | 13 | 2 | 15 |
| B31s | 0 | 1 | 1 | 1 | 1 | 2 |
| B35f | 7 | 8 | 15 | 12 | 0 | 12 |
| B35s | 2 | 2 | 4 | 0 | 0 | 0 |
| B40f | 2 | 2 | 4 | 5 | 0 | 5 |
| B40s | 0 | 1 | 1 | 0 | 0 | 0 |
| B4Lf | 5 | 11 | 16 | 8 | 8 | 16 |
| B41s | 0 | 0 | 0 | 0 | 1 | 1 |
| B50f | 2 | 3 | 5 | 2 | 8 | 10 |
| B50S | 1 | 0 | 1 | 0 | 0 | 0 |
| B60f | 3 | 1 | 4 | 1 | 2 | 3 |
| B70f | 1 | 3 | 4 | 0 | 0 | 0 |
| B70s | 1 | 0 | 1 | 0 | 1 | 1 |
| T20S | 1 | 0 | 1 | 5 | 0 | 5 |
| *PHILIPS* | | | | | | |
| A | 1 | 0 | 1 | 0 | 2 | 2 |
| B | 8 | 4 | 12 | 5 | 16 | 21 |
| C | 6 | 5 | 11 | 5 | 8 | 13 |

| | | | | | | |
|---|---|---|---|---|---|---|
| D | 9 | 2 | 11 | 2 | 0 | 2 |
| E | 0 | 1 | 1 | 1 | 0 | 1 |
| L | 3 | 6 | 9 | 5 | 11 | 16 |
| YA | 1 | 0 | 1 | 0 | 2 | 2 |
| YB | 0 | 0 | 0 | 1 | 0 | 1 |
| *TOSHIBA* | | | | | | |
| FC02 | 0 | 1 | 1 | 0 | 0 | 0 |
| FCO8 | 0 | 0 | 0 | 0 | 1 | 1 |
| FC10 | 0 | 1 | 1 | 0 | 0 | 0 |
| FC52 | 1 | 0 | 1 | 0 | 0 | 0 |

## Table E2: Radiomic Features and Their Corresponding Pathophysiology

| **Feature category** | **Descriptor** | **Intuitive Description** | **Relevance to SPN pathophysiology** |
|---|---|---|---|
| Haralick features (Repeated occurrence of gray level configuration in the texture represented via the gray-level co-occurrence matrix (GLCM), which varies rapidly with distance in fine textures and slowly in large textures) | Inverse Difference Moment (IDM) | IDM is a reflection of the presence or absence of uniformity, and hence is a measure of local regions of homogeneity<br>High IDM: Higher presence of locally uniform windows in GLCM<br>Low IDM: Higher presence of locally heterogeneous windows in GLCM | Captures underlying heterogeneity within the lesion. |
| | Correlation | Quantifies the linear patterns in an image based on the distance parameter. | Increased presence of linear patterns yield higher correlation values, lack of image linearity yield lower correlation values |
| | Sum Entropy | Measure of GLCM relationship to distribution of intensity with respect to entropy. Entropy is the measure of disorder. | Higher entropy is indicative of more chaotic arrangement in areas of high viable cell population |
| | Sum Variance | Measure of GLCM relationship to distribution of intensity with respect to variance. High sum variance: greater standard deviation of sum average. Low sum variance: low standard deviation of sum average | Possibly accounting for greater variation of scattered atypia and local accumulation of mitotic processes as observed on histopathology. |
| Laws features | E5, L5, S5, R5 (combination in both *X* and *Y* directions) | E-Edges<br>L-Level<br>S-Spots<br>R-Ripples | Accounting for characteristic qualitative appearance of ROIs (for e.g.: ring enhancement patterns, diffused tumor calcification or patchy appearances) |
| Gabor | Quantifies response to a given Gabor filter at a specific frequency and orientation | These filters comprise of various scales and orientations to locally characterize intensity variations. | Possibly capturing changes in tumor microarchitecture. And quantifying tumor lymphangiogenesis in adenocarcinomas and lymphohistiocytic inflammatory response in granulomas. |

## Table E3: List of Shape Features

| **Features** | **Description** |
|---|---|
| Size | Including Width, Height, Depth of bounding box |
| Area | from 2D slices of each nodule |
| Perimeter | from 2D slices of each nodule |
| Eccentricity | foci of the ellipse and to major axis length |
| Extend | ratio of pixels in the region to pixels in the total bounding box |
| Compactness | ratio of the perimeter squared to the product of $4\pi$ and area |
| Radial distance | distances from center of each slice to contour points |
| Roughness | perimeter of slices divided by convex perimeter |

| | |
|---|---|
| Elongation | from major and minor axis |
| Convexity | from convex hull |
| Equivalent Diameter | Diameter of circle with same area of slices |
| Sphericity | 3D compactness |

