BerConvoNet: A deep learning framework for fake news classification

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Why This Paper?

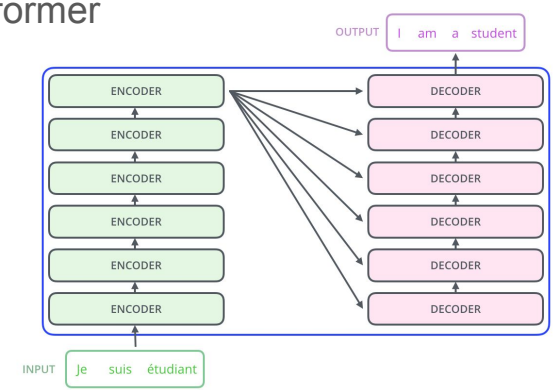
- Fake news
- Social Media Network
- Machine Learning

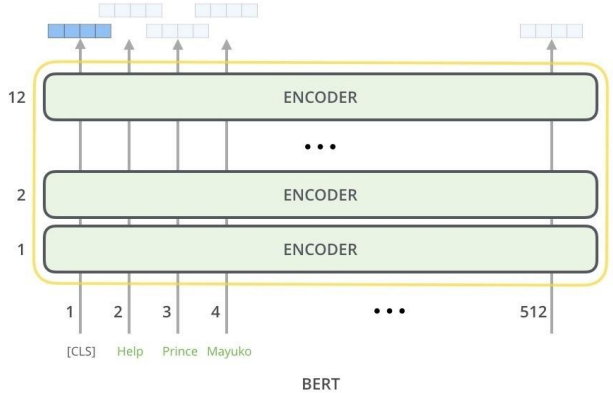
BERT(Bidirectional Encoder Representations from Transformers)

BERT is a pretrained, transformer-based unsupervised language model introduced by Google.

- published on October 2018
- a huge book corpus and Wikipedia
- leverage pre-training instead

