Week 3 - Unconstrained Minimization – Line Search Methods (Knud/Mort)

Theory: First order optimality for unconstrained minimization, Gradient descent method, Newton method

Literature: 41 pages of main text and 72 pages compendium.

Nocedal and Wright: Numerical Optimization, second edition, Springer, 2006.

- **Chapter 3 (pp. 30-47).**
- **section 8.1 pages 194-201 (Section 6.1 (pp. 135-144) in 2 ed.)**

K. G. Murty, Linear Complementarity, Linear and Nonlinear Programming, Helderman-Verlag, 1988.

- Chapter 10 (pp. 389-460).

In total 72 pages.

Exercises:

1: draw an example where the Armijo backtracking terminates in a point which is not a minimizer

solve exercise 3.2 , 3.3 from Nocedal and Wright

Programming case:

Re-implement the program from last week to solve the posing problem using the BFGS method.

I.e implement a line search method (I recommend choosing an Armijo backtracking)

implement a BFGS Quasi-Newton method using the line search from above.

Experiment with different initializations of the inverse hessian e.g. the identity or the inverse of $J^T J$

Report your result compared to the methods of previous assignments with regards to convergence precision etc.