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Exercise 3: Neural Networks & Tensorflow

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Outline

1. Information
2. Goals
3. Theory / Recap (30’)
4. Tensorflow Example (10’)
5. Exercises (5’)

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Information

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Goals

Goals of Today

- Understand the potential of neural networks
- Understand how neural networks are stacked neurons (again)
- Be able to set up the matrices of a neural network
- Understand parameter optimization (again)
- Understand how parameter optimization is used for neural networks
- Understand how Tensorflow works (more extensive)

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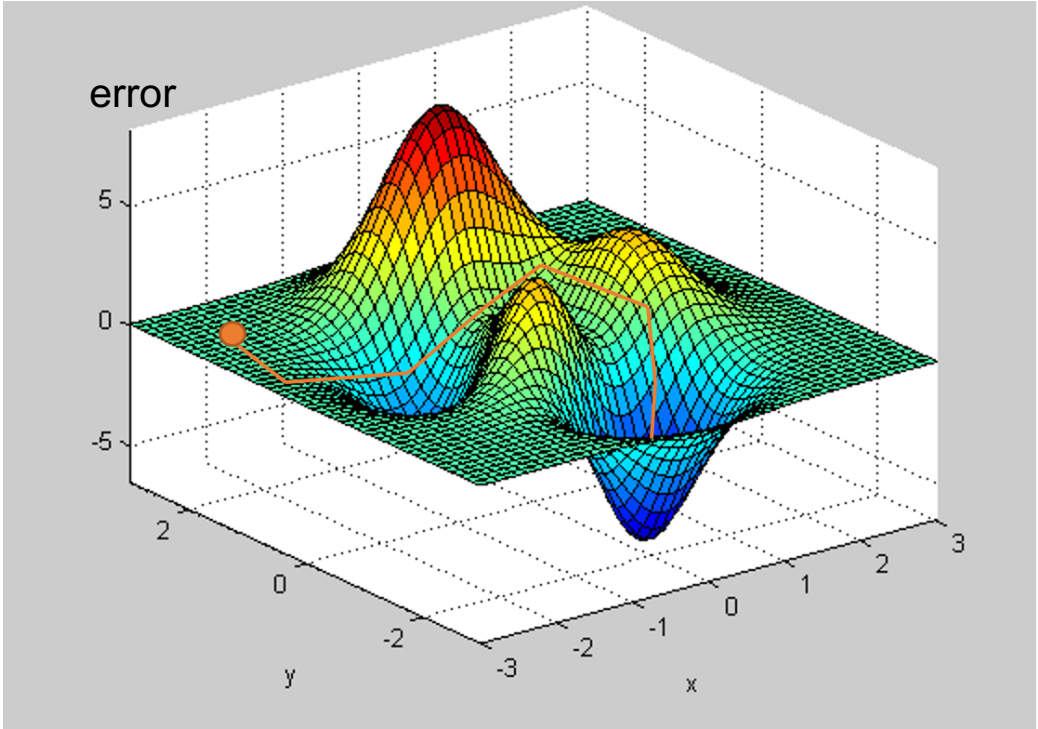
Theory / Recap

Parameter Optimization

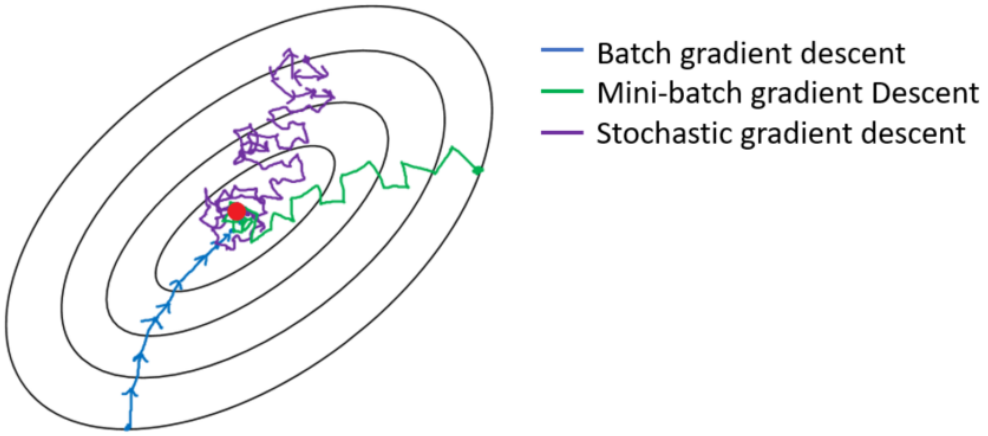
- Gradients Descent
- Looking at the image, what parameters are we optimizing ? (usually weights!)



