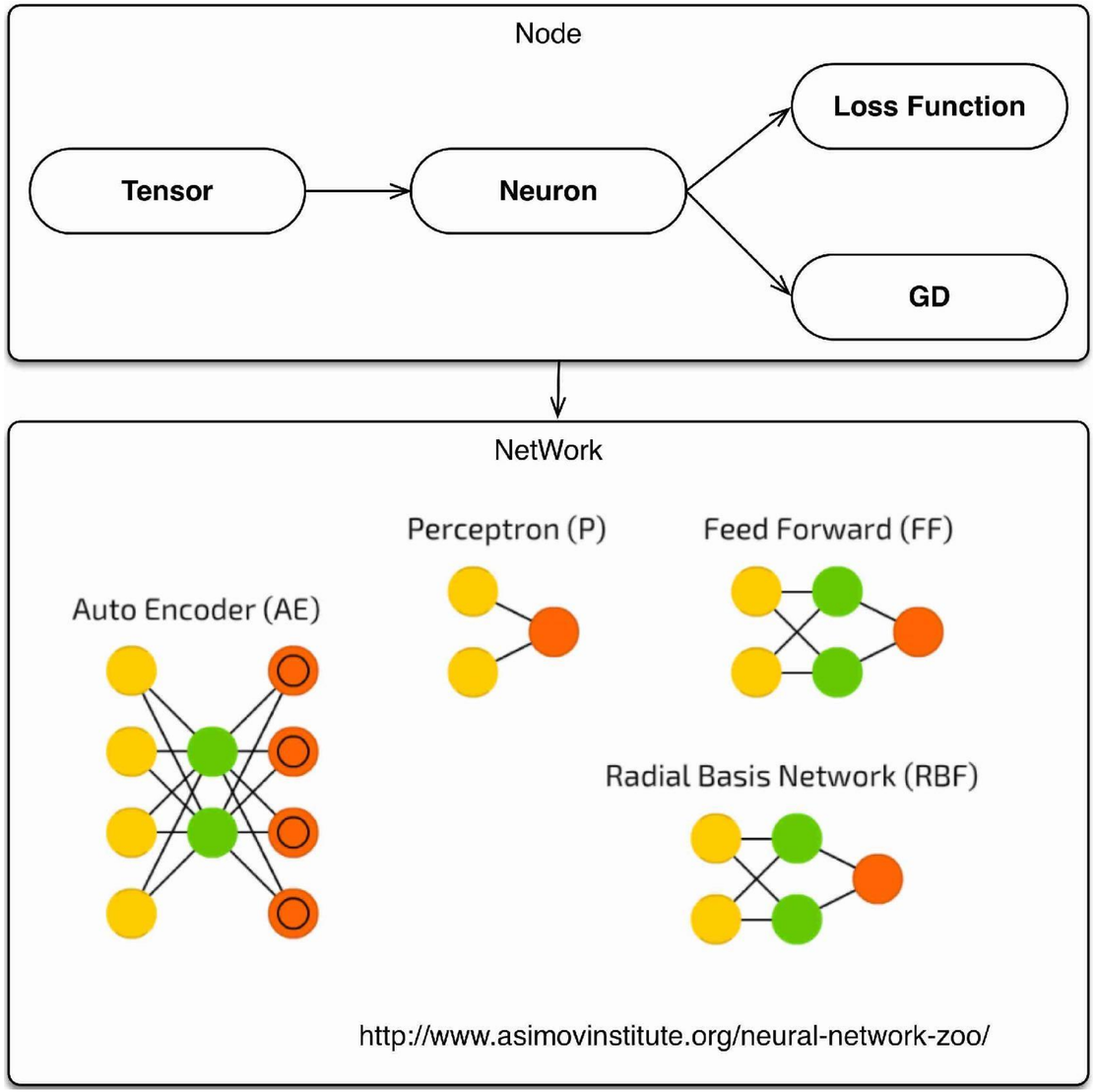
Tensorflow Basic

学习路线

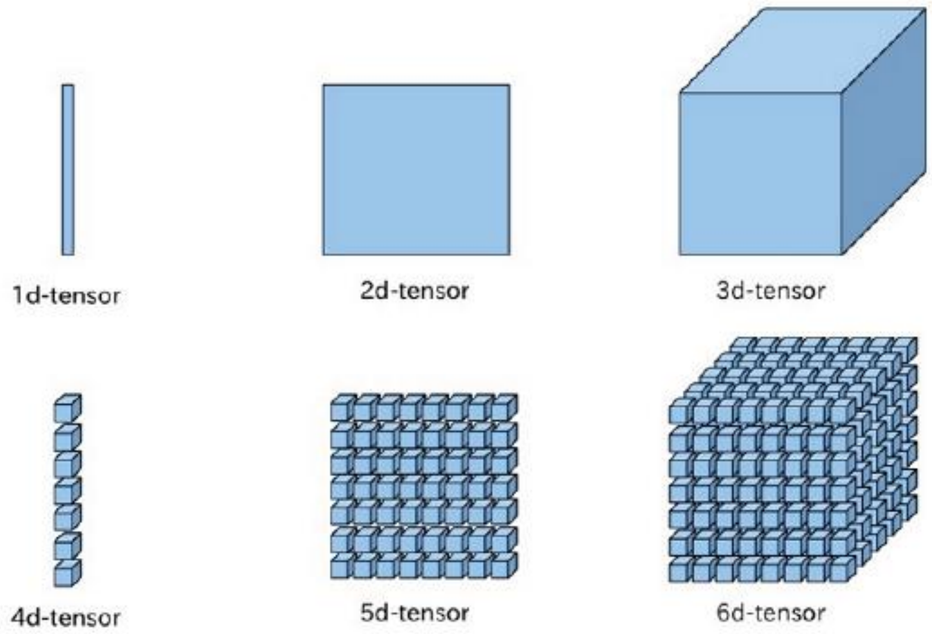

Node
Tensor
Neuron
Loss Function
GD
NetWork
Perceptron (P)
Feed Forward (FF)
Auto Encoder (AE)
Radial Basis Network (RBF)
http://www.asimovinstitute.org/neural-network-zoo/

