

DiBERT²: Humor Detection and Sentiment Analysis of Comic Texts Using Fine-Tuned BERT Models

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Background

- **Bidirectional Encoder Representations from Transformers (BERT)** [1]:
 - Deep language representations with learned encoding of context between tokens.
- **Fine-tuning:** Additional training of a model, on a specific dataset to perform a specific task (classification, entity recognition, question answering)
- **Humor Detection:** Determining whether text is humorous based on linguistics.
 - CoBERT[2] & “A Transformer Gets the Last Laugh” (TGtLL) [3]

Research Questions

- Can a pre-trained BERT model be fine-tuned on a domain of comic text, on task of humor detection and sentiment analysis?
- How does DiBERT² compare to existing humor classifiers and how does it perform on the sentiment analysis task?
- Can the classification results be used as input for the comic generating GANS.

Method

- **Dataset creation:**
 - Text is preprocessed into a unified format and labeled:

```

text humor
Are you kidding? False
My date complained about her life all night long! False
That is cruel and senseless. I am thoroughly ashamed of you. False
Maybe you could support it now and then stab me in the back later. True
How many ten dollar mouse pads can we get for 10,000? I hope this is a panic attack. True
...All the people with excessive nose hair and anyone who insists on being called doctor. True

(a)
text humor
we work for the same company. my cubicle is down the hall. False
we bought a start up just so we could get the engineers, including you. False
want some advice? why? False
hows this different from a layoff? with layoffs you get to keep your dignity. True
i started an online marketplace for dumb criminals. True

(b)
id better not keep her waiting at the door. do not anger jabba the date. True
    
```

Fig 1. Sample data from: (a) grammatically correct (b) parsed Dilbert datasets for humor classification.

- **Model creation:**
 - The classifiers are built on top of the pre-trained BERT model:

