Image Processing for Physicists

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Chosen topics
in computational imaging

Overview

- Computational imaging

- Optimization

  – Characterization of linear systems

  – Standard optimization methods (in 1-D and N-D)

- Complex-valued variables: Wirtinger calculus

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Computational imaging

1D optimization

- Bracketing

1D optimization

- Golden-section search

1D optimization

- Newton's method ("Newton-Raphson")

Optimization

- Gradient descent ("steepest descent")

Optimization

- Steepest descent with exact line search

Optimization

- Conjugate gradients

Optimization

- Nelder-Mead (downhill simplex method)

Optimization

- Stochastic gradient descent

Optimization

- Gauss-Newton method

Optimization

- Levenberg–Marquardt algorithm

Wirtinger derivatives

Wirtinger derivatives

Singular Value Decomposition

Singular Value Decomposition

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