2019-1 Deep Learning Homework #3

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(Deadline : May 6)

1. Use long short term memory (LSTM) to perform sentiment analysis on the following dataset [1].

   `https://ai.stanford.edu/~amaas/data/sentiment/`

   (a) Perform Porter's stemming algorithm, and compare the performance with no stemming algorithm.

   (b) Run conditional mutual information to filter top 500 words and perform sentiment analysis. Compare the experimental results with those of no filtering.

   For mutual information, refer `http://susandumais.com/cikm98.pdf` [2].

   (c) Generate a bag of words and apply support vector machine (SVM). Compare the results with those of LSTM on the original sequence data.

2. Go through the following tutorial for Word2Vec [3] generation using Gensim and OpinRank data. Perform experiments in the tutorial and prepare a report.

   `http://kavita-ganesan.com/gensim-word2vec-tutorial-starter-code/`

   `http://kavita-ganesan.com/entity-ranking-data/`

3. Go through the following tutorial for continuous bag of words (CBOW) [3] Word2Vec technique. Perform experiments in the tutorial and prepare a report.

   `https://bit.ly/2UOD2kL`

4. Go through the following tutorial for Skip-gram [3] Word2Vec technique with negative sampling [4]. Perform experiments in the tutorial and prepare a report.

   `https://bit.ly/2Vhp5v2`

5. Go through the following tutorial for Global Vectors (GloVe) [5] Word2Vec technique. Perform experiments in the tutorial and prepare a report.

   `https://bit.ly/2Ixdn9B`

   `https://github.com/thushv89/word2vec/blob/master/word2vec_GloVe.ipynb`

   For more information on GloVe, please consult the following:

   `https://nlp.stanford.edu/projects/glove/`

   `https://github.com/stanfordnlp/GloVe`

   `https://www.youtube.com/watch?v=ASn7ExxLZws`

6. Perform experiments of a part of speech (POS) tagger following the tutorial below:

   `https://bit.ly/2IIDObM`

7. Perform experiments of "Translation with a Sequence to Sequence Network and Attention" [6, 7, 8, 9] following the tutorial below:

   `https://pytorch.org/tutorials/intermediate/seq2seq_translation_tutorial.html`

Write a detailed report for all the experiments above and send the report to `dkkang@gmail.com`. The report has to be as detailed as possible.

References

[1] Andrew L. Maas, Raymond E. Daly, Peter T. Pham, Dan Huang, Andrew Y. Ng, and Christopher Potts. Learning Word Vectors for Sentiment Analysis. In *Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics: Human Language Technologies*, pages 142–150, Portland, Oregon, USA, June 2011. Association for Computational Linguistics.

[2] Susan Dumais, John Platt, David Heckerman, and Mehran Sahami. Inductive Learning Algorithms and Representations for Text Categorization. In *Proceedings of the Seventh International Conference on Information and Knowledge Management*, CIKM '98, pages 148–155, New York, NY, USA, 1998. ACM. event-place: Bethesda, Maryland, USA.

[3] Tomas Mikolov, Kai Chen, Greg Corrado, and Jeffrey Dean. Efficient Estimation of Word Representations in Vector Space. In *1st International Conference on Learning Representations, ICLR 2013, Scottsdale, Arizona, USA, May 2-4, 2013, Workshop Track Proceedings*, 2013.

[4] Tomas Mikolov, Ilya Sutskever, Kai Chen, Greg S Corrado, and Jeff Dean. Distributed Representations of Words and Phrases and their Compositionality. In C. J. C. Burges, L. Bottou, M. Welling, Z. Ghahramani, and K. Q. Weinberger, editors, *Advances in Neural Information Processing Systems 26*, pages 3111–3119. Curran Associates, Inc., 2013.

[5] Jeffrey Pennington, Richard Socher, and Christopher Manning. Glove: Global Vectors for Word Representation. In *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, pages 1532–1543, Doha, Qatar, October 2014. Association for Computational Linguistics.

[6] Ilya Sutskever, Oriol Vinyals, and Quoc V Le. Sequence to Sequence Learning with Neural Networks. In Z. Ghahramani, M. Welling, C. Cortes, N. D. Lawrence, and K. Q. Weinberger, editors, *Advances in Neural Information Processing Systems 27*, pages 3104–3112. Curran Associates, Inc., 2014.

[7] Dzmitry Bahdanau, Kyunghyun Cho, and Yoshua Bengio. Neural Machine Translation by Jointly Learning to Align and Translate. In *3rd International Conference on Learning Representations, ICLR 2015, San Diego, CA, USA, May 7-9, 2015, Conference Track Proceedings*, 2015.

[8] Oriol Vinyals and Quoc V. Le. A Neural Conversational Model. *CoRR*, abs/1506.05869, 2015.

[9] Kyunghyun Cho, Bart van Merriënboer, Çağlar Gülçehre, Dzmitry Bahdanau, Fethi Bougares, Holger Schwenk, and Yoshua Bengio. Learning Phrase Representations using RNN Encoder–Decoder for Statistical Machine Translation. In *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, pages 1724–1734, Doha, Qatar, October 2014. Association for Computational Linguistics.