CS 7016: Topics in Deep Learning

Course Instructor : Mitesh M. Khapra

Course Details

Credits: 12

Slot : K

Classes : Wednesday 15.25 : 16.40, Friday : 14.00-15.15

Teaching Assistant ~~"s"~~ : Preksha Nema (CS15D201)
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``A subset of these Topics'':

1) Word Embeddings
2) Question Answering
3) GCNs for NLP
4) Object Detection
5) Pose Estimation
6) Video Processing
7) Interpretability

Contextual Representations: Papers

1) Glove Embeddings
2) ElMo
3) BERT
4) Autoregressive Networks
5) XLNet
6) What does BERT Look at ?
7) A Structural Probe for finding Syntax in Word Representations

Question Answering : Papers

1) Datasets
2) BiDAF
3) DCNs
4) Gated Attention Reader
5) ReasoNet
6) Gated Self-Matching Networks
7) Match-LSTMs
8) Multi-perspective Context Matching
9) Iterative Alternative Neural Attention
10) MultiQA
11) Enhancing Pre-Trained Language Representations with Rich Knowledge for Machine Reading Comprehension
12) Explicit Utilization of General Knowledge in Machine Reading Comprehension
13) Adversarial SQuAD, Adversarial Example Generation

Interpretability for NLP:

1) Visualizing and Understanding Recurrent Networks
2) Understanding Neural Networks through Representation Erasure
3) Attention is not Explanation
4) Is Attention Interpretable ?
5) Contextual Decomposition
6) Automatic Rule Extraction from Long Short Term Memory Networks
7) Towards Explainable NLP
8) Interpretable Neural Predictions
9) Extracting Automata from RNN
10) Do Human Rationales improve Machine Learning

Object Detection

1) RCNN
2) Fast-RCNN
3) Faster-RCNN
4) Yolov1
5) Yolov2
6) Yolov3
7) FPN
8) RetinaNet
9) Speed/accuracy trade-offs for modern convolutional object detectors
10) Acquisition of Localization Confidence for Accurate Object Detection

Pose Estimation

1) Learning Human Pose Estimation Features with Convolutional Networks
2) DeepPose: Human Pose Estimation via Deep Neural Networks
3) Efficient Object Localization Using Convolutional Networks
4) Flowing ConvNets for Human Pose Estimation in Videos
5) Convolutional Pose Machines
6) Recurrent Human Pose Estimation
7) LSTM Pose Machines
8) Real-time 2D Multi-Person Pose Estimation on CPU: Lightweight OpenPose

GCNs and It's Applications

1) Graph Convolutional Networks
2) Semantic Role Labelling
3) Relation Extraction -I
4) Relation Extraction-II
5) Text Classification
6) Multihop-QA
7) Summarization
8) Goal Oriented Dialog
9) In word embeddings
10) Cognitive Graphs

Video Processing

1) Classification ([1], [2], [3], [4], [5])
2) Captioning ([1], [2], [3])
3) Video Summarization ([1], [2])
4) Question Answering ([1], [2], [3], [4])
5) Question Generation ([1])
6) Action Recognition ([1], [2], [3], [4], [5], [6], [7])

Assignments

1) Implement 2 QA models (15 %)
2) Implement 2 Video Processing models (15 %)

Projects (40 %)

1) Helmet Detection + Number Plate identification (will require object detection)
2) Cricket shot detection (will require pose estimation)
3) Sign Language Translation (will require pose estimation)
4) Satellite imagery analysis
5) You are free to propose your own projects

Evaluation

Mini-Quizzes : 25%

Class Participation: 5%

Assignment-I : 15%

Assignment-II : 15%

Project Phase I : 20%

Project Phase II : 20%