TensorFlow 2 预备知识

- 即时执行(Eager Execution), 计算图(Graph), 会话(Session)
- Tensor
  - Constant, Placeholder, Variable 三种表现形式
  - reshape, rank

Tensor

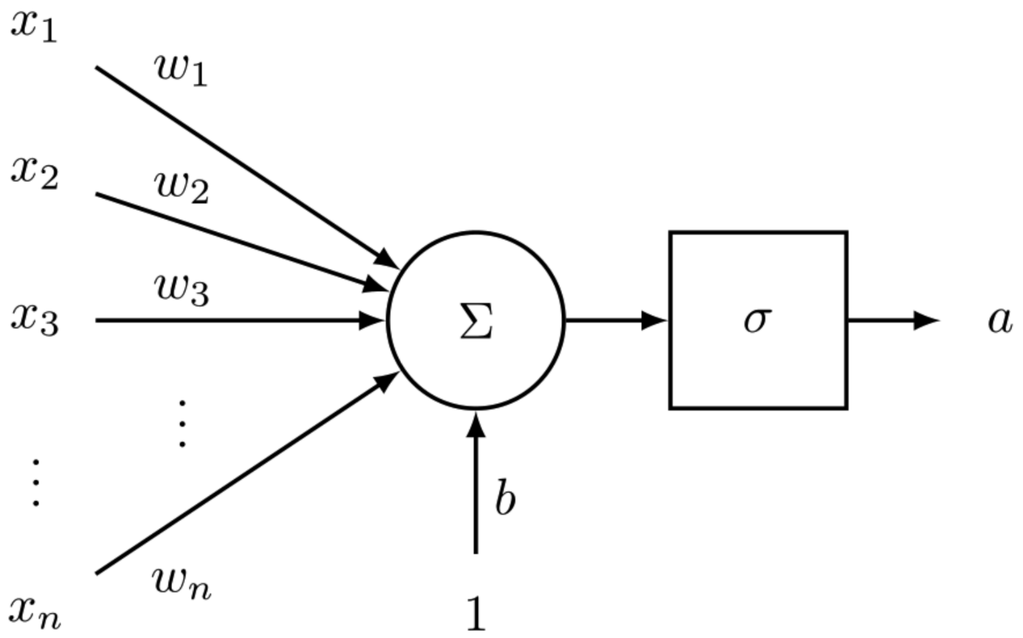
- basic_operations.ipynb
  - 用Constant实现简单计算
  - Matrix操作



