PARAMETER SELECTION RULES FOR $\ell^p - \ell^q$ REGULARIZATION

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Discrete ill-posed problems arise in many areas of science and engineering. Their solutions are very sensitive to perturbations. Regularization aims to reduce this sensitivity. Many regularization methods replace the original problem with a minimization one with a fidelity term and a regularization term. The use of a p-norm for the fidelity term and a q-norm for the regularization term, where $0 < p,q \leq 2$, has received considerable attention. The relative importance of these terms is determined by a regularization parameter.

The choice of a suitable regularization parameter is crucial. In this talk we discuss the various approaches for determining the regularization parameter automatically proposed in [1, 2, 3]. Computed examples of restoration of impulse noise and Gaussian noise contaminated images are presented.

References

[1] A. Buccini, *Generalized Cross Validation for $\ell^p - \ell^q$ regularization* (working title), In preparation.

[2] A. Buccini and L. Reichel, *An ℓ^2-ℓ^q regularization method for large discrete ill-posed problems*, Accepted on: Journal of Scientific Computing, 2018.

[3] A. Buccini and L. Reichel, *An $\ell^p - \ell^q$ minimization method with cross-validation for the restoration of impulse noise contaminated images*, Submitted, 2018.