Passau21 at the NTCIR-16 FinNum-3 Task:
Prediction Of Numerical Claims in the Earnings Calls with Transfer Learning

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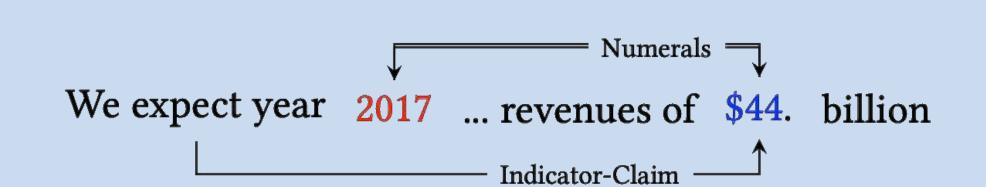Germany
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Abstract

The FinNum Task series aims at better understanding of numeral information in financial narratives. The goal of FinNum-3; on the English data part; is to have a fine-grained manager's claim detection in the Earning Conference Calls (ECCs) with the help of Natural Language Processing (NLP). To succeed in the best performance for predicting in-claim and out-of-claim numerals, we propose the BERT (Bidirectional Encoder Representations from Transformers) base model, which is pre-trained on a large corpus of English data.

Task Definition

We expect year 2017 ... revenues of $44. billion

An example of the train dataset including in-claim and out-of-claim target numerals.

As an addition to the challenge of containing the different labels in the same sentences, the dataset is imbalanced with a ratio of **12.67%**, which makes the process challenger. Thus, the **inference of the words** makes a big difference.

Dataset

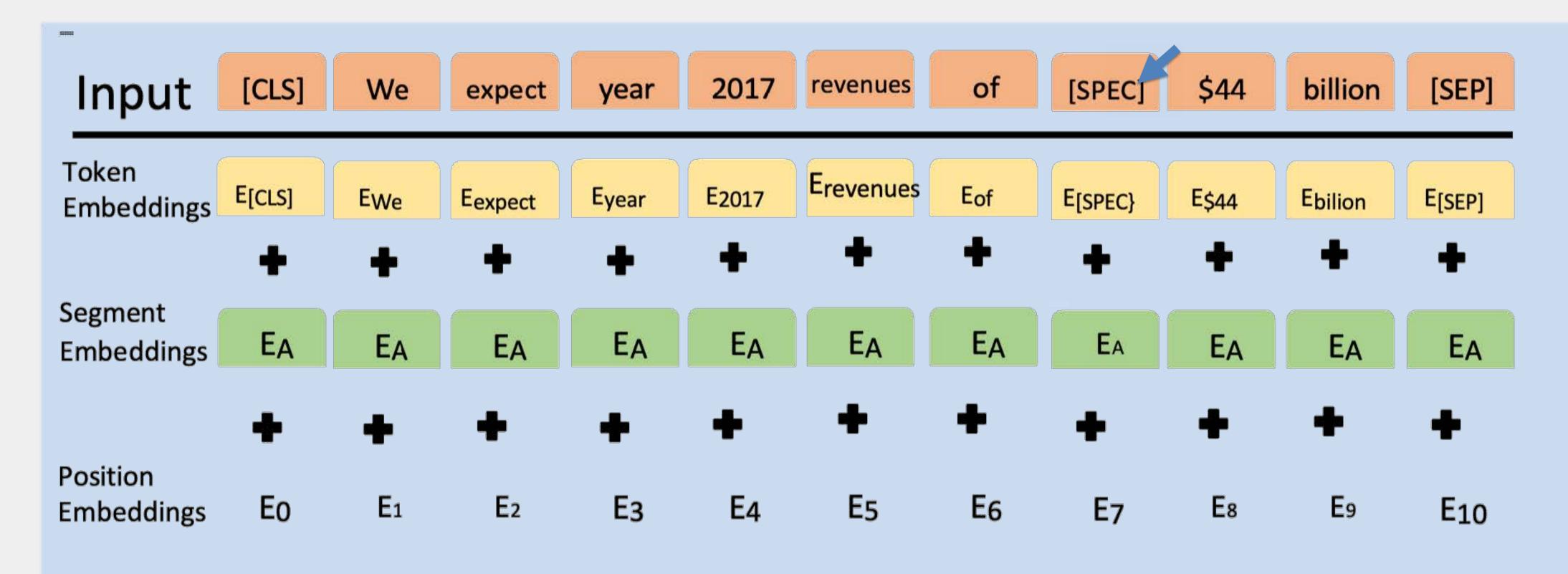|	Label	Numerals
Train	In-Claim	1,039
	Out-of-Claim	7,298
Development	In-Claim	114
	Out-of-Claim	1,007
Test	In-Claim	187
	Out-of-Claim	2,196
Total	In-Claim	1,340
	Out-of-Claim	10,571

Result

The result of our BERT model on that parameters are **86.48%** of macro-F1 score in the *validation* split and **87.12%** of macro-F1 score in the *test* data.

Parameter	Value
Weight Initialisation	Bert-base (Uncased)
Optimizer	Adam
Batch Size	48
Warmup Proportion	0.1
Learning Rate	2e-5
Total Epoch	7
Loss	Cross Entropy

Experiments on the sentence-segmented development data

To extract the information of which word is more important, we segmented them into different sentences and/or even more; however, it is **not applicable** for the actual task. At the end, there were only one type of claim in the same segment. After the preprocessing steps. We applied the models on the right. Surprisingly, all the 93.68% in the **Decision Tree** success rate comes from the word *"expect"*. That Show us the importance of **indicators**.

Models	F1-macro	F1-micro
SVM	79.89	93.83
Naive Bayes	77.56	93.39
CNN	75.86	91.43
Decision Tree	78.91	93.68
BERT base	89.15	96.51

Error Analysis

		Actual	
		In-Claim	Out-of-Claim
Predicted	In-Claim	154	33
	Out-of-Claim	62	2134

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Text Representation

Separator gives the ability to the **BERT model** which word is the **target**, since there are more than one numeral in the dataset. Here the target word is **$44** and in the next round it will be **2017**.

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