Unconstrained Optimisation

A Short Series of Lectures

by

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1. Introduction

Functions of Many Variables Taylor's Theorem Conditions for Optimality Global and Local Optima The Search Direction and the Step Length

2. Line Search and Univariate Methods

Golden-Section Search The Curve-Fitting Approach Quadratic Interpolation Cubic Interpolation Bracketing the Minimum

3. Multivariate Direct-Search Methods

Method of Hooke and Jeeves The Multidimensional Downhill Simplex Method The Method of Nelder and Mead

4. Newton Methods

The Method of Steepest Descent Newton–Raphson Procedure Extensions of Newton's Method

5. Conjugate-Gradient Methods

Conjugacy and Linear Dependence Quadratic Convergence The Method of Fletcher and Reeves

6. Quasi-Newton Methods

The Method of Davidson Fletcher and Powell Broyden's Family of Methods

7. Nonlinear Least Squares

The Gauss–Newton Method The Levenberg–Marquardt Method A Corrected Gauss–Newton Method