## Table E4: Human Machine Comparison

| Patient ID | Ground Truth | Reader 1 Decision | Reader 2 Decision | Machine Probability to be granuloma | Machine Probability to be adenocarcinoma | Machine Decision |
|---|---|---|---|---|---|---|
| 1 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.15698702 | 0.84301298 | Adenocarcinoma |
| 2 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.451797943 | 0.548202057 | Adenocarcinoma |
| 3 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.428191871 | 0.571808129 | Adenocarcinoma |
| 4 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.217179742 | 0.782820258 | Adenocarcinoma |
| 5 | Adenocarcinoma | Granuloma | Granuloma | 0.170487314 | 0.829512686 | Adenocarcinoma |
| 6 | Adenocarcinoma | Granuloma | Granuloma | 0.310319347 | 0.689680653 | Adenocarcinoma |
| 7 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.594666818 | 0.405333182 | Granuloma |
| 8 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.398721827 | 0.601278173 | Adenocarcinoma |
| 9 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.182128699 | 0.817871301 | Adenocarcinoma |
| 10 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.457522726 | 0.542477274 | Adenocarcinoma |
| 11 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.225932417 | 0.774067583 | Adenocarcinoma |
| 12 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.546704053 | 0.453295947 | Granuloma |
| 13 | Adenocarcinoma | Granuloma | Granuloma | 0.627371556 | 0.372628444 | Granuloma |
| 14 | Adenocarcinoma | Granuloma | Granuloma | 0.44143471 | 0.55856529 | Adenocarcinoma |
| 15 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.487733583 | 0.512266417 | Adenocarcinoma |
| 16 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.258908979 | 0.741091021 | Adenocarcinoma |
| 17 | Adenocarcinoma | Granuloma | Granuloma | 0.343601119 | 0.656398881 | Adenocarcinoma |
| 18 | Adenocarcinoma | Granuloma | Granuloma | 0.388671284 | 0.611328716 | Adenocarcinoma |
| 19 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.459183649 | 0.540816351 | Adenocarcinoma |
| 20 | Adenocarcinoma | Granuloma | Granuloma | 0.339556798 | 0.660443202 | Adenocarcinoma |
| 21 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.697577049 | 0.302422951 | Granuloma |
| 22 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.592326747 | 0.407673253 | Granuloma |
| 23 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.467184248 | 0.532815752 | Adenocarcinoma |
| 24 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.327260692 | 0.672739308 | Adenocarcinoma |
| 25 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.421689026 | 0.578310974 | Adenocarcinoma |
| 26 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.508677261 | 0.491322739 | Granuloma |
| 27 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.279868522 | 0.720131478 | Adenocarcinoma |
| 28 | Adenocarcinoma | Granuloma | Adenocarcinoma | 0.708279217 | 0.291720783 | Granuloma |
| 29 | Adenocarcinoma | Granuloma | Granuloma | 0.412411045 | 0.587588955 | Adenocarcinoma |
| 30 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.435403834 | 0.564596166 | Adenocarcinoma |
| 31 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.500569409 | 0.499430591 | Granuloma |
| 32 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.262578169 | 0.737421831 | Adenocarcinoma |
| 33 | Adenocarcinoma | Granuloma | Granuloma | 0.533491209 | 0.466508791 | Granuloma |
| 34 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.66020064 | 0.33979936 | Granuloma |
| 35 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.529480295 | 0.470519705 | Granuloma |
| 36 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.46269746 | 0.53730254 | Adenocarcinoma |
| 37 | Adenocarcinoma | Granuloma | Adenocarcinoma | 0.22140399 | 0.77859601 | Adenocarcinoma |
| 38 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.488864055 | 0.511135945 | Adenocarcinoma |
| 39 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.641295672 | 0.358704328 | Granuloma |
| 40 | Adenocarcinoma | Granuloma | Granuloma | 0.277193319 | 0.722806681 | Adenocarcinoma |
| 41 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.219110513 | 0.780889487 | Adenocarcinoma |

