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LIST OF SYMBOLS AND ABBREVIATIONS

Symbols

$g(x)$	-	Activation function
α	-	Alpha
A	-	Amplitude of QHT
$f_A^q(x)$	-	Analytic signal
$M_{\text{anisotropy}}$	-	Anisotropy
A^1	-	Approximation Coefficient for Level1
A^j	-	Approximation coefficients
S	-	Arithmetic mean
β	-	Bias of hidden layer
B	-	Box Mass
r	-	Box size
u_0	-	Center radial frequency
pc	-	Centroid
f	-	Complex part of signal
σ_u	-	Constant of Gaussian envelope along u axis
σ_v	-	Constant of Gaussian envelope along v axis
C_{ij}	-	Covariance
D	-	Detailed Coefficient
j	-	Decomposition level
D^j	-	Diagonal detail coefficients
D_T	-	Diffusion tensor
D_m	-	Diffusion matrix
u_x	-	Directional in x space
u	-	Directional in xy space
u_y	-	Directional in y space

λ_i	-	Eigen values
v_1, v_2	-	Eigen vectors
$E\{\}$	-	Empirical average
E	-	Energy
$E(M)$	-	Expected mass
diff_x	-	Frequency in horizontal direction
diff_y	-	Frequency in vertical direction
e_{mn}	-	Gabor coefficients of energy feature
K_{mn}	-	Gabor coefficients of kurtosis feature
S_{mn}	-	Gabor coefficients of skewness feature
W_G	-	Gaussian kernel
K_j	-	Gaussian weighting function
G	-	Gray level
Δ_u	-	Half peak span of Gaussian function
H	-	High pass filter
f_{Hi}	-	Hilbert transform
H^j	-	Horizontal detail coefficients
ΔI	-	Image gradient
N_w	-	Image width in pixels
i	-	Intensity
μ_4	-	Kurtosis
A_r	-	Lacunarity of matrix
-+	-	Locations of the grid pixels to the lower left of (x, y)
+-	-	Locations of the grid pixels to the upper right of (x, y)
++	-	Locations of the grid pixels to the lower right of (x, y)
--	-	Locations of the grid pixels to the upper left of (x, y)
L	-	Low pass filter

m_{-+}	-	Mapping of lower left of (x, y)
m_{++}	-	Mapping of lower right of (x, y)
$m_{..}$	-	Mapping of upper left of (x, y)
m_{+-}	-	Mapping of upper right
M_{box}^q	-	Mass moments
μ	-	Mean
ψ	-	Mother wavelet
$Z^{(1)}$	-	Moments
$NP(l)$	-	Number of flooding pixels
$\phi(x)$	-	One dimensional scaling function
$\psi(\cdot)$	-	One-dimensional wavelet function
θ	-	Orientation
φ	-	Phase of QHT
y_-	-	Position of pixels to bottom of current position y
x_-	-	Position of pixels to left of current position x
x_+	-	Position of pixels to right of current position x
y_+	-	Position of pixels to top of current position y
Q	-	Probability distribution of box mass
q	-	Quaternion
f_A^q	-	Quaternion analytic signal
F^q	-	Quaternion Fourier transform
f_A	-	Real part of signal
$\psi_h(x)$ and $\psi_h(y)$	-	Real tensor product
n_r	-	Relative height
ρ	-	Sigma
$\phi(x)$	-	Smoothing function
σ_x	-	Space constants of the Gaussian envelope along the x axis
σ_y	-	Space constants of the Gaussian envelope along the y axis

σ	-	Standard deviation
J	-	Structure tensor matrix
$\sigma(dir)$	-	Succolarity
R^n	-	Targets
M	-	Total frequency band
N	-	Total orientation
E	-	Trace
S^2	-	variance
V^j	-	Vertical detail coefficients
$\psi(x)$	-	Wavelet function
T	-	Weight vector
W	-	Window

Abbreviations

AHE	-	Adaptive histogram equalisation
AI	-	Anisotropy index
BMD	-	Bone mineral density
CT	-	Computed tomography
DA	-	Degree of anisotropy
DD	-	Diagonal detail of sub-image
DEXA	-	Dual energy X-ray absorptiometry
DT	-	Diffusion tensor
DTI	-	Diffusion tensor imaging
DWT	-	Discrete wavelet transform
ELM	-	Extreme learning machine
EMD	-	Empirical mode decomposition
FA	-	Fractional anisotropy
FD	-	Fractal dimension
FFT	-	Fast Fourier transform
FN	-	False negative

FP	-	False positive
GGD	-	Generalized Gaussian density
HPF	-	High pass filter
HHT	-	Hilbert-Huang transform
HOT	-	Hurst orientation transform
HR-pQCT	-	High resolution peripheral quantitative computed tomography
HSA	-	Hip structure analysis
HT	-	Hilbert transform
IMFs	-	Intrinsic mode functions
LB	-	Lacunarity binary
LDBC	-	Lacunarity differential box counting
LPF	-	Lowpass filter
LG	-	Lacunarity gray
LR	-	Lacunarity range
LTM	-	Lacunarity third moment
MIL	-	Mean intercept length
μ CT	-	Micro computed tomography
MR	-	Magnetic resonance
MRI	-	Magnetic resonance imaging
PCA	-	Principal component analysis
OA	-	Osteoarthritis
PS	-	Power spectrum
QCT	-	Quantitative computed tomography
QFT	-	Quaternion Fourier transform
QWT	-	Quaternion Wavelet transform
RA	-	Relative anisotropy
RBF	-	Radial basis function
ROI	-	Region of interest
SLD	-	Star length distribution

SLFNs	-	Single hidden layer feedforward neural networks
SMI	-	Structure model index
ST	-	Structure tensor
SVD	-	Star volume distribution
3D	-	Three dimension
TN	-	True negative
TP	-	True positive
2D	-	Two dimension
WT	-	Wavelet transform