



# Student Sentiment Analysis using NLP and ML

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**Abstract:** In the last decade, sentiment analysis has been considerably applied in multitudinous disciplines, including business, social networks, and education. Particularly in the education sphere, where dealing with and recovering scholars' opinions is a complicated task due to the nature of the language used by scholars and the large volume of information, the operation of sentiment analysis is growing yet remains challenging. The present education system represents a terrain that is continuously amended by a massive amount of data that is generated daily in various formats and utmost constantly hides useful and precious information. The sentiment/ opinion opposition, which could either be positive, negative, or neutral, represents one's station towards a target reality. Passions, on the other hand, are one's heartstrings expressed regarding a given content. Feedback is the statement transferred to reality about its formerly gist from which reality can anatomize the future and current behavior to achieve the awaited result. Feedback plays an important part in education and knowledge by helping to adopt new knowledge and help repeat mistakes. Sentiment analysis can be conducted at a word, judgment, or document position. Still, due to many documents, manual handling of sentiments is inoperable. Therefore, automatic data processing is demanded. Sentiment analysis from the text-predicated, judgment, or document-position corpora is employed using natural language processing (NLP). To know the exact sentiment of the scholars' textual feedback fashion is used. In this textual form, pupils are given a set of questions and they need to answer it in rulings. It is helpful to both the academic administration and the preceptor to overcome the issues related to their association. The end is to prize expressions of opinion and classify them as negative, positive, or neutral using machine knowledge ways.

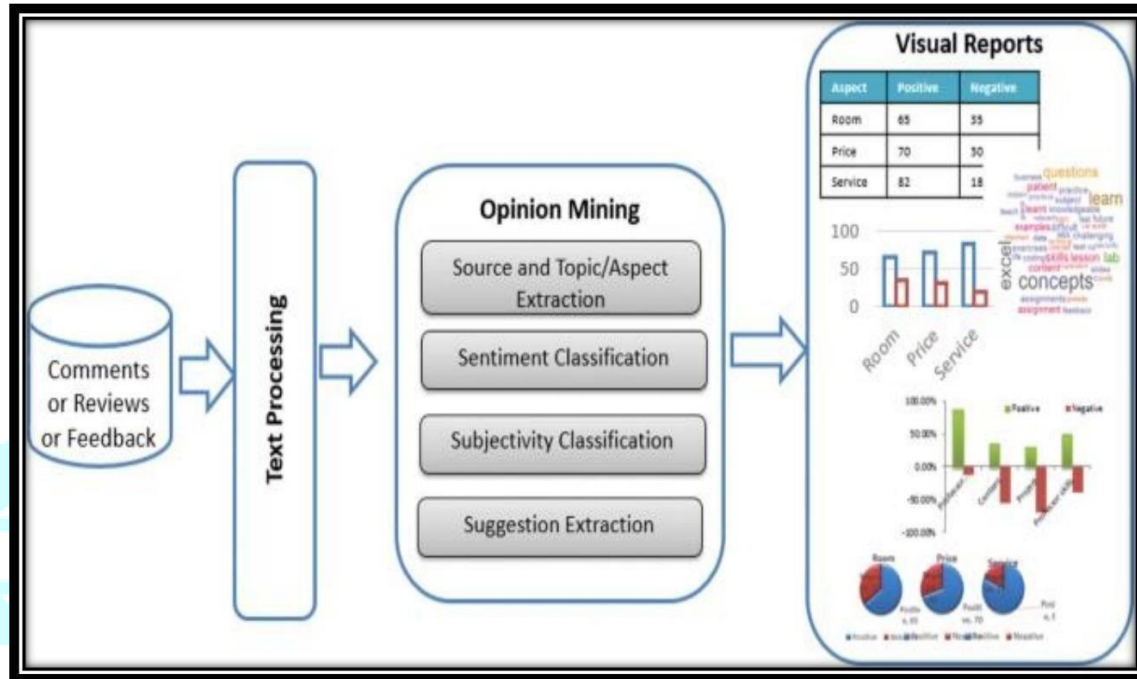
**Index Terms** – Student feedback, Text Analysis, Data mining, Sentiment classification, NLP, Machine Learning