https://towardsdatascience.com/gradient-descent-vs-neuroevolution-f907dace010f

One more thing: Batch

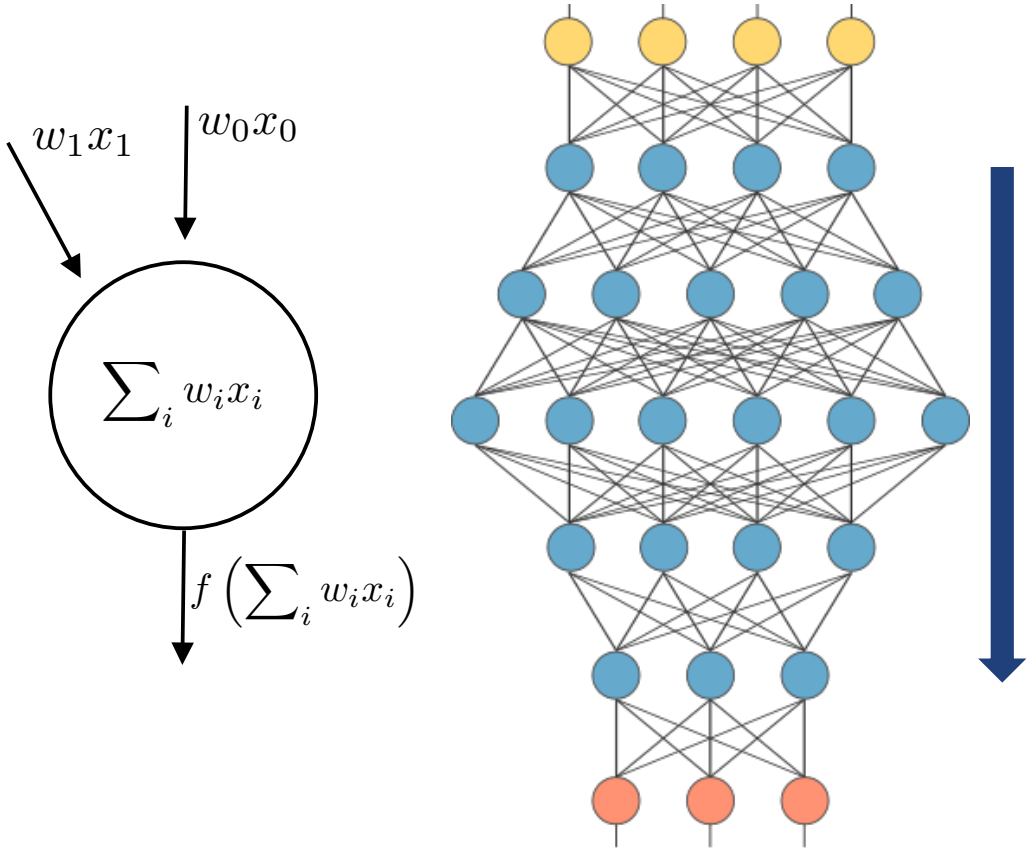
- We should average over all data
- Wouldn't fit into RAM, use smaller batches
- Stochastic Gradient Descent uses single samples



https://medium.com/@ImadPhd/gradient-descent-algorithm-and-its-variants-10f652806a3

Neural Networks

- Write single neuron with lin. alg.
- Stack to obtain network



Neural Networks: Dimensions of matrices (Tensorflow Style)

- Example: Give the weights and biases dimensions
  1. Input: [None, 10, 10], reshape as [None, 100]
  2. Layer 1: 20 neurons “20 outputs for each None”
  3. Layer 2: 5 neurons “5 outputs for each None”
  4. Output: [None, 2]

- Check out:
  - https://www.tensorflow.org/versions/r1.2/get_started/mnist/beginners (MNIST for beginners)
  - https://www.tensorflow.org/versions/r1.2/get_started/mnist/pros (MNIST for experts)
  - Don’t consider the Convolutional Layers, only look at how they set up the network and what dimensions they use!

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Tensorflow Example

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Exercises

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Questions?