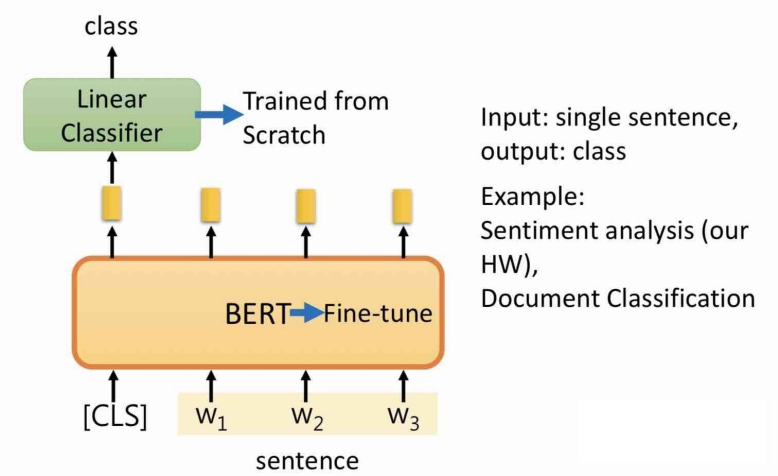
Transformer





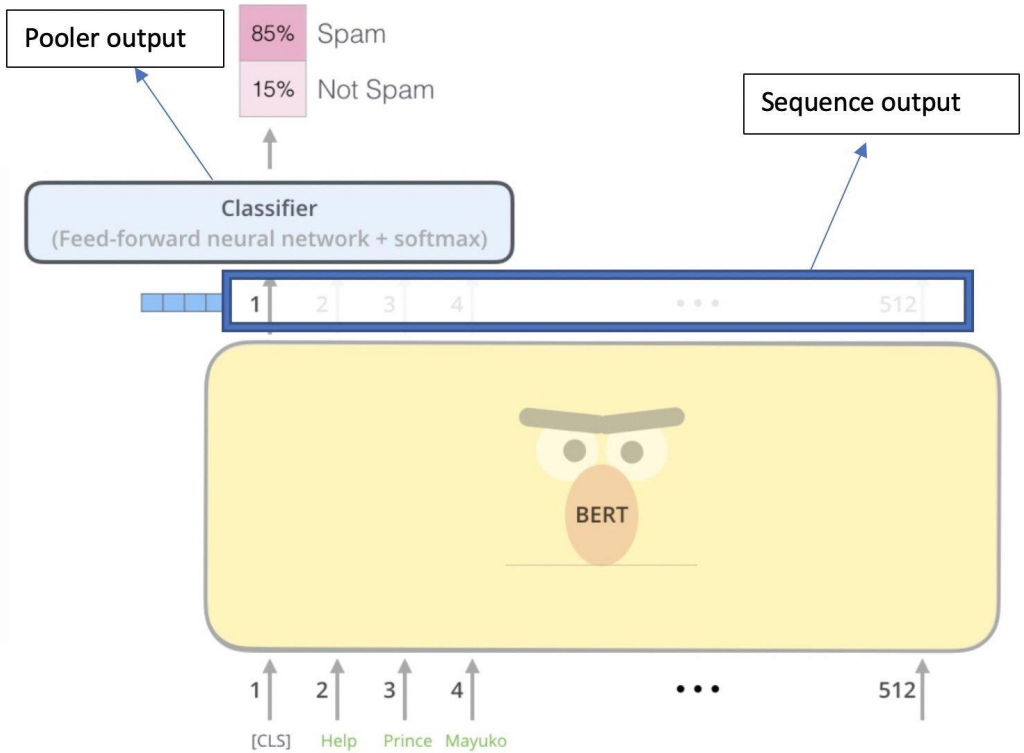
https://jalammar.github.io/illustrated-transformer/