https://github.com/aymericdamien/TensorFlow-Examples

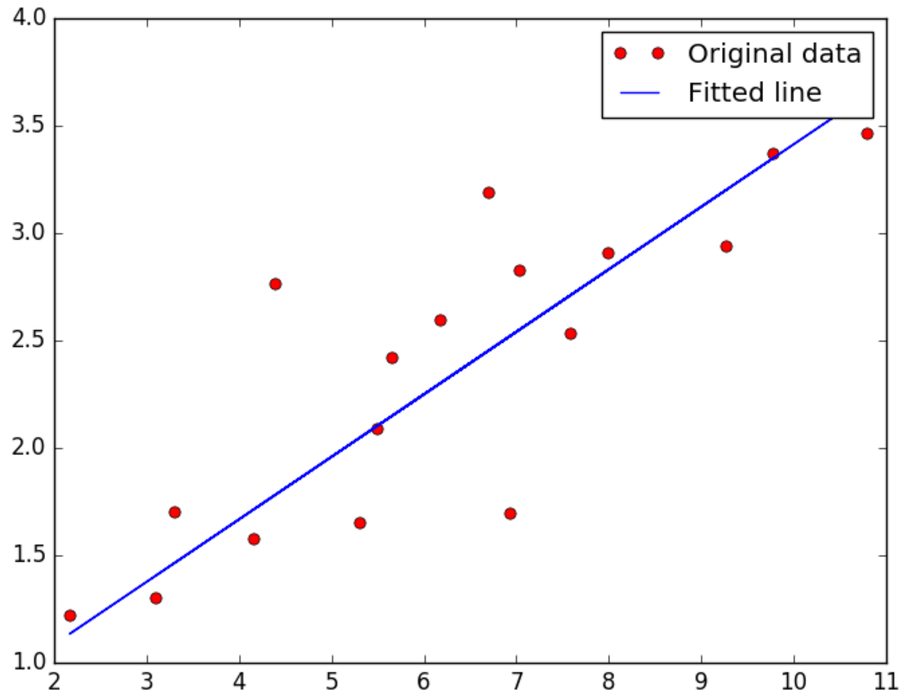
人工神经元Neuron模型

- 人工神经元
  - 建模为一个函数σ(Wx+b)，其中w是权重，x是输入，b是偏移量
  - 输入线性加权叠加
  - 一个非线性函数σ作用，进行输出，σ称为激活函数
- logistic_regression.ipynb
- 用Variables, Placeholder实现一个简单的线性人工神经元

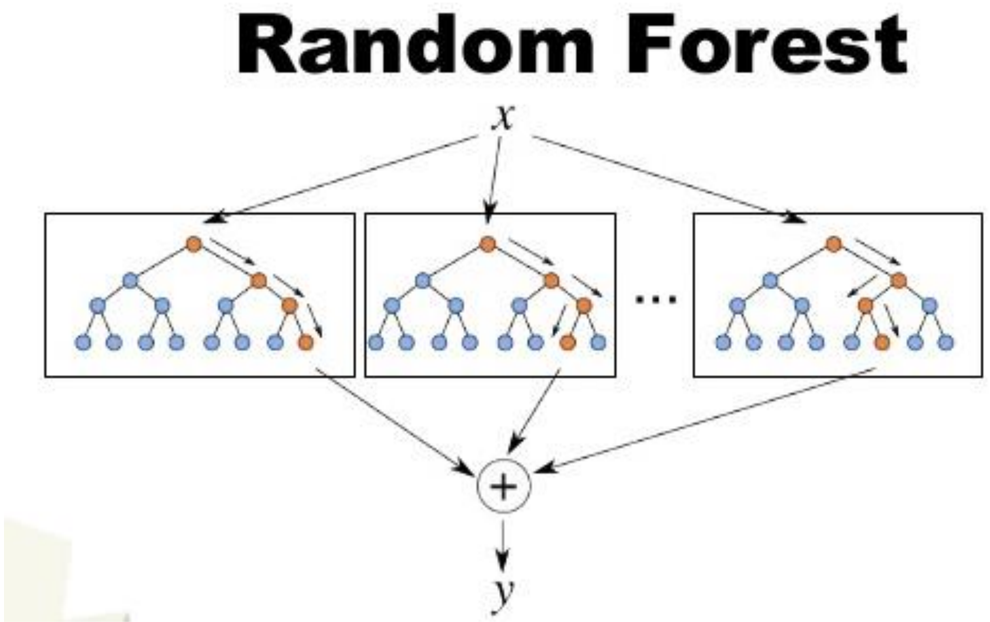


Loss & GD

- linear_regression.ipynb
  - 定义距离Loss
  - 梯度下降GD
  - 迭代优化Loss
- logistic_regression.ipynb
  - 多一个sigmod激活函数