| | | | | | | |
|---|---|---|---|---|---|---|
| 42 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.13796198 | 0.86203802 | Adenocarcinoma |
| 43 | Adenocarcinoma | Granuloma | Granuloma | 0.068405524 | 0.931594476 | Adenocarcinoma |
| 44 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.336761786 | 0.663238214 | Adenocarcinoma |
| 45 | Adenocarcinoma | Granuloma | Granuloma | 0.279784671 | 0.720215329 | Adenocarcinoma |
| 46 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.507869671 | 0.492130329 | Granuloma |
| 47 | Adenocarcinoma | Granuloma | Granuloma | 0.512467548 | 0.487532452 | Granuloma |
| 48 | Adenocarcinoma | Granuloma | Granuloma | 0.170699255 | 0.829300745 | Adenocarcinoma |
| 49 | Adenocarcinoma | Granuloma | Granuloma | 0.168254547 | 0.831745453 | Adenocarcinoma |
| 50 | Adenocarcinoma | Granuloma | Granuloma | 0.199324536 | 0.800675464 | Adenocarcinoma |
| 51 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.220089569 | 0.779910431 | Adenocarcinoma |
| 52 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.187993409 | 0.812006591 | Adenocarcinoma |
| 53 | Adenocarcinoma | Granuloma | Granuloma | 0.699486118 | 0.300513882 | Granuloma |
| 54 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.168752822 | 0.831247178 | Adenocarcinoma |
| 55 | Adenocarcinoma | Granuloma | Granuloma | 0.490589132 | 0.509410868 | Adenocarcinoma |
| 56 | Adenocarcinoma | Granuloma | Granuloma | 0.200721347 | 0.799278653 | Adenocarcinoma |
| 57 | Adenocarcinoma | Granuloma | Granuloma | 0.175873853 | 0.824126147 | Adenocarcinoma |
| 58 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.564827451 | 0.435172549 | Granuloma |
| 59 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.127602442 | 0.872397558 | Adenocarcinoma |
| 60 | Adenocarcinoma | Granuloma | Granuloma | 0.129927656 | 0.870072344 | Adenocarcinoma |
| 61 | Adenocarcinoma | Granuloma | Granuloma | 0.264220845 | 0.735779155 | Adenocarcinoma |
| 62 | Adenocarcinoma | Adenocarcinoma | Granuloma | 0.217930978 | 0.782069022 | Adenocarcinoma |
| 63 | Adenocarcinoma | Granuloma | Granuloma | 0.212184059 | 0.787815941 | Adenocarcinoma |
| 64 | Adenocarcinoma | Adenocarcinoma | Adenocarcinoma | 0.133448459 | 0.866551541 | Adenocarcinoma |
| 65 | Adenocarcinoma | Granuloma | Granuloma | 0.160772986 | 0.839227014 | Adenocarcinoma |
| 66 | Adenocarcinoma | Granuloma | Granuloma | 0.115126289 | 0.884873711 | Adenocarcinoma |
| 67 | Adenocarcinoma | Granuloma | Granuloma | 0.214203904 | 0.785796096 | Adenocarcinoma |
| 68 | Adenocarcinoma | Granuloma | Granuloma | 0.144694627 | 0.855305373 | Adenocarcinoma |
| 69 | Adenocarcinoma | Granuloma | Adenocarcinoma | 0.159683611 | 0.840316389 | Adenocarcinoma |
| 70 | Adenocarcinoma | Granuloma | Granuloma | 0.374095144 | 0.625904856 | Adenocarcinoma |
| 71 | Adenocarcinoma | Granuloma | Granuloma | 0.126530107 | 0.873469893 | Adenocarcinoma |
| 72 | Adenocarcinoma | Granuloma | Granuloma | 0.148974261 | 0.851025739 | Adenocarcinoma |
| 73 | Granuloma | Granuloma | Adenocarcinoma | 0.322456663 | 0.677543337 | Adenocarcinoma |
| 74 | Granuloma | Granuloma | Granuloma | 0.647035946 | 0.352964054 | Granuloma |
| 75 | Granuloma | Granuloma | Adenocarcinoma | 0.485036359 | 0.514963641 | Adenocarcinoma |
| 76 | Granuloma | Granuloma | Granuloma | 0.517373973 | 0.482626027 | Granuloma |
| 77 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.433816398 | 0.566183602 | Adenocarcinoma |
| 78 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.495053649 | 0.504946351 | Adenocarcinoma |
| 79 | Granuloma | Adenocarcinoma | Granuloma | 0.467139728 | 0.532860272 | Adenocarcinoma |
| 80 | Granuloma | Granuloma | Granuloma | 0.609387618 | 0.390612382 | Granuloma |
| 81 | Granuloma | Granuloma | Granuloma | 0.247117744 | 0.752882256 | Adenocarcinoma |
| 82 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.503335025 | 0.496664975 | Granuloma |
| 83 | Granuloma | Adenocarcinoma | Granuloma | 0.675145581 | 0.324854419 | Granuloma |
| 84 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.479232204 | 0.520767796 | Adenocarcinoma |
| 85 | Granuloma | Granuloma | Granuloma | 0.229430508 | 0.770569492 | Adenocarcinoma |
| 86 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.521294709 | 0.478705291 | Granuloma |
| 87 | Granuloma | Granuloma | Granuloma | 0.695016389 | 0.304983611 | Granuloma |
| 88 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.740984791 | 0.259015209 | Granuloma |
| 89 | Granuloma | Adenocarcinoma | Granuloma | 0.799722283 | 0.200277717 | Granuloma |
| 90 | Granuloma | Granuloma | Granuloma | 0.167484876 | 0.832515124 | Adenocarcinoma |