## I. INTRODUCTION

Evaluation of a particular course and the educator who handled the course need to be estimated by the student at the end of each semester in advanced education institutions. The high purpose of gathering students' feedback is to assess and ameliorate the tutoring quality. The feedback helps preceptors to refine their tutoring methodology and enables them to more understand the pupil's perspective. The present education system represents a geography that is continuously amended by a massive quantum of data that is generated daily in colorful formats and most frequently hides useful and precious information. The content which is delivered beyond the class will bring a lot of advantages to perform in sentiment analysis and opinion mining technology. Sentiments and opinions expressed by scholars are a precious source of information not only for assaying scholars' gist towards a course, content, or preceptors but also for reforming programs and institutions for their enhancement. Although both sentiment analysis and opinion mining feel analogous, there's a slight difference between the two the former refers to changing sentiment words and expressions flaunting feelings, whereas the latter refers to rooting and assaying people's opinions for a given reality. For this study, we consider that both ways are used interchangeably. The sentiment/ opinion opposition, which could either be positive, negative, or neutral, represents one's station towards a target reality. Feelings, on the other hand, are one's passions expressed regarding a given content. Since the 1960s, several propositions about emotion discovery and bracket have been developed. The study conducted by Pletcher categorizes emotions into eight orders wrathfulness, expectation, nausea, fear, joy, sadness, surprise, and trust.

## II. METHODOLOGY

Sentiment analysis can be conducted at a word, judgment, or document position. still, due to many documents, the homemade running of sentiments is impracticable. thus, automatic data processing is demanded. Sentiment analysis from the textbook- grounded, judgment, or document- position corpora is employed using natural language processing (NLP). utmost exploration papers set up in the literature published employed pure NLP ways, including wordbook and wordbook-grounded approaches for sentiment analysis. Many of those papers used conventional machine learning classifiers. Recent times have seen a shift from pure NLP- grounded approaches to deep literacy-grounded modeling in feting and classifying sentiment, and the number of papers published lately on the accepted content has increased significantly. The sentiment opposition can be represented by separate markers like positive, negative, neutral, and nebulous. a comparison of the presented methodology and other sentiment analysis tools (different machine learning algorithms) is also discussed Advice Agent keeps track of all the Glutted Children.



## III. RESEARCH METHODOLOGY

### A. "Sentiment Analysis in Education Domain: A Systematic Literature Review"

This paper (1) addresses performing a novelettish analysis in the education sphere which can be used to ameliorate the tutoring-literacy process and scholars' performance, as well as the reduction in course abandonment. The author explains veritably well about what is the sentiment analysis process, what approaches and digital educational coffers are used in sentiment analysis, and what are the main benefits of using sentiment analysis in the education sphere. He says that there are two main sentiment analysis approaches used in this sphere machine literacy and wordbook-grounded approaches. Among them, Support Vector Machine (SVM) and Naive Bayes are the most habituated ways. There is a trend to combine both the machine literacy approach and the wordbook-grounded approach to perform the sentiment analysis process. This review also revealed that forums of MOOCs and social networks like Facebook and Twitter are the most habituated digital education coffers to collect data demanded to perform the sentiment analysis process.

### B. "Sentiment Analysis of Students' Feedback with NLP and Deep Learning: A Systematic Mapping Study"

This paper (2) addresses the Finding and rooting the retired "plums" from the ocean of educational data constitutes one of the great advantages that sentiment analysis and opinion mining techniques can give. They state that sentiments and opinions expressed by scholars are a valuable source of information not only for assaying scholars 'gist towards a course, content, or teachers but also for reforming programs and institutions for their enhancement. To conduct this study, they applied methodical mapping as the there are numerous proposed systems preliminarily for sentiment analysis. For this proposed design there are some papers that told us to modernize and apply it in an effective and functional manner exploration methodology for reviewing the literature grounded on the PRISMA frame. They have used supervised, unsupervised, wordbook grounded, wordbook- supervised, wordbook- unsupervised ways for this study. They also have linked a variety of challenges regarding the operation of sentiment analysis to examine pupil feedback and have recommended the unborn directions to attack these challenges.