BERT



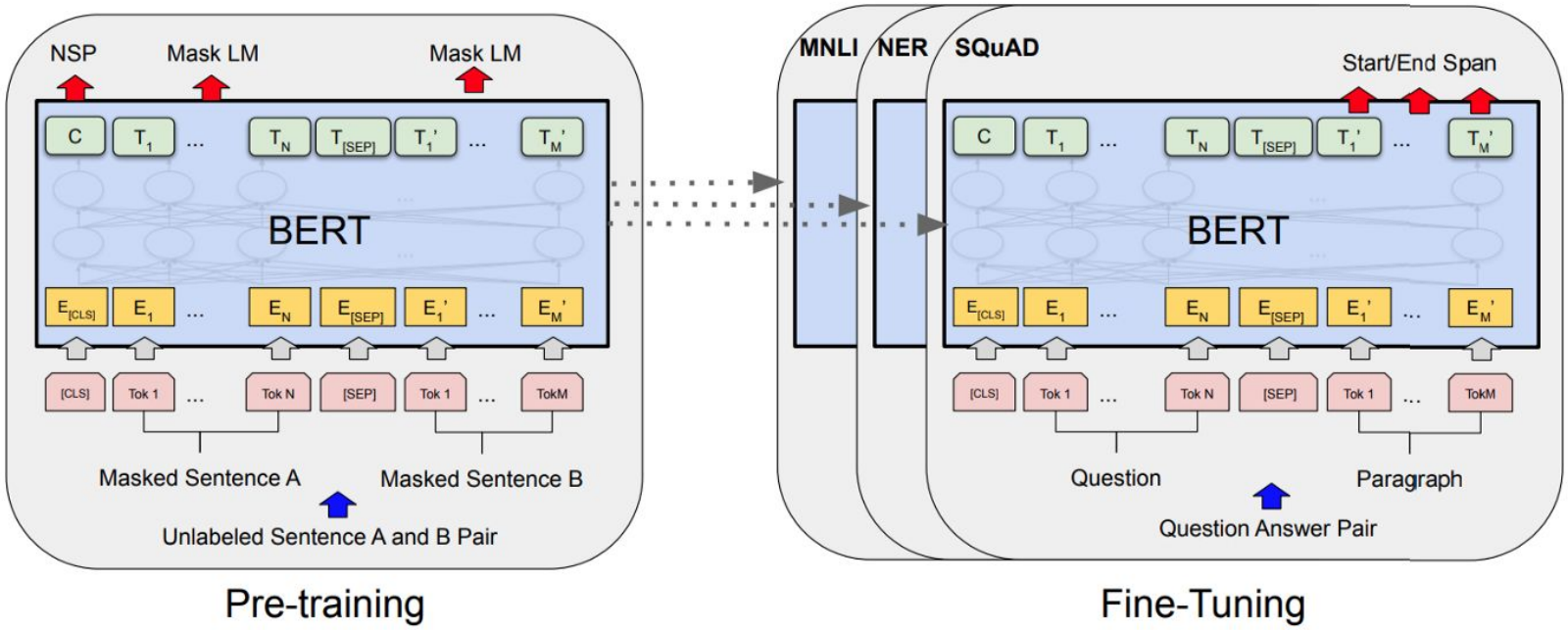
Input: single sentence, output: class

Example:
Sentiment analysis (our HW),
Document Classification

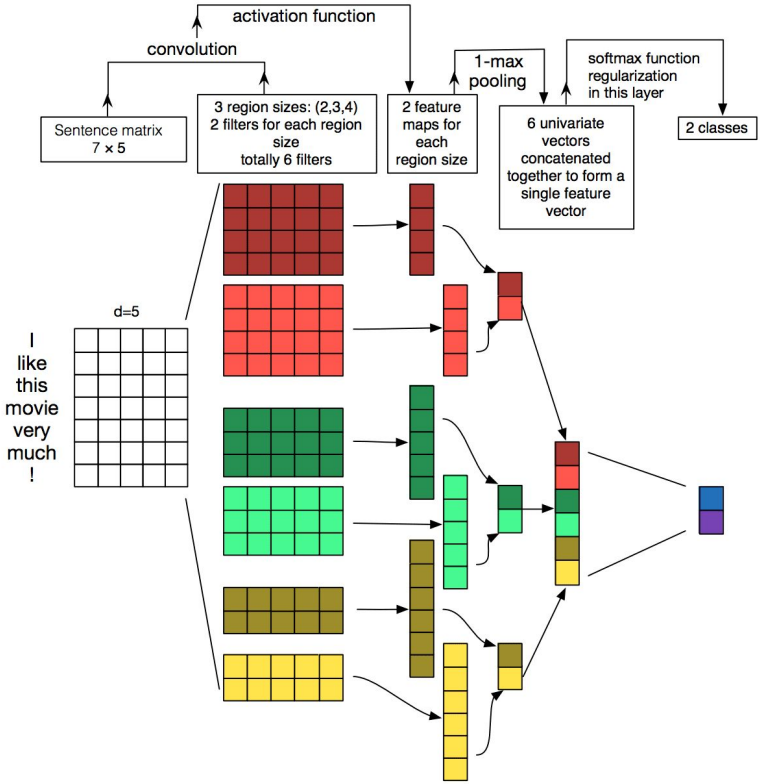


