

7.0 Conclusion

For this thesis, test images are compressed by using the Multiple Bases Representation. By using such a method, the compressed images lose energy. Partitioning of the original images into subimages introduces blocking artifacts into the MBR reconstructed images.

Study of the error signal leads one to many constraints which can be used to better reconstruct the images. To guarantee that the constraints will not degrade the distorted images, the convexity of the constraining sets is proved.

The performance of the Projection Onto Convex Sets method highly depends on the initial vector. The sign constraint, which does not enforce any energy into the reconstructed error signal, needs an energy-added initial vector. The observed signal plus either white noise or a vector formed by the unsent basis vectors is a good initial vector for the sign constraint. The number of constrained signs must be sufficiently large, otherwise the added noise may degrade the final images.

The observed signal itself is the most appropriate for the minimum increasing and decreasing constraints which enforce the addition of energy to the reconstructed signal. Using the spike constraint, a hybrid constraint which not only enforces the addition of energy to the reconstructed signal but also corrects the signs, results in the best PSNR when the iteration process is initiated by the observed signal plus a constant.

The slope and norm-of-slope constraints are aimed particularly at the removal of the blocking artifacts. The observed signal is found to be the most appropriate initial vector for

these constraints. Generally, most constraints require extra side information. In order to minimize the needed additional information, the norm values, which are necessary for the norm-of-slope constraint, are estimated from the observed signal. The estimated norm efficiently substitutes for the actual norm in the images tried.

To increase the PSNR, the reconstruction method utilizes composite constraints. The order of the projection operators does not significantly affect the final PSNR's as much as which constraints make up the composite constraints.

Blocking boundaries are the regions where high distortion occurs. The boundary constraints efficiently remove the artifacts in these regions and thus increase the boundary PSNR. Subjectively, for these kinds of distorted images, human perception is more sensitive to the boundary PSNR than to the overall PSNR.