C. *E-learning and Sentiment Analysis: A case study*”:

The main end of the authors per this paper (3) is to give sequestration of communication among pupils by relinquishment of a Sentiment Analysis methodology for the discovery of the classroom mood during the literacy process. In this paper, they investigate the relinquishment of a probabilistic approach grounded on the idle Dirichlet Allocation (LDA) as Sentiment theft. The proposed approach can descry the mood of scholars on colorful topics and school teachers can tune

D. *“A Literature Review on Application of Sentiment Analysis Using Machine Learning Techniques*”:

Through this paper (4) the authors aim to fete the operations and results of novelettish analysis for the assaying and bracket of views using Machine literacy (ML) approaches. In this paper, the author explains the need for novelettish analysis, novelettish bracket, Sentiment analysis exploration fields, Machine literacy grounded sentiment analysis methodology, operations of novelettish analysis using machine literacy ways, and Use cases of novelettish analysis.

E. *“Natural language processing for analysis of student online sentiment in a postgraduate program*”:

In this paper (5) the authors have tried to find the answer to the question How does a natural language processing tool help dissect pupil online sentiment in a postgraduate program? Google Natural Language Processing (Google NLP) has been used for sentiment analysis in this design. This service estimates the ‘emotional opinion’ of the textbook to determine the station of the pen with two numerical parameters which are ‘score’ and ‘magnitude’ for the whole given textbook and every single judgment in the textbook. They have tried this test on the postgraduate scholars in their Google Plus(G) community. The authors conclude that scholars are anticipated to manage well with their literacy in discrepancy to the low sentiment which indicated that scholars might not be managing Well with their needs and support may be demanded.

F. *“Sentiment analysis for social media survey*”:

Sentiment analysis for social media check” In this paper (6), the authors use the data from social media for the novelettish analysis. They have used machine literacy wordbook-only, literacy-only, and cold-blooded approaches, of which the mongrel approach has yielded favorable results. They Have also talked about the challenges in the novelettish analysis.

G. *“Sentiment Analysis for Hausa: classifying student’s comments*”

“In this research [7] the authors first collected 40,000 comments on the Hausa-English Sentiment Analysis Corpus for Educational Environments (HESAC). They later investigated monolingual and cross-lingual approaches for Hausa to classify student comments in course evaluations and proposed a novel stemming algorithm for Hausa to improve accuracy. They stated that with the help of topic identification techniques, even more, valuable information can be extracted.

H. *“A Review Paper on the Role of Sentiment Analysis in Quality Education*”:

This study (8) presents a methodical review of exploration on sentiment analysis towards SDG4 quality education through social media platforms like Twitter, and Facebook and a review of 21 studies listed in SCOPUS. In this study, the dataset is taken from Kaggle with names as a pupil-performance- data- set. The authors believe that this system will help educational institutions in relating to and supporting low- performing scholars at an original stage. Using an agreement-grounded system for inspiring opinions, the authors estimate the emphasis of AI-grounded services on inclusively fulfilling the SDGs. To prognosticate the performance of the scholars’ authors have used ML and AL ways.

I. *“Sentiment analysis of student comment using lexicon-based approach*”:

In this exploration paper (9) the author’s end is to fete that the scholars’ feedback can be anatomized using wordbook grounded approach to identify the scholar's positive or negative station. There are two main approaches for sentiment analysis machine literacy grounded and wordbook grounded. The machine literacy grounded approach uses bracket fashion to classify textbooks. wordbook grounded system uses sentiment wordbook with opinion words and matches them with data to determine opposition. wordbook grounded approach involves calculating the exposure of words or expressions. In the utmost of the being tutoring evaluation system, the intensifier words and eyeless negation words are not considered. The position of opinion result is not displayed whether positive or negative opinion. To address this problem, the author proposed to analyze the scholars’ textbook feedback automatically using wordbook grounded approach to prognosticate the position of tutoring performance and analyzes automatically the scholars’ feedback comments into explosively negative, relatively negative, weakly negative, or explosively positive, or relatively positive, or weakly positive or neutral category using two dictionaries. The position of opinion results for any teacher given out from scholars’ feedback commentary.

J. *“Student Feedback Mining System Using Sentiment Analysis*”:

In this exploration paper (10), The author says that they've developed a pupil feedback mining system(SFMS) that applies textbook analytics and sentiment analysis approach to give preceptors a quantified and deeper analysis of the qualitative feedback from scholars that will ameliorate the scholar's learning experience. After collecting the feedback from the scholars and textbook processing is done to clean the data also features or motifs are uprooted from the pre-processed document. The Feedback comments about each content are collected and made as a cluster Classify the commentary using a sentiment classifier and apply the visualization ways to represent the views of scholars. This proposed system is an effective approach for furnishing qualitative feedback for the educator that enriches the students learning. This system uses preprocessing, content birth, clustering, and bracketing to represent the student views in a graphical way. This system will be useful to ameliorate the scholar's literacy and educator’s styles of delivery