https://jalammar.github.io/illustrated-bert/

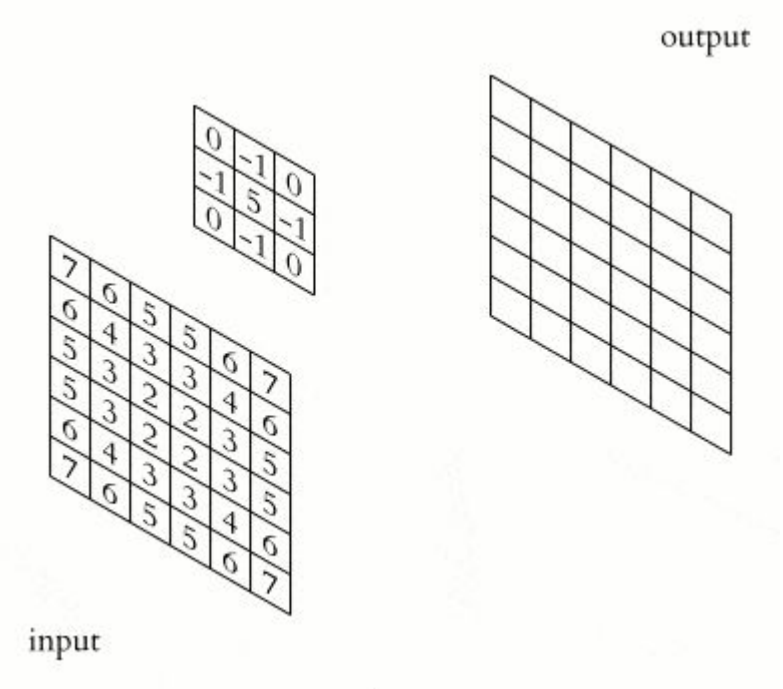
Bert Embedding



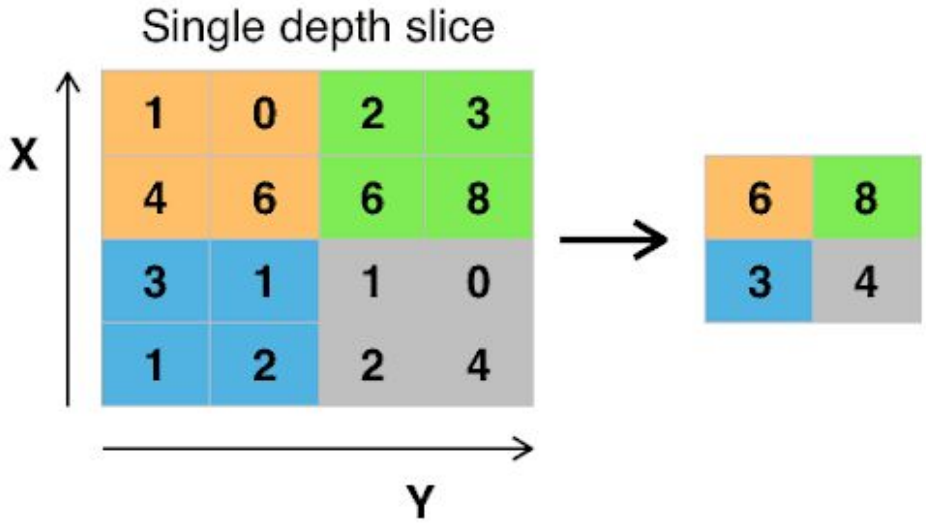
Convolutional Neural Network on Text Classification



