OpenAI Scholars

Syllabus

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Date: February 6, 2019

Goals

- ✦ Develop a strong foundation in current state of the art NLP theory and methods
- ✦ Overview reinforcement learning
- ✦ Introduce myself to unsupervised learning
- ✦ Understand recent developments in question answering systems enough for me to attempt a new development in question answering systems using reinforcement learning and unsupervised learning for my project
  - ✧ Deploy my project on mobile and web at the end of the program
- ✦ Grow from all these experiences so that I am able to continue to doing exciting work in the field, ideally going more in depth as an OpenAI Fellow on the Language Team

Approach

Going through relevant coursework and reading seminal papers, all while implementing what I'm learning. I have cast my net wide in the first month so that in the second month I can zero in on topics most relevant to my project of interest. I have left space in this syllabus during the second month to add papers relevant to my project. Note: CS224n topics include papers in suggested readings.

Materials

- ✾ Natural Language Processing
  - ✾ CS224n: Natural Language Processing with Deep Learning
  - ✾ Attention Is All You Need
  - ✾ Natural Language Understanding: Foundations and State-of-the-Art

- ✿ Reinforcement Learning
  - ✿ RL0-Intro
  - ✿ RL1-Policy-Gradients
  - ✿ RL2-Q-Functions
  - ✿ RL3-Large_Scale
- ❄ Unsupervised Learning
  - ❄ Reducing the Dimensionality of Data with Neural Networks
  - ❄ Autoencoders
  - ❄ PCA Whitening
  - ❄ PCA Whitening Implementation
  - ❄ Sparce Encoding
  - ❄ ICA
  - ❄ RICA
  - ❄ RICA Implementation
- ✣ Seminal Project Papers
  - ✣ Improving Language Understanding with Unsupervised Learning
  - ✣ Improving Language Understanding by Generative Pre-Training
  - ✣ Semi-Supervised Sequence Learning
  - ✣ Open Sourcing Active Question Reformulation with Reinforcement Learning
  - ✣ Open Sourcing BERT: State-of-the-Art Pre-training for Natural Language Processing
  - ✣ Universal Language Model Fine-tuning for Text Classification
  - ✣ Coarse-to-Fine Question Answering for Long Documents

Schedule

Week 1

February 4

- ✦ Draft syllabus content
- ✦ Download & configure PyCharm

February 5

- ✦ Draft syllabus content
- ✦ Configure terminal (bashrc, bash_profile, vimrc)

February 6

- ✦ Draft & schedule syllabus content
- ✦ Investigate model serving
- ✦ TensorFlow installation

February 7

- ✦ Revise Syllabus
- ❃ CS224n Word Vectors
- ❃ Natural Language Understanding: Foundations and State-of-the-Art
- ❄ Autoencoders

February 8

- ✦ Finalize Syllabus
- ✿ RL0-Intro

February 9

- ❃ CS224n Word Vectors 2 and Word Senses
- ❄ Reducing the Dimensionality of Data with Neural Networks

February 10

- ✿ RL0-Intro

Week 2

February 11

- ❃ CS224n Assignment #1: Exploring Word Vectors
- ❄ PCA Whitening

February 12

- ✿ RL0-Intro

February 13

- ❃ CS224n Word Window Classification, Neural Networks, and Matrix Calculus
- ❄ PCA Whitening Implementation

February 14

- ✿ RL0-Intro

February 15

- ❃ CS224n Backpropagation and Computation Graphs
- ❄ Sparce Encoding

February 16

- ✿ RL-Intro

February 17

- ✾ CS224n Assignment #2: Word2Vec
- ❄ ICA

Week 3

February 18

- ✿ RL0-Intro

February 19

- ✾ CS224n Linguistic Structure: Dependency Parsing
- ❄ RICA

February 20

- ✿ RL0-Intro

February 21

- ✾ CS224n The probability of a sentence? Recurrent Neural Networks and Language Models
- ❄ RICA Implementation

February 22

- ✿ RL1-Policy-Gradients

February 23

- ✾ CS224n Assignment #3: Dependency Parsing
- ❄ InfoGAN

February 24

- ✿ RL1-Policy-Gradients

Week 4

February 25

- ✾ CS224n Vanishing Gradients and Fancy RNNs

February 26

- ✿ RL1-Policy-Gradients

February 27

- ✾ CS224n Machine Translation, Seq2Seq and Attention

February 28

- ✿ RL1-Policy-Gradients

March 1

- ✾ CS224n Transformers
- ✾ Attention Is All You Need
- ✾ Transformer Implementation

March 2

- ✿ RL1-Policy-Gradients

March 3

- ✾ CS224n Assignment #4: Neural Machine Translation

Week 5

March 4

- ✿ RL1-Policy-Gradients

March 5

- ✾ CS224n Question Answering

March 6

- ✿ RL1-Policy-Gradients

March 7

- ✾ CS224n Natural Language Generation
- ✣ Improving Language Understanding by Generative Pre-Training

March 8

- ✿ RL2-Q-Functions

March 9

- ✾ CS224n Reinforcement Learning for NLP Guest Lecture
- ✣ Universal Language Model Fine-tuning for Text Classification
- ✣ Coarse-to-Fine Question Answering for Long Documents

March 10

- ✿ RL2-Q-Functions

Week 6

March 11

- ✾ CS224n Semi-supervised Learning for NLP
- ✣ Semi-Supervised Sequence Learning
- ✣ Improving Language Understanding with Unsupervised Learning

March 12

- ✿ RL2-Q-Functions

March 13

- ✾ CS224n ConvNets for NLP

March 14

- ✿ RL2-Q-Functions

March 15

- ✾ CS224n Information from parts of words: Subword Models

March 16

- ✿ RL2-Q-Functions

March 17

- ✾ CS224n Modeling contexts of use: Contextual Representations and Pretraining

Week 7

March 18

- ✦ Project Planning
- ✿ RL2-Q-Functions

March 19

- ✦ Project Planning
- ✾ Assignment 5 TBD

March 20

- ✦ Project Planning
- ✿ RL2-Q-Functions

March 21

- ✦ Project Planning
- ✾ CS224n Reference in Language and Coreference Resolution

March 22

- ✦ Project Planning
- ✿ RL3-Large_Scale

March 23

- ✦ Project Planning
- ✾ CS224n Multitask Learning: A general model for NLP?

March 24

- ✦ Project Planning
- ✿ RL3-Large_Scale

Week 8

March 25

- ✦ Project Planning
- ✾ CS224n Constituency Parsing and Tree Recursive Neural Networks

March 26

- ✦ Project Planning
- ✿ RL3-Large_Scale

March 27

- ✦ Project Planning
- ✾ CS224n Safety, Bias, and Fairness

March 28

- ✦ Project Planning
- ✿ RL3-Large_Scale

March 29

- ✦ Project Planning
- ✿ RL3-Large_Scale

March 30

- ✦ Project Planning
- ✿ RL3-Large_Scale

March 31

- ✦ Project Planning
- ✿ RL3-Large_Scale

Week 9-13 Project