







# Ensemble Tweets Emotion Detection Model Using Transformer Based Architecture, Support Vector Machine and Long Short-Term Memory

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**Abstract.** In this current age of Fourth Industrial Revolution (4IR), there is an exponential growth in public generated data such as mobile data, business data, social media data, Internet of Things (IoT) data, cyber security data which are in form of image, video and text, due to the incessant usage of social media. This available textual data is frequently adopted and significantly important for extracting information such as user's sentiments, and emotions. Considering the complexity and large amount of textual data, the adoption of various machine learning and deep learning model for the analysis of emotion has not yet attained optimum accuracy. Recently, Bidirectional Encoder Representational from Transformer Based Architecture (BERT) are achieving state of art accuracy. Hence, this study adopts an ensemble-based model using Bidirectional Encoder Representational from Transformer (BERT-Large), Long Short-Term Memory (LSTM) and Support Vector Machine (SVM) for detecting user's emotion. The three trained model are loaded from the local repository and stack together by comparing their predictions and selecting the majority vote approach. This study performs emotional analysis on imbalanced tweets of six (6) different classes, which includes; sadness, anger, love, surprise, fear, and joy. The experiment shows that the voting of BERT prediction and Ensemble model perform better than the other models with to an optimum accuracy of 93%, 93% respectively. BERT-Large performed well as a standalone model and also the ensemble techniques for prediction of multi-social platforms in real time usage.

**Keywords:** Emotions · BERT-Large · Support Vector Machine · Long short-term memory · Ensemble

## 1 Introduction

Recent emanation of various social media platform such as WhatsApp, Facebook, Instagram, and twitters has resulted to large amount of publicly available text corpus or dataset [1, 2]. Considering the fact that social media user tends to feel more comfortable expressing their feelings or opinions during chatting session, hence social media data is tag to be more realistic or rich in emotional context [3]. Different opinion of customer feedback on a particular product can facilitate the quick identification of issues