| | | | | | | |
|---|---|---|---|---|---|---|
| 91 | Granuloma | Granuloma | Granuloma | 0.604168881 | 0.395831119 | Granuloma |
| 92 | Granuloma | Granuloma | Granuloma | 0.793995055 | 0.206004945 | Granuloma |
| 93 | Granuloma | Granuloma | Granuloma | 0.466947239 | 0.533052761 | Adenocarcinoma |
| 94 | Granuloma | Granuloma | Granuloma | 0.820598836 | 0.179401164 | Granuloma |
| 95 | Granuloma | Granuloma | Granuloma | 0.614592672 | 0.385407328 | Granuloma |
| 96 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.565909981 | 0.434090019 | Granuloma |
| 97 | Granuloma | Granuloma | Adenocarcinoma | 0.508951349 | 0.491048651 | Granuloma |
| 98 | Granuloma | Granuloma | Granuloma | 0.592362637 | 0.407637363 | Granuloma |
| 99 | Granuloma | Granuloma | Granuloma | 0.679019111 | 0.320980889 | Granuloma |
| 100 | Granuloma | Granuloma | Granuloma | 0.114896247 | 0.885103753 | Adenocarcinoma |
| 101 | Granuloma | Granuloma | Granuloma | 0.2334818 | 0.7665182 | Adenocarcinoma |
| 102 | Granuloma | Granuloma | Granuloma | 0.458155947 | 0.541844053 | Adenocarcinoma |
| 103 | Granuloma | Granuloma | Granuloma | 0.348893928 | 0.651106072 | Adenocarcinoma |
| 104 | Granuloma | Granuloma | Granuloma | 0.368355109 | 0.631644891 | Adenocarcinoma |
| 105 | Granuloma | Adenocarcinoma | Granuloma | 0.44925938 | 0.55074062 | Adenocarcinoma |
| 106 | Granuloma | Granuloma | Granuloma | 0.868440244 | 0.131559756 | Granuloma |
| 107 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.339678087 | 0.660321913 | Adenocarcinoma |
| 108 | Granuloma | Adenocarcinoma | Granuloma | 0.492012287 | 0.507987713 | Adenocarcinoma |
| 109 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.550445047 | 0.449554953 | Granuloma |
| 110 | Granuloma | Granuloma | Granuloma | 0.516011103 | 0.483988897 | Granuloma |
| 111 | Granuloma | Adenocarcinoma | Granuloma | 0.636684478 | 0.363315522 | Granuloma |
| 112 | Granuloma | Adenocarcinoma | Granuloma | 0.802220259 | 0.197779741 | Granuloma |
| 113 | Granuloma | Granuloma | Granuloma | 0.398955824 | 0.601044176 | Adenocarcinoma |
| 114 | Granuloma | Granuloma | Granuloma | 0.700085546 | 0.299914454 | Granuloma |
| 115 | Granuloma | Granuloma | Granuloma | 0.402380168 | 0.597619832 | Adenocarcinoma |
| 116 | Granuloma | Granuloma | Adenocarcinoma | 0.55477403 | 0.44522597 | Granuloma |
| 117 | Granuloma | Granuloma | Granuloma | 0.510849378 | 0.489150622 | Granuloma |
| 118 | Granuloma | Granuloma | Granuloma | 0.389949797 | 0.610050203 | Adenocarcinoma |
| 119 | Granuloma | Granuloma | Granuloma | 0.752794434 | 0.247205566 | Granuloma |
| 120 | Granuloma | Granuloma | Granuloma | 0.706200334 | 0.293799666 | Granuloma |
| 121 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.560087419 | 0.439912581 | Granuloma |
| 122 | Granuloma | Adenocarcinoma | Granuloma | 0.503834788 | 0.496165212 | Granuloma |
| 123 | Granuloma | Granuloma | Granuloma | 0.577140752 | 0.422859248 | Granuloma |
| 124 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.535145577 | 0.464854423 | Granuloma |
| 125 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.521104111 | 0.478895889 | Granuloma |
| 126 | Granuloma | Granuloma | Granuloma | 0.707044276 | 0.292955724 | Granuloma |
| 127 | Granuloma | Granuloma | Granuloma | 0.714973642 | 0.285026358 | Granuloma |
| 128 | Granuloma | Granuloma | Granuloma | 0.583077546 | 0.416922454 | Granuloma |
| 129 | Granuloma | Adenocarcinoma | Granuloma | 0.595917392 | 0.404082608 | Granuloma |
| 130 | Granuloma | Granuloma | Granuloma | 0.578412376 | 0.421587624 | Granuloma |
| 131 | Granuloma | Granuloma | Granuloma | 0.691840653 | 0.308159347 | Granuloma |
| 132 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.420612843 | 0.579387157 | Adenocarcinoma |
| 133 | Granuloma | Adenocarcinoma | Granuloma | 0.858248592 | 0.141751408 | Granuloma |
| 134 | Granuloma | Granuloma | Adenocarcinoma | 0.455447785 | 0.544552215 | Adenocarcinoma |
| 135 | Granuloma | Granuloma | Granuloma | 0.571245827 | 0.428754173 | Granuloma |
| 136 | Granuloma | Granuloma | Granuloma | 0.722669039 | 0.277330961 | Granuloma |
| 137 | Granuloma | Adenocarcinoma | Granuloma | 0.461698041 | 0.538301959 | Adenocarcinoma |
| 138 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.621469142 | 0.378530858 | Granuloma |
| 139 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.905624642 | 0.094375358 | Granuloma |

| | | | | | | |
|---|---|---|---|---|---|---|
| 140 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.919283893 | 0.080716107 | Granuloma |
| 141 | Granuloma | Adenocarcinoma | Adenocarcinoma | 0.810264724 | 0.189735276 | Granuloma |
| 142 | Granuloma | Granuloma | Granuloma | 0.637635392 | 0.362364608 | Granuloma |
| 143 | Granuloma | Adenocarcinoma | Granuloma | 0.455177001 | 0.544822999 | Adenocarcinoma |
| 144 | Granuloma | Granuloma | Granuloma | 0.261016412 | 0.738983588 | Adenocarcinoma |
| 145 | Granuloma | Granuloma | Granuloma | 0.661045577 | 0.338954423 | Granuloma |

