SoSe 2020
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# Optimization and Data Science
## 10. Presence exercises

### Theoretical exercise 1: Stochastic gradient method

*a) For what kind of optimization problems is the stochastic gradient method useful?*

*b) How does the stochastic gradient method work?*

**Theoretical exercise 2: Stochastic, minibatch and full gradient method**

*a) What is the difference between the stochastic gradient, the minibatch gradient and the full gradient method.*

*b) How would you quantify the total computational effort of the stochastic gradient, the minibatch gradient and the full gradient method?*

**Theoretical exercise 3: Loss function**

*a) What are typical loss functions?*

*b) Are there any disadvantages when choosing certain loss functions?*

**Theoretical exercise 4: Evolution Strategies**

*a) How does the $(\mu + \lambda)$-Evolution Strategy work using the following mutability?*

- *constant mutability*

- *different mutabilities*

- *mutated mutabilities*

- *Mutation Strategy Parameter Control (MSC)*

*b) What is the difference between $(\mu + \lambda)$-ES and $(\mu, \lambda)$-ES?*

*c) What are the main differences between CMA-ES and $(\mu + \lambda)$-ES?*