Optimisation 1, Lecture 22

Markus Grasmair

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

Trondheim,
March 24, 2023

Previous lecture

- Sequential quadratic programming for inequality constrained problems:
  - Interpret Newton's method for the KKT system as solution of a quadratic programme.
  - Generalise this idea to inequality constraints.
- Multicriteria optimisation:
  - Given a function $f : \Omega \to S$ with $(S, \preceq)$ partially ordered, a point x^* is a Pareto optimum for f, if there does not exist $x \in \Omega$ with $f(x) \prec f(x^*)$.
  - In particular if $f : \Omega \to \mathbb{R}^n$, then x^* is a Pareto optimum, if there does not exist $x \in \Omega$ with

$$\begin{aligned} f_i(x) &\leq f_i(x^*) && \text{for all } 1 \leq i \leq n, \\ f_k(x) &< f_k(x^*) && \text{for at least one } 1 \leq k \leq n. \end{aligned}$$

Goals for today's lecture

- Pareto optimality; examples.
- The weighted sum method for computing Pareto optima.