

# LIST OF ABBREVIATIONS

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2D/3D	Two/ Three dimensional
AD	Anisotropic Diffusion
ART	Algebraic Reconstruction Techniques
BM3D	Block-matching and 3D filtering
CAV	Component Averaging Methods
CONVEF sion	CONvolutional Virtual Electric Field Anisotropic Diffu-
CP	Correlation Parameter
CS	Compressed Sensing
CT	Computed Tomography
ECT	Emission Computed Tomography (PET/SPECT)
EM	Expectation Maximization
FBP	Filtered Backprojection
FOM	Figure of Merit
FOV	Field of View
FT	Fourier Transform
GMRF	Gaussian Markov Random Field
GVF	Gradient Vector Flow
INGVF	Inverse Gradient Vector Flow
IR	Iterative Reconstruction
kV	Kilo Voltage
LOR	Line of Response
LS	Least Squares
MAD	Minimum Absolute Deviation

MAP	Maximum <i>A Posteriori</i>
MART	Multiplicative Algebraic Reconstruction Techniques
mAs	Milliampere-second
MedAD	Median Anisotropic Diffusion
MLEM	Maximum Likelihood Expectation Maximization
MRF	Markov Random Field
MRI	Magnetic Resonance Imaging
MRP	Median Root Prior
MSSIM	Mean Square Similarity Index
NRMSD	Normalized Root Mean Square Deviation
OSEM	Ordered Subsets Expectation Maximization
OS-MRP	Ordered Subsets Median Root Prior
PDE	Partial Differential Equation
PET	Positron Emission Tomography
PL	Poisson Likelihood
PPB	Probabilistic Patch Based
PSF	Point Spread Function
PSNR	Peak Signal to Noise Ratio
PWLS	Penalized Weighted Least Square
QM	Quadratic Membrane
RMSE	Root Mean Square Error
SART	Simultaneous Algebraic Reconstruction Techniques
SIR	Statistical Iterative Reconstruction
SIRT	Simultaneous Iterative Reconstruction Techniques
SNR	Signal to Noise Ratio
SPECT	Single Photon Emission Computed Tomography
SVD	Singular Value Decomposition
TV	Total Variation

# LIST OF SYMBOLS

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$y^n$	<i>Updated image after <math>n^{\text{th}}</math> MLEM iteration</i>
$L^k$	<i>Updated image after <math>k^{\text{th}}</math> iteration of SART</i>
$N_{calc}^k$	<i>Calculated projections at <math>k^{\text{th}}</math> iteration</i>
$x_{calc}^n$	<i>Calculated projections at <math>n^{\text{th}}</math> iteration</i>
$X_{true}$	<i>True projections,</i>
$Q_\theta$	<i>Filtered projection</i>
$\bar{f}$	<i>The average gray scale of all pixels in reconstructed image</i>
$\beta$	<i>An isotope dependent decay constant</i>
$\phi(\ \nabla x\ )$	<i>Energy function defined in terms of gradient norm of the image</i>
$e_j^k$	<i>Projection Error</i>
$P_\theta(t)$	<i>Projection view at different angle <math>\theta</math></i>
$\sigma$	<i>Standard deviations</i>
$f_{\text{ORIG}}$	<i>The corresponding original numerical phantom image,</i>
$C(\nabla f)$	<i>The diffusion function,</i>
$\nabla f$	<i>The local image gradient and</i>
$f_{\text{REC}}$	<i>The reconstructed image,</i>
$\hat{f}$	<i>Estimated Object</i>
$\hat{F}(r, \theta)$	<i>The Fourier transform of <math>F(r, \theta)</math></i>
$(t, s)$	<i>Rotated coordinate system</i>

$ r $	<i>Ramp filter</i>
$\Sigma$	<i>Summation</i>
$\mu(s; E)$	<i>linear attenuation coefficient</i>
$A$	<i><math>M \times N</math> Projection/system matrix</i>
$b$	<i>linear vector representing a sinogram</i>
$d(\hat{y}, \mathbf{y})$	<i>Log-likelihood / data fit term</i>
$f$	<i>linear vector representing recon image</i>
$f(x, y)$	<i>2D Image Slice</i>
$g(l, \theta)$	<i>sinogram or Radon transform</i>
$I_d$	<i>integrated X-ray intensity for a given detector</i>
$K$	<i>gradient threshold</i>
$M$	<i>The total number of detector tubes</i>
$N$	<i>The total number of image pixels</i>
$N_i$	<i>the pixel value (detected counts emitted)</i>
$R(\mathbf{x})$	<i>Regularizer (e.g., a roughness penalty)</i>
$R\{ \}$	<i>Radon transform</i>
$t$	<i>is the iteration step</i>
$w_i$	<i>weighting factor</i>
$X$	<i>Constraint set</i>
$x$	<i>image vector</i>
$\mathbf{x}^{true}$	<i>true object</i>
$y$	<i>projection vector</i>
$\lambda$	<i>relaxation parameter</i>

# LIST OF KEYWORDS

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Acceleration techniques

Anisotropic Diffusion

Computed tomography

Emission Computed tomography

Image Reconstruction algorithms

Iterative Methods

Maximum Likelihood Expectation Maximization

Median-Anisotropic Diffusion

Medical Imaging

Noise Reduction

Ordered Subset Expectation-maximization algorithms

Positron emission tomography

Signal to Noise Ratio

Single-photon emission computed tomography

Statistical Iterative Reconstruction

Statistical Sinogram Smoothing

X-ray Computed Tomography