

Optimisation 1, Lecture 16

Markus Grasmair

Department of Mathematics,
Norwegian University of Science and Technology,
Trondheim, Norway

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Previous lecture

- Quasi-Newton methods:

- ▶ In each step consider the model function

$$f(x_k + p) \approx m_k(p) = f(x_k) + \langle \nabla f(x_k), p \rangle + \frac{1}{2} \langle p, B_k p \rangle.$$

- ▶ Define the search direction p_k as the minimiser of m_k and find a suitable step length $\alpha_k > 0$.
- ▶ Define B_{k+1} by slightly changing B_k in such a way that the secant equation holds:

$$B_{k+1}s_k = y_k \quad \text{that is, } B_{k+1}(x_{k+1} - x_k) = \nabla f(x_{k+1}) - \nabla f(x_k).$$

- Symmetrix rank 1 (SR1) method:

- ▶ Choose B_{k+1} such that $B_{k+1} - B_k$ is a symmetric rank 1 matrix.

Goals for today's lecture

- The DFP and BFGS methods.
- Trust region methods as alternatives to the line search idea.