## Table E5: Intranodular Radiomic Features

| Feature number | Feature Family | Descriptor | Statistic | Location | *P* value* |
|---|---|---|---|---|---|
| 1 | Gabor | $f = 32, \theta = 3\pi/4$ | Kurtosis | Intranodular | 0.0007 |
| 2 | Gabor | $f = 4, \theta = 3\pi/4$ | Skewness | Intranodular | 0.007 |
| 3 | Gabor | $f = 4, \theta = \pi/2$ | Median | Intranodular | 0.0008 |
| 4 | Laws energy | W5E5† | Median | Intranodular | 0.001 |
| 5 | Laws energy | S5E5 | Median | Intranodular | 0.0005 |
| 6 | Gabor | $f = 32, \theta = 3\pi/2$ | Median | Intranodular | 0.0004 |
| 7 | Gabor | $f = 32, \theta = \pi/2$ | Skewness | Intranodular | 0.0004 |
| 8 | Gabor | $f = 4, \theta = \pi/8$ | Kurtosis | Intranodular | 0.0004 |
| 9 | Gabor | $f = 4, \theta = \pi/4$ | Median | Intranodular | 0.0004 |
| 10 | Gabor | $f = 4, \theta = \pi/8$ | Skewness | Intranodular | 0.0004 |
| 11 | Gabor | $f = 4, \theta = \pi/8$ | Standard Deviation | Intranodular | 0.0003 |
| 12 | Gabor | $f = 4, \theta = \pi/8$ | Median | Intranodular | 0.0003 |

Column 1 reflects the feature number, column 2 indicates the feature family of the feature, column 3 provides details about the feature (such as f = frequency of the filter, $\theta$ = orientation of the filter with respect to the normal axis). Column 4 reflects the statistic that was derived for the feature, column 5 reflects the nodule region of feature extraction, column 6 provides the *P* values of the features to distinguish adenocarcinomas from granulomas.

* The *P* values were computed using the paired Student *t* test for continuous variables.

† Feature descriptors for Laws Energy-Descriptors include all combinations of five 1D filters: level (L), edge (E), spot (S), wave (W), and ripple (R). For example, in this experiment, W5E5 (feature number 4) implies that Laws energy based textural patterns of waves (W) in the horizontal direction and edges (E) in the vertical direction using 5-pixel by 5 pixel 2-D convolution filter was statistically different ($P < .001$) between adenocarcinomas and granulomas. Further information on Laws energy features can be found in Table E2.

## Table E6: Hyper Parameter Optimization Details:

| Parameter | Details |
|---|---|
| Convolution 1 | Kernel size: 5, stride: 2, padding = ‘same’ |
| Pool 1 (MAX pooling) | Kernel size: 2, stride: 2, padding = ‘same’ |
| Convolution 2 | Kernel size: 5, stride: 2, padding = ‘same’ |
| Pool 2 (MAX pooling) | Kernel size: 2, stride: 2, padding = ‘same’ |
| Convolution 3 | Kernel size: 5, stride: 2, padding = ‘same’ |
| Pool 3 (MAX pooling) | Kernel size: 2, stride: 2, padding = ‘same’ |

## Table E7: AUC Values Obtained on the Training and Independent Test Set Using Different Classifiers

| | Intranodular classifier | |
|---|---|---|
| | Training AUC [95% CI] | Testing AUC [95% CI] |
| **LDA** | 0.72 [0.55, 0.89] | 0.72 [0.56, 0.89] |
| **SVM-linear** | **0.73 [0.56, 0.89]** | **0.75 [0.59, 0.91]** |
| **SVM-RBF** | 0.63 [0.46, 0.82] | 0.66 [0.48, 0.84] |
| **RF** | 0.69 [0.52, 0.86] | 0.72 [0.55, 0.88] |
| **QDA** | 0.74 [0.58, 0.90] | 0.72 [0.55, 0.88] |