K. *“Learning sentiment from students’ feedback for real-time interventions in classrooms”:*

In this paper (11) the author has delved into the literacy capabilities of feedback by four machine literacy styles for learning sentiment from scholars’ textual feedback Naive Bayes, Complement Naive Bayes, Maximum Entropy, and Support Vector Machines. Our trials indicate that two styles, i.e., SVM with radial base kernel and CNB, give veritably good results. thus, they could be used for real-time feedback analysis. In Naïve Bayes approach the small quantum of training data is enough to estimate parameters, it is fast and incremental, and can deal with discrete and nonstop attributes. point selection allows a more accurate analysis of the sentiments and detailed summarization of the results. One of the most common points is n-grams. this system of taking feedback can punctuate different issues that the pupil may have with the lecture and can prize meaningful feelings (RQ1), and these feelings give precious perceptivity for course preceptors that go beyond the scholars’ grades or tone-reported star conditions (RQ2). Specifically, they show that Vader, a simple rule-grounded sentiment predictor, produces emotion scores that are close to those of mortal evaluators.

L. *“Capturing Student Feedback and Emotions in Large Computing Courses: A Sentiment Analysis Approach”*

In this paper (12), The author has delved into a scalable approach to collect and dissect pupil feedback and feelings. They have set up that sentiment analysis can efficiently capture pupil feelings, bearing the eventuality to lessen both the obscurity and feedback gaps. Their study analyzes scholars’ comprehension of their guests when they are working on an assignment and not their factual gests. comprehensions and perceived feelings are important since they impact the students’ views on their own capacities and tone efficiency. There are two introductory conclusion tasks opposition discovery and emotion recognition. Their study shows that it can prize meaningful feelings (RQ1), and that these feelings give precious perceptivity to course preceptors that go beyond the scholars’ grades or tone-reported star conditions (RQ2). Specifically, they show that Vader, a simple rule-grounded sentiment predictor, produces emotion scores that are close to those of mortal evaluators.

M. *“Speech Recognition using Deep Learning”*

This researcher [13] chooses to listen to the desired sound from a large file. In this research, deep learning was used to classify speech. Google Corpus was used to train the model. They have used data from the Google audio Set, which is Google's voice data warehouse to be used as training and test data. They have selected the sounds of dogs and cats and cut out unrelated parts. Then they converted that audio signal into a vector to be used as audio. They have used data from the Google audio Set which is Google's voice data warehouse to be used as training and test data. They have selected the sounds of dogs and cats and cut out unrelated parts. Then they converted that audio signal into a vector to be used as audio. the representation using Mel- frequency cepstral coefficient (MFCC) is done. It also used TensorFlow, which is an open-source machine learning library. this research will make the computer more intelligent and capable.

N. *“Speech Recognition using Artificial Neural Network”*

In this research paper [14] proposes two approaches for speech recognition via supervised and unsupervised learning. Speech signals are non-stationary signals. In this paper They have proposed Bi-directional Recurrent Neural Network with Long Short-Term Memory model (LSTM), so that speech signal reconstruction can be done in a proper way without performance loss. For unsupervised learning, model is designed based on Restricted Boltzmann Machine (RBM) which generates a reconstruction-based output and helps in conversion of voice into text, each letter by letter. For supervised learning, for supervised learning, For RBM, only slight increase in percentage accuracy was obtained