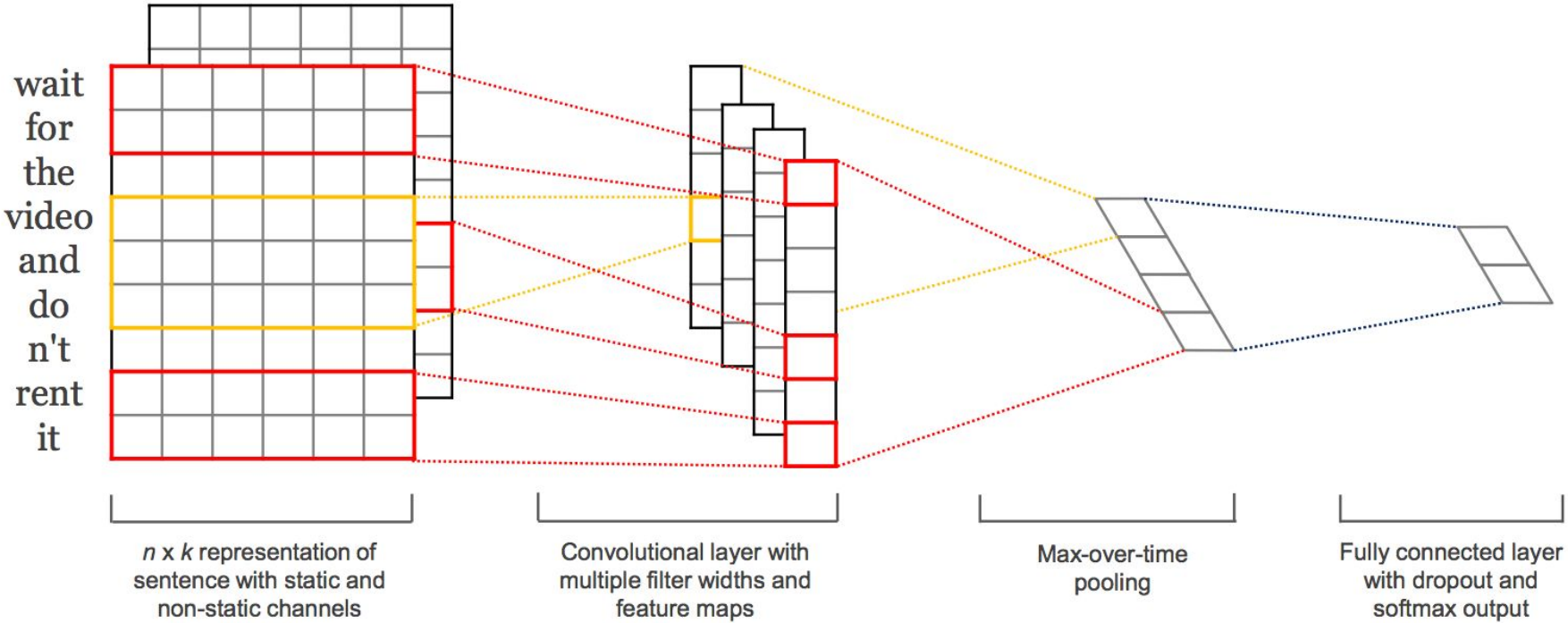
Convolution



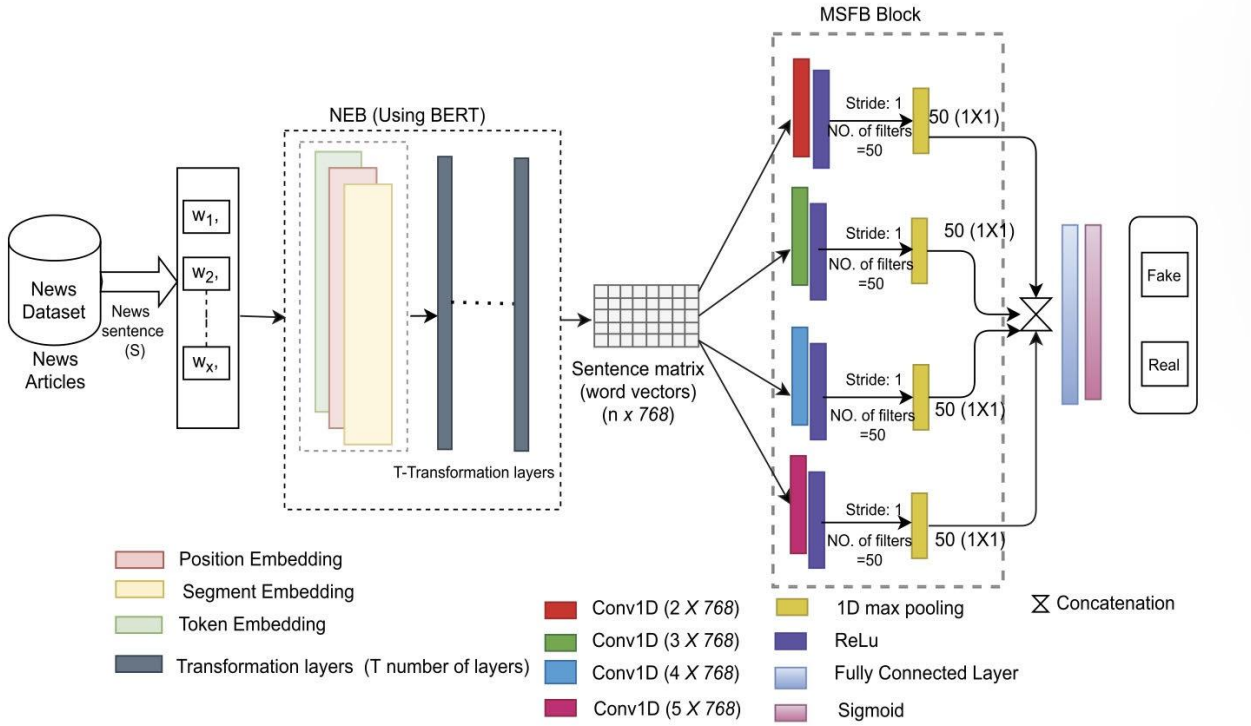
MaxPooling



Convolutional Neural Network



BerConvoNet framework



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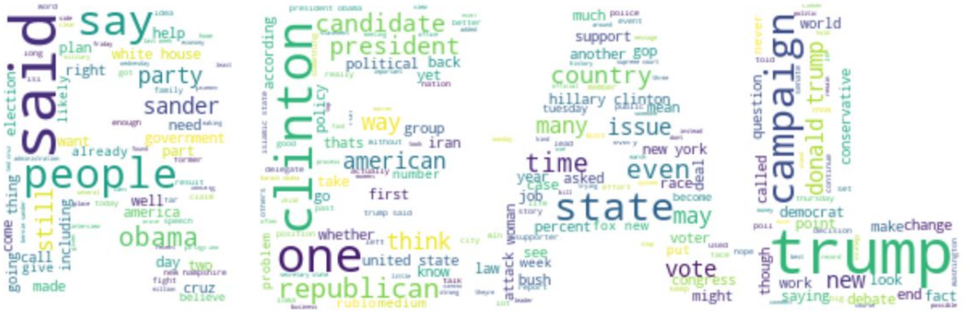
Implementation

Word Cloud


said
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candidate
president
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one
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country
issue
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even
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vote
campaign
donald trump
trump


time
american
hillary clinton
many
say
even
hillary
people
one
country
government
clinton
new
said
trump

Results in paper

- Acurracy 94.25% on Dataset-1
- Acurracy 97.45% on Dataset-2
- The highest precision on four Dataseta

Models	Precision	Recall	F1 Score	MCC	Accuracy	Specificity	G-mean
DATASET-1							
Random+ CNN	0.7854	0.7093	0.7454	0.5548	0.7800	0.8388	0.7713
Static-GloVe+ CNN	0.5191	**0.9799**	0.6787	0.1674	0.5380	0.0996	0.3124
Dynamic Glove+ CNN	0.7795	0.8049	0.7920	0.5844	0.7920	0.7795	0.7921
Random+LSTM	0.8115	0.9399	0.8710	0.7307	0.8608	0.7816	0.8571
ELMo+NN	0.9512	0.9215	0.9362	0.8722	0.9358	0.9508	0.9360
BERT+ CNN	**0.9513**	0.9355	**0.9433**	**0.8851**	**0.9425**	**0.9598**	**0.9426**
