

Title: BiLSTM Models with and Without Pretrained Embeddings and BERT on German Patient Reviews(Conference Paper)

Author:Roy, P., Riad, M.J.A., Akter, L., Hasan, N., Shuvo, M.R., Quader, M.A., Quader, M.A., Anwar, A.S.

aPrairie View A & M University, Department Of Computer Science, TX, United States

bMaster Of Science In Information Technology (MSIT), Washington University Of Science And Technology, Vienna, United States

cUttara University, Department Of Computer Science, Bangladesh

Abstract

This research searches into the use of Deep learning in sentiment analysis, focusing on the analysis of German patient reviews with two neural network architectures: a Bidirectional Long Short-Term Memory (BiLSTM) model with pretrained embeddings and a BERT (Bidirectional Encoder Representations from Transformers) model. The primary goal is to determine how effective these models are at categorising patient sentiments into 'poor' and 'excellent' categories. We used a dataset of approximately 500,000 reviews, each with a numerical rating and a textual comment. To facilitate model input, the text data was preprocessed. Our findings show a significant difference in performance between the two models, with the BERT model performing better in terms of accuracy and balanced classification across sentiment categories, emphasising the importance of model selection and application. The BERT model demonstrated superior performance, achieving a remarkable accuracy of 98.4%. It exhibited high precision, recall, and F1-scores, particularly in classifying 'poor' sentiments (0.98, 0.99, and 0.99, respectively). BiLSTM model with pretrained embeddings demonstrated a pronounced dip in performance for the 'excellent' category, with zero scores across precision, recall, and F1-score metrics, while retaining high performance for the 'poor' category. LSTM Without Pretrained Embeddings model's accuracy of the model is 91%,LSTM With Pretrained Embeddings result 97%.The study underscores the critical influence of model selection and the incorporation of pretrained embeddings in achieving high accuracy and balanced classification across sentiment categories. This research contributes to the ongoing conversation about the application of advanced machine learning techniques in the analysis of patient feedback and sentiment classification. © 2024 IEEE.

Author keywords

BERTBiLSTMclassificationembeddingsssentiment

Inde BiLSTM Models with and Without Pretrained Embeddings and BERT on German Patient Reviews(Conference Paper)

- Roy, P.,
- Riad, M.J.A.,
- Akter, L.,
- Hasan, N.,
- Shuvo, M.R.,
- Quader, M.A.,
- Quader, M.A.,
- Anwar, A.S.
- ^aPrairie View A & M University, Department Of Computer Science, TX, United States
- ^bMaster Of Science In Information Technology (MSIT), Washington University Of Science And Technology, Vienna, United States
- ^cUttara University, Department Of Computer Science, Bangladesh

[View additional affiliations](#)

Abstract

This research searches into the use of Deep learning in sentiment analysis, focusing on the analysis of German patient reviews with two neural network architectures: a Bidirectional Long Short-Term Memory (BiLSTM) model with pretrained embeddings and a BERT (Bidirectional Encoder Representations from Transformers) model. The primary goal is to determine how effective these models are at categorising patient sentiments into 'poor' and 'excellent'

categories. We used a dataset of approximately 500,000 reviews, each with a numerical rating and a textual comment. To facilitate model input, the text data was preprocessed. Our findings show a significant difference in performance between the two models, with the BERT model performing better in terms of accuracy and balanced classification across sentiment categories, emphasising the importance of model selection and application. The BERT model demonstrated superior performance, achieving a remarkable accuracy of 98.4%. It exhibited high precision, recall, and F1-scores, particularly in classifying 'poor' sentiments (0.98, 0.99, and 0.99, respectively). BiLSTM model with pretrained embeddings demonstrated a pronounced dip in performance for the 'excellent' category, with zero scores across precision, recall, and F1-score metrics, while retaining high performance for the 'poor' category. LSTM Without Pretrained Embeddings model's accuracy of the model is 91%, LSTM With Pretrained Embeddings result 97%. The study underscores the critical influence of model selection and the incorporation of pretrained embeddings in achieving high accuracy and balanced classification across sentiment categories. This research contributes to the ongoing conversation about the application of advanced machine learning techniques in the analysis of patient feedback and sentiment classification. © 2024 IEEE.

Author keywords

BERTBiLSTMclassificationembeddings sentiment

Indexed keywords

Engineering controlled terms: EmbeddingsNetwork architectureSentiment analysis

Engineering uncontrolled terms Bidirectional encoder representation from transformerBidirectional long short-term scoresMemory modelingModel SelectionPerformanceSentimentSentiment analysis

Engineering main heading: Long short-term memory

- **ISBN:** 979-835037156-7
- **Source Type:** Conference Proceeding
- **Original language:** English
- **DOI:** 10.1109/AMATHE61652.2024.10582115
- **Document Type:** Conference Paper
- **Publisher:** Institute of Electrical and Electronics Engineers Inc.

Indexed keywords

Engineering controlled terms: EmbeddingsNetwork architectureSentiment analysis

Engineering uncontrolled terms Bidirectional encoder representation from
transformerBidirectional long short-term memoryEmbeddingsF1 scoresMemory
modelingModel SelectionPerformanceSentimentSentiment analysisTransformer modeling

Engineering main heading: Long short-term memory

ISBN: 979-835037156-7

Source Type: Conference Proceeding

Original language: English

DOI: 10.1109/AMATHE61652.2024.10582115

Document Type: Conference Paper

Publisher: Institute of Electrical and Electronics Engineers Inc.