## Table E8: List of Textural Features Extracted

| 252 features extracted from the intranodular region and each of the 6 perinodular regions | | | | |
|---|---|---|---|---|
| **#** | **Feature** | **frequency** | **theta** | **Statistic** |
| 1 | Gabor Wavelet 1 | 2 | $\pi/8$ | Median |
| 2 | Gabor Wavelet 1 | | | Standard Deviation |
| 3 | Gabor Wavelet 1 | | | Skewness |
| 4 | Gabor Wavelet 1 | | | Kurtosis |
| 5 | Gabor Wavelet 2 | | $\pi/4$ | Median |
| 6 | Gabor Wavelet 2 | | | Standard Deviation |
| 7 | Gabor Wavelet 2 | | | Skewness |
| 8 | Gabor Wavelet 2 | | | Kurtosis |
| 9 | Gabor Wavelet 3 | | $3*\pi/8$ | Median |
| 10 | Gabor Wavelet 3 | | | Standard Deviation |
| 11 | Gabor Wavelet 3 | | | Skewness |
| 12 | Gabor Wavelet 3 | | | Kurtosis |
| 13 | Gabor Wavelet 4 | | $\pi/2$ | Median |
| 14 | Gabor Wavelet 4 | | | Standard Deviation |
| 15 | Gabor Wavelet 4 | | | Skewness |
| 16 | Gabor Wavelet 4 | | | Kurtosis |
| 17 | Gabor Wavelet 5 | | $3*\pi/4$ | Median |
| 18 | Gabor Wavelet 5 | | | Standard Deviation |
| 19 | Gabor Wavelet 5 | | | Skewness |
| 20 | Gabor Wavelet 5 | | | Kurtosis |
| 21 | Gabor Wavelet 6 | 4 | $\pi/8$ | Median |
| 22 | Gabor Wavelet 6 | | | Standard Deviation |
| 23 | Gabor Wavelet 6 | | | Skewness |
| 24 | Gabor Wavelet 6 | | | Kurtosis |
| 25 | Gabor Wavelet 7 | | $\pi/4$ | Median |
| 26 | Gabor Wavelet 7 | | | Standard Deviation |
| 27 | Gabor Wavelet 7 | | | Skewness |
| 28 | Gabor Wavelet 7 | | | Kurtosis |
| 29 | Gabor Wavelet 8 | | $3*\pi/8$ | Median |
| 30 | Gabor Wavelet 8 | | | Standard Deviation |
| 31 | Gabor Wavelet 8 | | | Skewness |
| 32 | Gabor Wavelet 8 | | | Kurtosis |
| 33 | Gabor Wavelet 9 | | $\pi/2$ | Median |
| 34 | Gabor Wavelet 9 | | | Standard Deviation |
| 35 | Gabor Wavelet 9 | | | Skewness |
| 36 | Gabor Wavelet 9 | | | Kurtosis |

| | | | | |
|---|---|---|---|---|
| 37 | Gabor Wavelet 10 | | 3*π/4 | Median |
| 38 | Gabor Wavelet 10 | | | Standard Deviation |
| 39 | Gabor Wavelet 10 | | | Skewness |
| 40 | Gabor Wavelet 10 | | | Kurtosis |
| 41 | Gabor Wavelet 11 | 8 | π/8 | Median |
| 42 | Gabor Wavelet 11 | | | Standard Deviation |
| 43 | Gabor Wavelet 11 | | | Skewness |
| 44 | Gabor Wavelet 11 | | | Kurtosis |
| 45 | Gabor Wavelet 12 | | π/4 | Median |
| 46 | Gabor Wavelet 12 | | | Standard Deviation |
| 47 | Gabor Wavelet 12 | | | Skewness |
| 48 | Gabor Wavelet 12 | | | Kurtosis |
| 49 | Gabor Wavelet 13 | | 3* π/8 | Median |
| 50 | Gabor Wavelet 13 | | | Standard Deviation |
| 51 | Gabor Wavelet 13 | | | Skewness |
| 52 | Gabor Wavelet 13 | | | Kurtosis |
| 53 | Gabor Wavelet 14 | | π/2 | Median |
| 54 | Gabor Wavelet 14 | | | Standard Deviation |
| 55 | Gabor Wavelet 14 | | | Skewness |
| 56 | Gabor Wavelet 14 | | | Kurtosis |
| 57 | Gabor Wavelet 15 | | 3*π/4 | Median |
| 58 | Gabor Wavelet 15 | | | Standard Deviation |
| 59 | Gabor Wavelet 15 | | | Skewness |
| 60 | Gabor Wavelet 15 | | | Kurtosis |
| 61 | Gabor Wavelet 16 | 16 | π/8 | Median |
| 62 | Gabor Wavelet 16 | | | Standard Deviation |
| 63 | Gabor Wavelet 16 | | | Skewness |
| 64 | Gabor Wavelet 16 | | | Kurtosis |
| 65 | Gabor Wavelet 17 | | π/4 | Median |
| 66 | Gabor Wavelet 17 | | | Standard Deviation |
| 67 | Gabor Wavelet 17 | | | Skewness |
| 68 | Gabor Wavelet 17 | | | Kurtosis |
| 69 | Gabor Wavelet 18 | | 3* π/8 | Median |
| 70 | Gabor Wavelet 18 | | | Standard Deviation |
| 71 | Gabor Wavelet 18 | | | Skewness |
| 72 | Gabor Wavelet 18 | | | Kurtosis |
| 73 | Gabor Wavelet 19 | | π/2 | Median |
| 74 | Gabor Wavelet 19 | | | Standard Deviation |
| 75 | Gabor Wavelet 19 | | | Skewness |
| 76 | Gabor Wavelet 19 | | | Kurtosis |
| 77 | Gabor Wavelet 20 | | 3*π/4 | Median |
| 78 | Gabor Wavelet 20 | | | Standard Deviation |
| 79 | Gabor Wavelet 20 | | | Skewness |
| 80 | Gabor Wavelet 20 | | | Kurtosis |
| 81 | Gabor Wavelet 21 | 32 | π/8 | Median |
| 82 | Gabor Wavelet 21 | | | Standard Deviation |
| 83 | Gabor Wavelet 21 | | | Skewness |
| 84 | Gabor Wavelet 21 | | | Kurtosis |
| 85 | Gabor Wavelet 22 | | π/4 | Median |