DATASET-2							
Random+CNN	0.8622	0.7886	0.8238	0.6698	0.8340	0.8780	0.8321
Static-Glove+ CNN	0.5958	0.9116	0.7206	0.3499	0.6480	0.3865	0.5936
Dynamic Glove+ CNN	0.8475	0.8333	0.8403	0.6920	0.8462	0.8583	0.8457
Random+LSTM	0.9498	0.9190	0.9342	0.8709	0.9352	0.9514	0.9351
ELMo+NN	0.8784	0.8996	0.8889	0.7758	0.8877	0.8760	0.8877
BERT+CNN	**0.9685**	**0.9825**	**0.9754**	**0.9490**	**0.9745**	**0.9659**	**0.9742**
DATASET-3							
Random+CNN	0.6951	0.6513	0.6724	0.3936	0.6980	0.7404	0.6944
Static-Glove+ CNN	0.8055	0.3610	0.4986	0.3398	0.6500	0.9189	0.5759
Dynamic Glove+ CNN	0.6116	**0.9113**	0.7326	0.3832	0.6667	0.4200	0.6194
Random+LSTM	0.6970	0.7823	0.7322	0.4455	0.7211	0.6599	0.7185
ELMo+NN	0.7168	0.7536	0.7347	0.4704	0.7347	0.7168	0.7350
BERT+CNN	**0.7454**	0.7634	**0.7543**	**0.5038**	**0.7518**	**0.7403**	**0.7518**
DATASET-4							
Random+CNN	0.7391	0.3542	0.4788	0.2835	0.6300	0.8846	0.5597
Static-Glove+ CNN	0.8064	0.6410	0.7143	0.5711	0.7989	0.9008	0.7599
Dynamic Glove+ CNN	0.8105	0.8750	0.8415	0.7088	0.8543	0.8378	0.8562
Random+LSTM	0.7600	**0.9047**	0.8261	0.6305	0.8095	0.7143	0.8039
ELMo+NN	**0.8993**	0.8803	**0.8897**	0.7875	0.8938	0.9067	0.8934
BERT+CNN	0.8696	0.8889	0.8791	**0.7978**	**0.9027**	**0.9118**	**0.9003**

Repository

- Model Training with TPU
- Avoid crash or OOM
- Train model with different batch_size