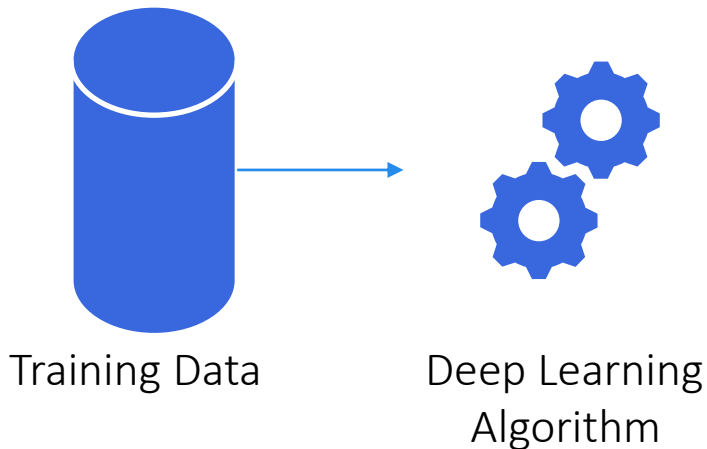# Deep Learning
Epochs / Batch Size / Iterations

Bert Gollnick
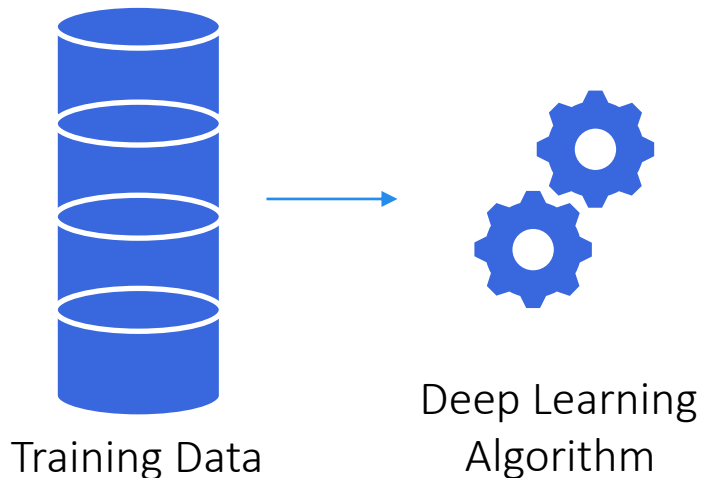
Deep Learning Epoch/BatchSize/Iterations

Problem
- Usually not possible to pass all data at once.

Solution
- Dataset divided into mini-batches.
- Batch Size represents training samples in mini-batch.

Training Data

Deep Learning Algorithm

Training Data

Deep Learning Algorithm

Deep Learning Epoch/BatchSize/Iterations

- Epoch finished when complete dataset is passed through the neural network forward and backward.

- An iteration is a single gradient update (update of model weights).

- Example:
    - Dataset of 500 images
    - Mini-batches of 50 images
    - → 10 iterations required for finishing a single epoch

Deep Learning Epoch/BatchSize/Iterations

Model History Plot
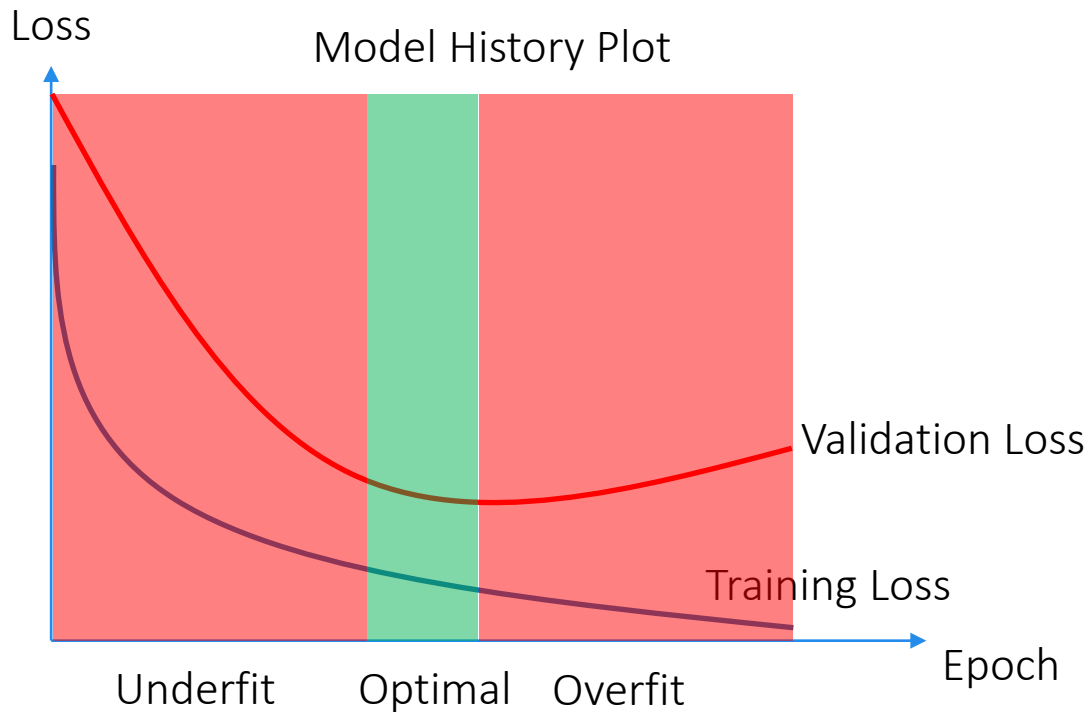
- Strategy: Early Stopping

Deep Learning Epoch/BatchSize/Iterations

- Batch size
    - Too small: high degree of variance within batches (small sample does not represent complete dataset)
    - Too large: possibly memory issues; overfitting
    - Optimum needs to be found
- Hyperparameter „batch size" influences other hyperparameters
- Combination of hyperparameters relevant, e.g. batch size & learning rate

- Heuristic:
    - $BatchSize = \sqrt{Observations}$
    - Often: batch size defined as multiple of 2, e.g. 128, 256, …