| | | | | |
|---|---|---|---|---|
| 86 | Gabor Wavelet 22 | | | Standard Deviation |
| 87 | Gabor Wavelet 22 | | | Skewness |
| 88 | Gabor Wavelet 22 | | | Kurtosis |
| 89 | Gabor Wavelet 23 | | 3* π/8 | Median |
| 90 | Gabor Wavelet 23 | | | Standard Deviation |
| 91 | Gabor Wavelet 23 | | | Skewness |
| 92 | Gabor Wavelet 23 | | | Kurtosis |
| 93 | Gabor Wavelet 24 | | π/2 | Median |
| 94 | Gabor Wavelet 24 | | | Standard Deviation |
| 95 | Gabor Wavelet 24 | | | Skewness |
| 96 | Gabor Wavelet 24 | | | Kurtosis |
| 97 | Gabor Wavelet 25 | | 3*π/4 | Median |
| 98 | Gabor Wavelet 25 | | | Standard Deviation |
| 99 | Gabor Wavelet 25 | | | Skewness |
| 100 | Gabor Wavelet 25 | | | Kurtosis |
| 101 | Laws Energy 1 | L5 L5 | | Median |
| 102 | Laws Energy 1 | | | Standard Deviation |
| 103 | Laws Energy 1 | | | Skewness |
| 104 | Laws Energy 1 | | | Kurtosis |
| 105 | Laws Energy 2 | L5E5 | | Median |
| 106 | Laws Energy 2 | | | Standard Deviation |
| 107 | Laws Energy 2 | | | Skewness |
| 108 | Laws Energy 2 | | | Kurtosis |
| 109 | Laws Energy 3 | L5S5 | | Median |
| 110 | Laws Energy 3 | | | Standard Deviation |
| 111 | Laws Energy 3 | | | Skewness |
| 112 | Laws Energy 3 | | | Kurtosis |
| 113 | Laws Energy 4 | L5 W5 | | Median |
| 114 | Laws Energy 4 | | | Standard Deviation |
| 115 | Laws Energy 4 | | | Skewness |
| 116 | Laws Energy 4 | | | Kurtosis |
| 117 | Laws Energy 5 | L5R5 | | Median |
| 118 | Laws Energy 5 | | | Standard Deviation |
| 119 | Laws Energy 5 | | | Skewness |
| 120 | Laws Energy 5 | | | Kurtosis |
| 121 | Laws Energy 6 | E5 L5 | | Median |
| 122 | Laws Energy 6 | | | Standard Deviation |
| 123 | Laws Energy 6 | | | Skewness |
| 124 | Laws Energy 6 | | | Kurtosis |
| 125 | Laws Energy 7 | E5E5 | | Median |
| 126 | Laws Energy 7 | | | Standard Deviation |
| 127 | Laws Energy 7 | | | Skewness |
| 128 | Laws Energy 7 | | | Kurtosis |
| 129 | Laws Energy 8 | E5S5 | | Median |
| 130 | Laws Energy 8 | | | Standard Deviation |
| 131 | Laws Energy 8 | | | Skewness |
| 132 | Laws Energy 8 | | | Kurtosis |
| 133 | Laws Energy 9 | E5 W5 | | Median |
| 134 | Laws Energy 9 | | | Standard Deviation |

| | | | |
|---|---|---|---|
| 135 | Laws Energy 9 | | Skewness |
| 136 | Laws Energy 9 | | Kurtosis |
| 137 | Laws Energy 10 | S5 L5 | Median |
| 138 | Laws Energy 10 | | Standard Deviation |
| 139 | Laws Energy 10 | | Skewness |
| 140 | Laws Energy 10 | | Kurtosis |
| 141 | Laws Energy 11 | S5E5 | Median |
| 142 | Laws Energy 11 | | Standard Deviation |
| 143 | Laws Energy 11 | | Skewness |
| 144 | Laws Energy 11 | | Kurtosis |
| 145 | Laws Energy 12 | S5S5 | Median |
| 146 | Laws Energy 12 | | Standard Deviation |
| 147 | Laws Energy 12 | | Skewness |
| 148 | Laws Energy 12 | | Kurtosis |
| 149 | Laws Energy 13 | S5 W5 | Median |
| 150 | Laws Energy 13 | | Standard Deviation |
| 151 | Laws Energy 13 | | Skewness |
| 152 | Laws Energy 13 | | Kurtosis |
| 153 | Laws Energy 14 | S5E5 | Median |
| 154 | Laws Energy 14 | | Standard Deviation |
| 155 | Laws Energy 14 | | Skewness |
| 156 | Laws Energy 14 | | Kurtosis |
| 157 | Laws Energy 15 | S5R5 | Median |
| 158 | Laws Energy 15 | | Standard Deviation |
| 159 | Laws Energy 15 | | Skewness |
| 160 | Laws Energy 15 | | Kurtosis |
| 161 | Laws Energy 16 | W5 L5 | Median |
| 162 | Laws Energy 16 | | Standard Deviation |
| 163 | Laws Energy 16 | | Skewness |
| 164 | Laws Energy 16 | | Kurtosis |
| 165 | Laws Energy 17 | W5E5 | Median |
| 166 | Laws Energy 17 | | Standard Deviation |
| 167 | Laws Energy 17 | | Skewness |
| 168 | Laws Energy 17 | | Kurtosis |
| 169 | Laws Energy 18 | W5S5 | Median |
| 170 | Laws Energy 18 | | Standard Deviation |
| 171 | Laws Energy 18 | | Skewness |
| 172 | Laws Energy 18 | | Kurtosis |
| 173 | Laws Energy 19 | W5 W5 | Median |
| 174 | Laws Energy 19 | | Standard Deviation |
| 175 | Laws Energy 19 | | Skewness |
| 176 | Laws Energy 19 | | Kurtosis |
| 177 | Laws Energy 20 | W5R5 | Median |
| 178 | Laws Energy 20 | | Standard Deviation |
| 179 | Laws Energy 20 | | Skewness |
| 180 | Laws Energy 20 | | Kurtosis |
| 181 | Laws Energy 21 | R5 L5 | Median |
| 182 | Laws Energy 21 | | Standard Deviation |
| 183 | Laws Energy 21 | | Skewness |

