

Squad: 10570 testing examples

BERT Experiment

<https://arxiv.org/pdf/1810.04805.pdf> before fine tuning: 'exact_match': 0.1892147587511826, 'f1': 6.621467870661215

After finetuning: {'exact_match': 81.17313150425733, 'f1': 88.60500392080594}

Parameters: learning_rate=2e-5, num_train_epochs=3, weight_decay=0.01,

Training Loss Graph and Accuracy with respect to loss:

Sample Predictions: The 1973 oil crisis began in October 1973 when the members of the Organization of Arab Petroleum Exporting Countries (OAPEC, consisting of the Arab members of OPEC plus Egypt and Syria) proclaimed an oil embargo. By the end of the embargo in March 1974, the price of oil had risen from US\$3 per barrel to nearly \$12 globally; US prices were significantly higher. The embargo caused an oil crisis, or "shock", with many short- and long-term effects on global politics and the global economy. It was later called the "first oil shock", followed by the 1979 oil crisis, termed the "second oil shock."

1. What is the price of oil at the end of March of 1974?

- Prediction: US\$3 per barrel
- Answer: nearly \$12

2. What is another term for the oil crisis?

- prediction: shock
- answer: first oil shock.

The crisis had a major impact on international relations and created a rift within NATO. Some European nations and Japan sought to disassociate themselves from United States foreign policy in the Middle East to avoid being targeted by the boycott. Arab oil producers linked any future policy changes to peace between the belligerents. To address this, the Nixon Administration began multilateral negotiations with the combatants. They arranged for Israel to pull back from the Sinai Peninsula and the Golan Heights. By January 18, 1974, US Secretary of State Henry Kissinger had negotiated an Israeli troop withdrawal from parts of the Sinai Peninsula. The promise of a negotiated settlement between Israel and Syria was enough to convince Arab oil producers to lift the embargo in March 1974.

1. How did the Nixon administration negotiate with the uncooperative countries?

1. prediction: multilateral negotiations with the combatants
2. answer: multilateral negotiations with the combatants

One of its earliest massive implementations was brought about by Egyptians against the British occupation in the 1919 Revolution. Civil disobedience is one of the many ways people have rebelled against what they deem to be unfair laws. It has been used in many nonviolent resistance movements in India (Gandhi's campaigns for independence from the British Empire), in Czechoslovakia's Velvet Revolution and in East Germany to oust their communist governments, In South Africa in the fight against apartheid, in the American Civil Rights Movement, in the Singing Revolution to bring independence to the Baltic countries from the Soviet Union, recently with the 2003 Rose Revolution in Georgia and the 2004 Orange Revolution in Ukraine, among other various movements worldwide.

What is an example of major civil disobedience in South Africa?

- *Ground Truth Answers*: apartheidfight against apartheidthe fight against apartheidthe fight against apartheid Singing Revolution to bring independence to the Baltic countries
- *Prediction*: Singing Revolution

ALBERT

<https://arxiv.org/pdf/1909.11942.pdf> ALBERT was proposed by researchers at Google Research in 2019. The goal of this paper to improve the training and results of BERT architecture by using different techniques like parameter sharing, factorization of embedding matrix, Inter sentence Coherence loss.

Squad_v2 uses Ensemble

<https://web.stanford.edu/class/archive/cs/cs224n/cs224n.1204/reports/default/report08.pdf> - Classifier giving yes/no

Before Finetuning: {'exact_match': 0.1986754966887417, 'f1': 5.5146775988438685}

After Finetuning: {'exact_match': 83.65184484389782, 'f1': 90.5877276321257}

Parameters: learning_rate=2e-5, num_train_epochs=3, weight_decay=0.01,

Training Loss Graph and Accuracy with respect to loss:

Epoch	Training Loss
1	0.872500
2	0.637700
3	0.433300

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- *Prediction:* Fight against Apartheid

XLNet

12-layer, 768-hidden, 12-heads, 110M parameters. XLNet English model

	BERT	RoBERTa	DistilBERT	XLNet
Size (millions)	Base: 110 Large: 340	Base: 110 Large: 340	Base: 66	Base: ~110 Large: ~340
Training Time	Base: 8 x V100 x 12 days* Large: 64 TPU Chips x 4 days (or 280 x V100 x 1 days*)	Large: 1024 x V100 x 1 day; 4-5 times more than BERT.	Base: 8 x V100 x 3.5 days; 4 times less than BERT.	Large: 512 TPU Chips x 2.5 days; 5 times more than BERT.
Performance	Outperforms state-of-the-art in Oct 2018	2-20% improvement over BERT	3% degradation from BERT	2-15% improvement over BERT
Data	16 GB BERT data (Books Corpus + Wikipedia). 3.3 Billion words.	160 GB (16 GB BERT data + 144 GB additional)	16 GB BERT data. 3.3 Billion words.	Base: 16 GB BERT data Large: 113 GB (16 GB BERT data + 97 GB additional). 33 Billion words.
Method	BERT (Bidirectional Transformer with MLM and NSP)	BERT without NSP**	BERT Distillation	Bidirectional Transformer with Permutation based modeling

Exact match: 11.07568590350047304 F1: 12.287306378081716 Not only trains more slowly, it also needs more training.

```
"HasAns_exact": 74.7132253711201
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"HasAns_f1": 82.11971607032643
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To improve the training, XLNet introduces permutation language modeling, where all tokens are predicted but in random order. This is in contrast to BERT's masked language model where only the masked (15%) tokens are predicted.

Distill BERT

2 times as fast!! 26 minutes

'exact_match': 77.79564806054873, 'f1': 85.84742236577813 The crisis had a major impact on international relations and created a rift within NATO. Some European nations and Japan sought to disassociate themselves from United States foreign policy in the Middle East to avoid being targeted by the boycott. Arab oil producers linked any future policy changes to peace between the

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- Answer: nearly \$12

2. What is another term for the oil crisis? second oil shock #stor566