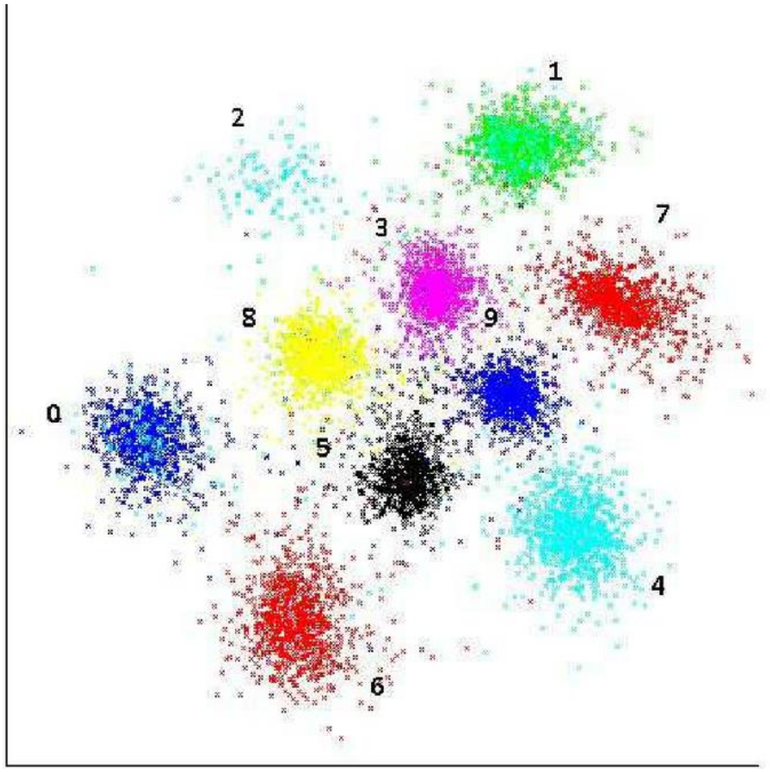


Mnist传统解法



随机森林

random_forest.ipynb



最近邻方法

nearest_neighbor.ipynb

DNN思考

- 打开https://playground.tensorflow.org/
- 思考如下几个问题:
  - 调节学习率，看收敛速度有什么差别
  - 1-2个神经元分别能处理什么样的分类问题
  - 最少需要多少个神经元可解XOR问题
  - 做出螺旋线问题,比比训练速度和神经元数(loss < 0.05)