| | | | |
|---|---|---|---|
| 184 | Laws Energy 21 | | Kurtosis |
| 185 | Laws Energy 22 | R5E5 | Median |
| 186 | Laws Energy 22 | | Standard Deviation |
| 187 | Laws Energy 22 | | Skewness |
| 188 | Laws Energy 22 | | Kurtosis |
| 189 | Laws Energy 23 | R5S5 | Median |
| 190 | Laws Energy 23 | | Standard Deviation |
| 191 | Laws Energy 23 | | Skewness |
| 192 | Laws Energy 23 | | Kurtosis |
| 193 | Laws Energy 24 | R5 W5 | Median |
| 194 | Laws Energy 24 | | Standard Deviation |
| 195 | Laws Energy 24 | | Skewness |
| 196 | Laws Energy 24 | | Kurtosis |
| 197 | Laws Energy 25 | R5R5 | Median |
| 198 | Laws Energy 25 | | Standard Deviation |
| 199 | Laws Energy 25 | | Skewness |
| 200 | Laws Energy 25 | | Kurtosis |
| 201 | Haralick 1 | Entropy | Median |
| 202 | Haralick 1 | | Standard Deviation |
| 203 | Haralick 1 | | Skewness |
| 204 | Haralick 1 | | Kurtosis |
| 205 | Haralick 2 | Energy | Median |
| 206 | Haralick 2 | | Standard Deviation |
| 207 | Haralick 2 | | Skewness |
| 208 | Haralick 2 | | Kurtosis |
| 209 | Haralick 3 | Inertia | Median |
| 210 | Haralick 3 | | Standard Deviation |
| 211 | Haralick 3 | | Skewness |
| 212 | Haralick 3 | | Kurtosis |
| 213 | Haralick 4 | Inverse Difference Moment (IDM) | Median |
| 214 | Haralick 4 | | Standard Deviation |
| 215 | Haralick 4 | | Skewness |
| 216 | Haralick 4 | | Kurtosis |
| 217 | Haralick 5 | Correlation | Median |
| 218 | Haralick 5 | | Standard Deviation |
| 219 | Haralick 5 | | Skewness |
| 220 | Haralick 5 | | Kurtosis |
| 221 | Haralick 6 | Correlation Information 1 | Median |
| 222 | Haralick 6 | | Standard Deviation |
| 223 | Haralick 6 | | Skewness |
| 224 | Haralick 6 | | Kurtosis |
| 225 | Haralick 7 | Correlation Information 2 | Median |
| 226 | Haralick 7 | | Standard Deviation |
| 227 | Haralick 7 | | Skewness |
| 228 | Haralick 7 | | Kurtosis |
| 229 | Haralick 8 | Sum Average | Median |
| 230 | Haralick 8 | | Standard Deviation |
| 231 | Haralick 8 | | Skewness |
| 232 | Haralick 8 | | Kurtosis |

| | | | |
|---|---|---|---|
| 233 | Haralick 9 | Sum Variance | Median |
| 234 | Haralick 9 | | Standard Deviation |
| 235 | Haralick 9 | | Skewness |
| 236 | Haralick 9 | | Kurtosis |
| 237 | Haralick 10 | Sum Entropy | Median |
| 238 | Haralick 10 | | Standard Deviation |
| 239 | Haralick 10 | | Skewness |
| 240 | Haralick 10 | | Kurtosis |
| 241 | Haralick 11 | Difference Average | Median |
| 242 | Haralick 11 | | Standard Deviation |
| 243 | Haralick 11 | | Skewness |
| 244 | Haralick 11 | | Kurtosis |
| 245 | Haralick 12 | Difference Variance | Median |
| 246 | Haralick 12 | | Standard Deviation |
| 247 | Haralick 12 | | Skewness |
| 248 | Haralick 12 | | Kurtosis |
| 249 | Haralick 13 | Difference Entropy | Median |
| 250 | Haralick 13 | | Standard Deviation |
| 251 | Haralick 13 | | Skewness |
| 252 | Haralick 13 | | Kurtosis |