CS224N: Natural Language Processing with Deep Learning

Machine Comprehension on SQuAD using Bi-Directional Attention Flow

Ruohan Zhan and Daisy Ding

Institute for Computational and Mathematical Engineering, Stanford University

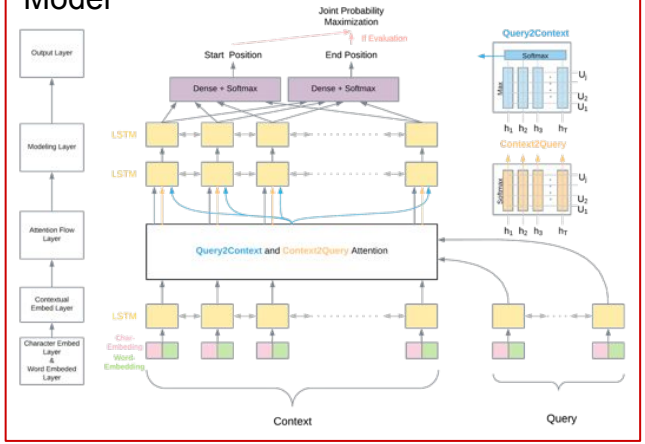
Motivation

Machine comprehension (MC) aims to extract information from a given context in response to a given query. Various industries are paying close attention to artificial intelligent agents with machine comprehension capability, from legal service support to financial trading.

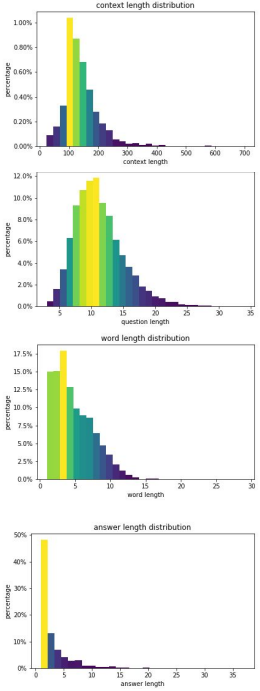
Problem Formulation

Given a context and one or many questions, build machine comprehension system to predict answers for questions. For SQuAD dataset, answers are excerpts from contexts.

Model



Data: SQuAD



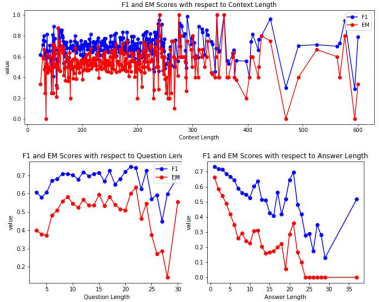
Results and Analysis

Model comparison

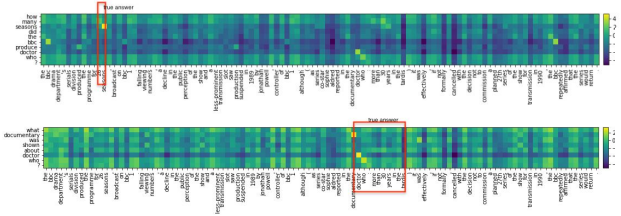
Model	Dev Set F1	Dev Set EM	Test Set F1	Test Set EM
Baseline	43.6	34.3	-	-
OurBiDAF1	72.4	62.2	-	-
OurBiDAF2, joint-pred	73.7	62.7	-	-
OurBiDAF3, joint-pred, char-embed	75.3	64.7	75.6	65.3
BiDAF,[1]	-	-	77.3	68.0
Dynamic Coattention	-	-	75.9	66.2
r-net	-	-	68.4	77.5
Human Performance	-	-	91.2	82.3

Table 1: Result comparison among different models(single) on Dev set

Context/Question/Answer Length



Attention Visualization



Question Type

Question Type	F1	EM
What	64.23	49.53
When	81.28	68.32
How	75.91	54.20
Who	74.82	67.05
Where	64.06	64.10
Which	75.29	50.58
Why	53.63	17.30

Conclusion and Further Study

In this project, we re-implemented BiDAF model and achieved good performance in dev and test set of SQuAD dataset. Further studies look into more advanced model such as coattention and R-Net, better loss function, etc.

Reference

[1] M. J. Seo, *et al.*, , "Bidirectional attention flow for machine comprehension," CoRR, vol. abs/1611.01603, 2016.