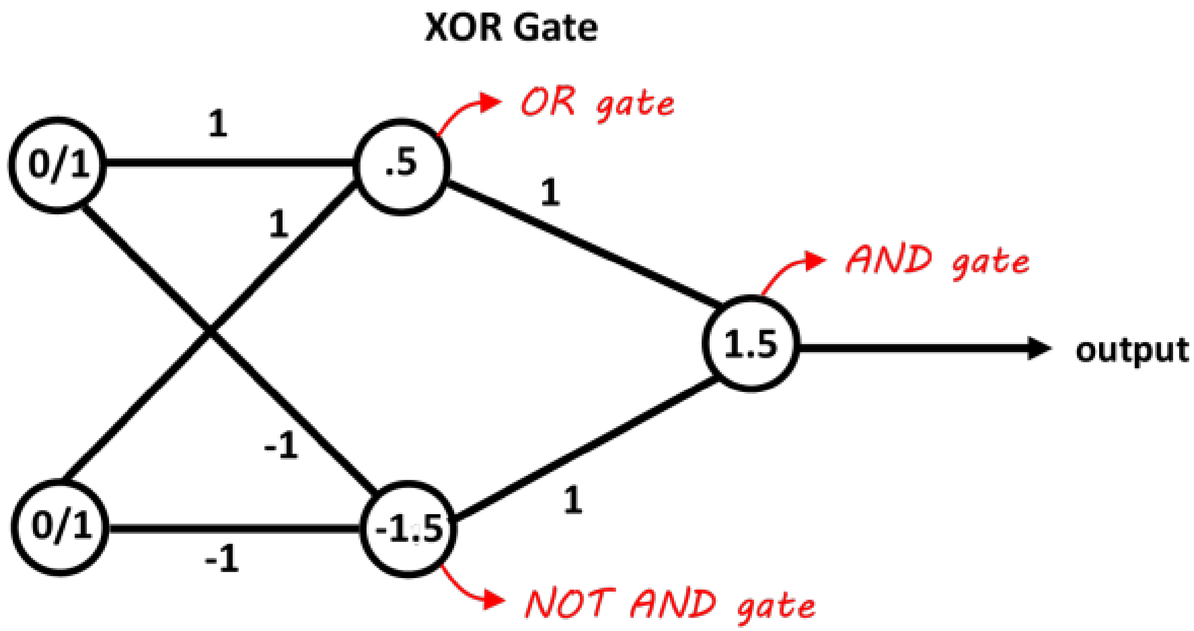
收敛讨论

- 学习率过大会引起震荡,学习率太小收敛太慢;
- NN对初始值的选择比较敏感，如何初始化参数;
- 测试集和训练集的Loss差异

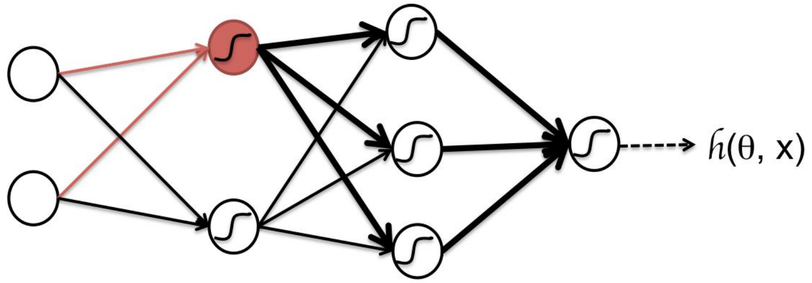
XOR问题

- 不是个线性问题
- 2个ReLU神经元可解

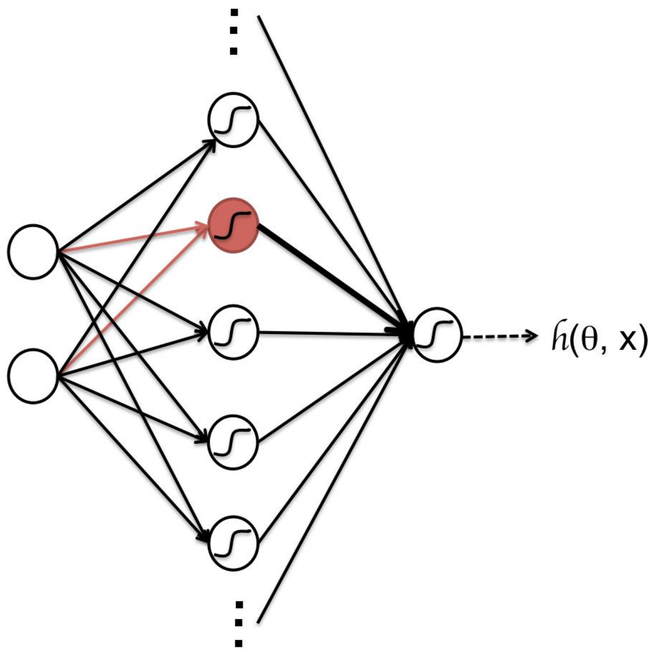
	0	1
0	0	-0.5
1	-0.5	0



宽度 vs. 深度



Deep Network



Shallow Network

Deep networks are more “compact” than shallow counterparts.
When a function can be compactly represented by a deep architecture, it might need a very large architecture to be represented by an insufficiently deep one.

Reference

- Q.V. Le. A Tutorial on Deep Learning Lecture Notes, 2015.
- Y. Bengio. Learning deep architectures for AI. Foundations and Trends in Machine Learning, 2(1):1-127, 2009.
- L. Ba and R. Caurana. Do deep nets really need to be deep? arXiv preprint arXiv:1312.6184, 2013.
- Y. LeCun, L. Bottou, G. Orr, and K. R. Muller. Efficient backprop. In Neural networks: Tricks of the trade. Springer, 1998.

谢谢大家！