6.16 review

神经网络基础

通过cs231n课程, 目前已经对训练一个全连接层网络步原理以及步骤有了基本的了解, 主要包括:

- 数据预处理
- 前向以及反向传播
- 正则化方法
- 梯度更新相关算法

学习材料

1. 学习课程的视频以及 note **目前已经完成 module1**

   Module 0: Preparation

Software Setup
Python / Numpy Tutorial (with Jupyter and Colab)

   Module 1: Neural Networks

Image Classification: Data-driven Approach, k-Nearest Neighbor, train/val/test splits L1/L2 distances, hyperparameter search, cross-validation
Linear classification: Support Vector Machine, Softmax parameteric approach, bias trick, hinge loss, cross-entropy loss, L2 regularization, web demo
Optimization: Stochastic Gradient Descent optimization landscapes, local search, learning rate, analytic/numerical gradient
Backpropagation, Intuitions chain rule interpretation, real-valued circuits, patterns in gradient flow
Neural Networks Part 1: Setting up the Architecture model of a biological neuron, activation functions, neural net architecture, representational power
Neural Networks Part 2: Setting up the Data and the Loss preprocessing, weight initialization, batch normalization, regularization (L2/dropout), loss functions
Neural Networks Part 3: Learning and Evaluation gradient checks, sanity checks, babysitting the learning process, momentum (+nesterov), second-order methods, Adagrad/RMSprop, hyperparameter optimization, model ensembles
Putting it together: Minimal Neural Network Case Study minimal 2D toy data example

2. 课程作业完成**assignment1** being12345/cs231n: cs231n (github.com) -- 使用 numpy 手写一个二层神经网络

图机器学习

看了相关图机器学习综述

学习图机器学习库 networkx, 并且代码实践

学习图机器学习特征工程: 节点工程, 边工程, 全图工程(人工)方法

相关材料

1. 综述(没有代码比较空泛)
2. networkx库代码视频学习

3. 相关理论学习至2

Date	Description	Optional Readings	Events	Deadlines
Tue 1/10	1. Introduction [slides]			
Thu 1/12	2. Feature Engineering for ML in Graphs [slides]	• Efficient Graphlet Kernels for Large Graph Comparison • Weisfeiler-lehman Graph Kernels	Colab 0, Colab 1 **out**	
Tue 1/17	3. Node Embeddings [slides]	• DeepWalk: Online Learning of Social Representations • node2vec: Scalable Feature Learning for Networks • Network Embedding as Matrix Factorization		
Thu 1/19	4. Graph Neural Networks [slides]	• Geometric Deep Learning: the Erlangen Programme of ML • Semi-Supervised Classification with Graph Convolutional Networks	Homework 1 **out**	
Tue 1/24	5. A General Perspective on GNNs [slides]	• Design Space of Graph Neural Networks • Inductive Representation Learning on Large Graphs • Graph Attention Networks		

计划

1. 继续相关理论学习阅读经典 paper
2. 实践 paper 中的代码熟悉图机器学习编程

线性代数

复习至**vector space**

学习材料

1. 学习 MIT 18.06 strang 课程 以及阅读相关教材至11

SES #	TOPICS	READINGS IN 4TH EDITION	READINGS IN 5TH EDITION
1	The geometry of linear equations	1.1-2.1	1.1-2.1
2	Elimination with matrices	2.2-2.3	2.2-2.3
3	Matrix operations and inverses	2.4-2.5	2.4-2.5
4	*LU* and *LDU* factorization	2.6	2.6
5	Transposes and permutations	2.7	2.7
6	Vector spaces and subspaces	3.1	3.1
7	The nullspace: Solving Ax = 0	3.2	3.2
8	Rectangular *PA* = *LU* and Ax = b	3.3-3.4	3.3
9	Row reduced echelon form	3.3-3.4	3.3
10	Basis and dimension	3.5	3.4
11	The four fundamental subspaces	3.6	3.5

矩阵微积分

学习了梯度的求法对于经典函数例如 softmax sigmoid WX 做了推导

学习材料

1. being12345/matrix_calculus: This is including most useful matrix calculus material (github.com)