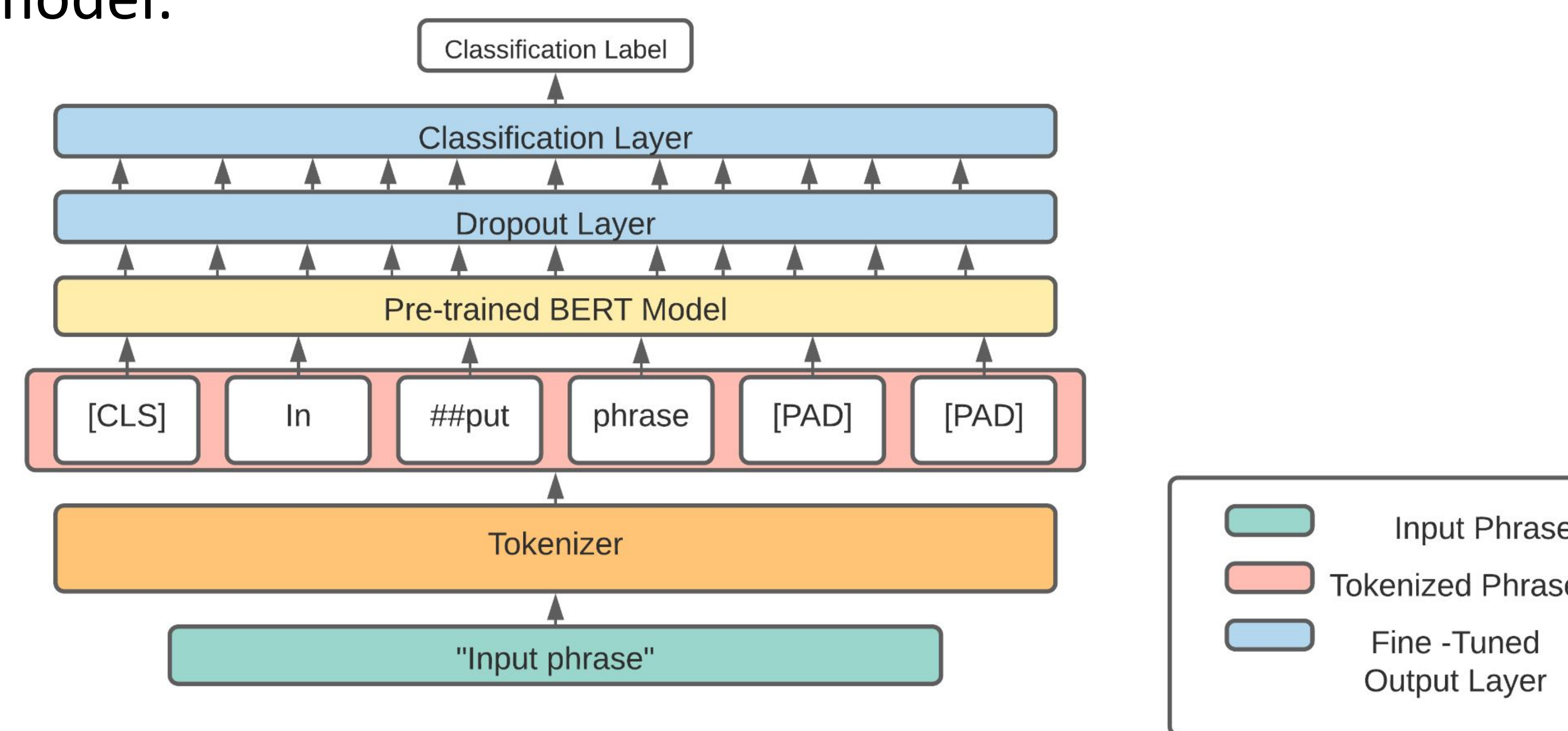


Fig. 2 The architecture of the DiBERT² classifiers.

- **Dynamic Batching [4] & Fine-Tuning Techniques [5][6]**
 - Decreased number of padding tokens

	CoBERT	POTD
ΔTokens	60%	66%
ΔTime	35%	60%

Table I: Differences in the number of tokens and training times when training DiBERT² with dynamic batching on the CoBERT & POTD.

- DiBERT² compared against simple classifiers, TGtLL & CoBERT
 - Assessed on the basis of accuracy and F1-scores on different datasets
 - Dilbert, Garfield, CoBERT, Short Jokes, Pun Of The Day (POTD)

Results

Method	Dataset	Accuracy	F1-Score
DiBERT ²	Dilbert	79%	81%
DiBERT ²	POTD	99%	99%
TGtLL	POTD	93%	93%
DiBERT ²	CoBERT	96%	96%
CoBERT	CoBERT	98%	98%

Table II: Comparisons of scores between DiBERT² and chosen baselines on chosen datasets on the task of humor detection.

	Accuracy	F1-Score
DiBERT ²	65%-80%	64%-81%

Table III: Found accuracy and F1-Score range on the task of sentiment analysis on the Dilbert dataset.

Conclusions

- DiBERT² outperforms or matches the chosen baselines on the task of humor detection.
- Predictions achieved from the task of sentiment analysis are not reliable.
- Classification results of DiBERT² for humor detection could be used within the comic generating GAN pipeline.

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References

1. Devlin, Jacob, et al. "Bert: Pre-training of deep bidirectional transformers for language understanding." arXiv preprint arXiv:1810.04805 (2018).
2. Annamoradnejad, Issa, and Gohar Zoghi. "Colbert: Using bert sentence embedding for humor detection." arXiv preprint arXiv:2004.12765 (2020).
3. Weller, Orion, and Kevin Seppi. "Humor detection: A transformer gets the last laugh." arXiv preprint arXiv:1909.00252 (2019).
4. Michael Benesty. Divide Hugging Face Transformers training time by 2 or more. June 2020. URL: <https://towardsdatascience.com/divide-hugging-face-transformers-training-time-by-2-or-more-21bf7129db9q-21bf7129db9e>.
5. Mosbach, Marius, Maksym Andriushchenko, and Dietrich Klakow. "On the stability of fine-tuning bert: Misconceptions, explanations, and strong baselines." arXiv preprint arXiv:2006.04884 (2020).
6. Zhang, Tianyi, et al. "Revisiting few-sample BERT fine-tuning." arXiv preprint arXiv:2006.05987 (2020).