AbstractID:9382Title :ANewLimite d-AngleCTR econstructionMethod basedonT otal-Variation Minimization

Purpose:

Todev elop a new C T rec onstruction alg orithm bas ed on Total -Variation (TV) minim ization. Th e new algorithm is specifica lly desig ned fo r limited a ngle reconstruction to allevia te v olume information los s causedbyincomplete p rojections.

Methods:

TVis   defined asthesumma tionof thegradientsbetweenadjacentpixe   ls.A non linearconjuga tegra dient algorithm is used to minim   ize T V a nd pr ojection error simultaneously. Pixel Signal   -to-Noise Ratio (PSNR)w asusedtoqu   antitativelye valuatereconstr uctionquality ofaShepp -Loganphantom .H eadand neckCT imagesw ererec onstructedfromsimulatedprojec tionstodemonstrater econstructionqu ality at differentscanangl e.The eff ectsofwei ghtingfactors forTV andprojectionfre quencywer e investigated.

Results:

Thea lgorithmcanre constructgoodqualityimageswiththesca   n angle as low as 60 degree.   With 90 - degree projections, the   reconstructed Shepp -Logan phantom has   a high PSNR of   17 dB..   Weighting factorsforTVw   erede terminedthrou ghsimulatio ns.I mage qualitieswereimprovedb ywe ightingmore highfrequencyoftheprojec   tiondata. Insimulationtests usinghea d/necksimulatedprojections,volu   me informationcanbere   coveredac curatelyfrom60 -degreeprojections

Conclusion:

TheTV -basedre constructionalgorithmimprove sthe qualityoflimitedangle   CT reconstruction.