O. *“Speech Recognition by machine”:*

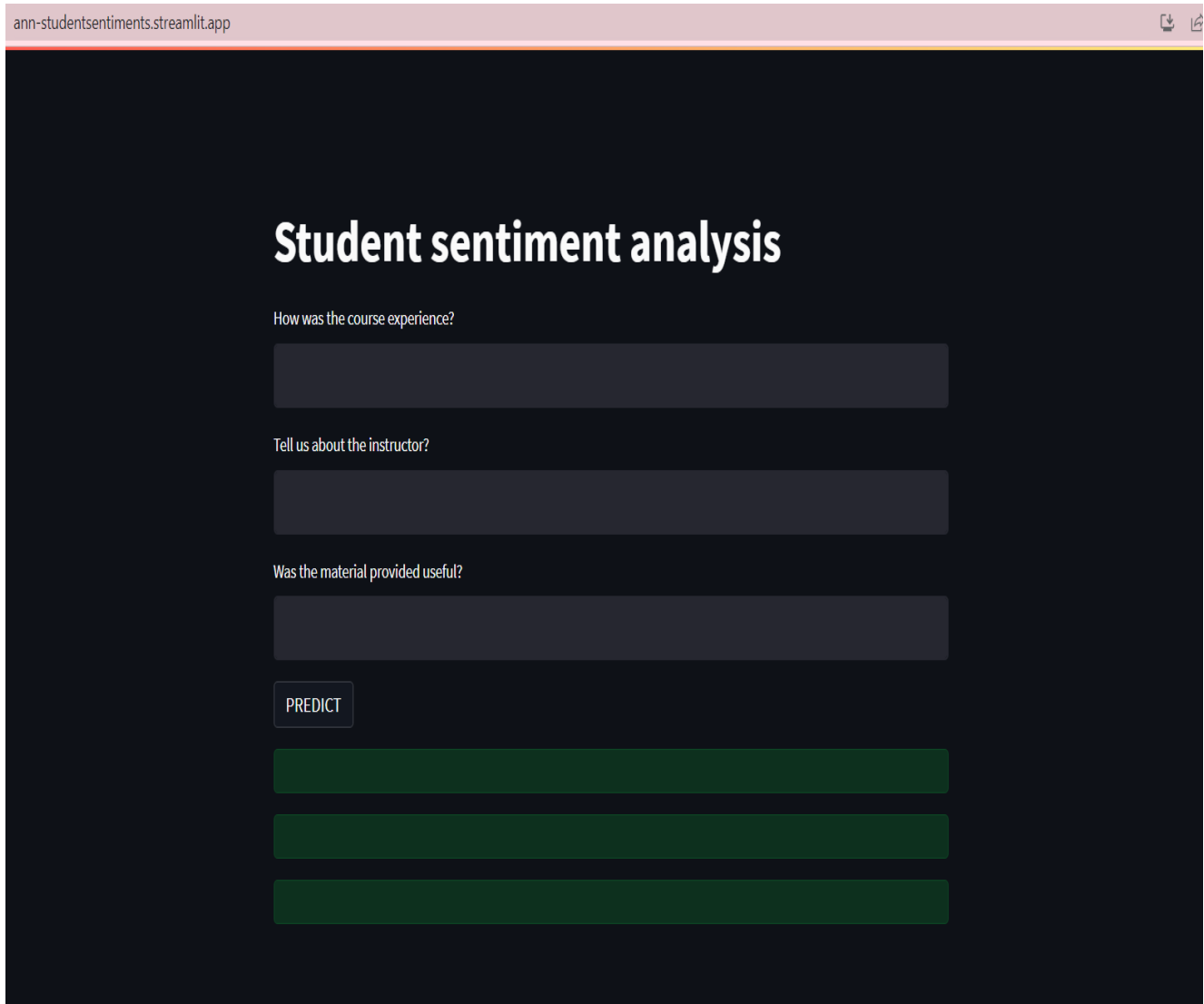
This paper presents a brief check on Automatic Speech Recognition and discusses the major themes and advances made in the once 60 times of exploration, to give a technological perspective and an appreciation of the abecedarian progress that has been fulfilled in this important area of speech communication. machines, exploration in speech and speaker recognition, as a first step toward natural mortal- machine communication, has attracted important enthusiasm over the once five decades. they have also encountered several practical limitations which hamper a wide deployment of operation and services. In utmost speech recognition tasks, mortal subjects produce one to two orders of magnitude less crimes than machines. This paper attempts to give a comprehensive check of exploration on speech recognition and to give some time wise progress. Although significant progress has been made in the last two decades, there is still work to be done, and we believe that a robust speech recognition system should be effective under full variation in environmental conditions, speaker variability etc.

#### IV. RESULTS AND DISCUSSION

The current chapter deals with the analysis of results of the proposed framework. Result is one of the last and important phases in the project development. It explains how the project works and its results. In our project we are checking the student sentiment analysis that we will give some feedback and that will predict whether our project is positive or negative.

##### a. Login page

This is the login page of our project student sentiment analysis where we need to give the feedback about the course and the instructor and about the study material.



ann-studentsentiments.streamlit.app

## Student sentiment analysis

How was the course experience?

Tell us about the instructor?

Was the material provided useful?

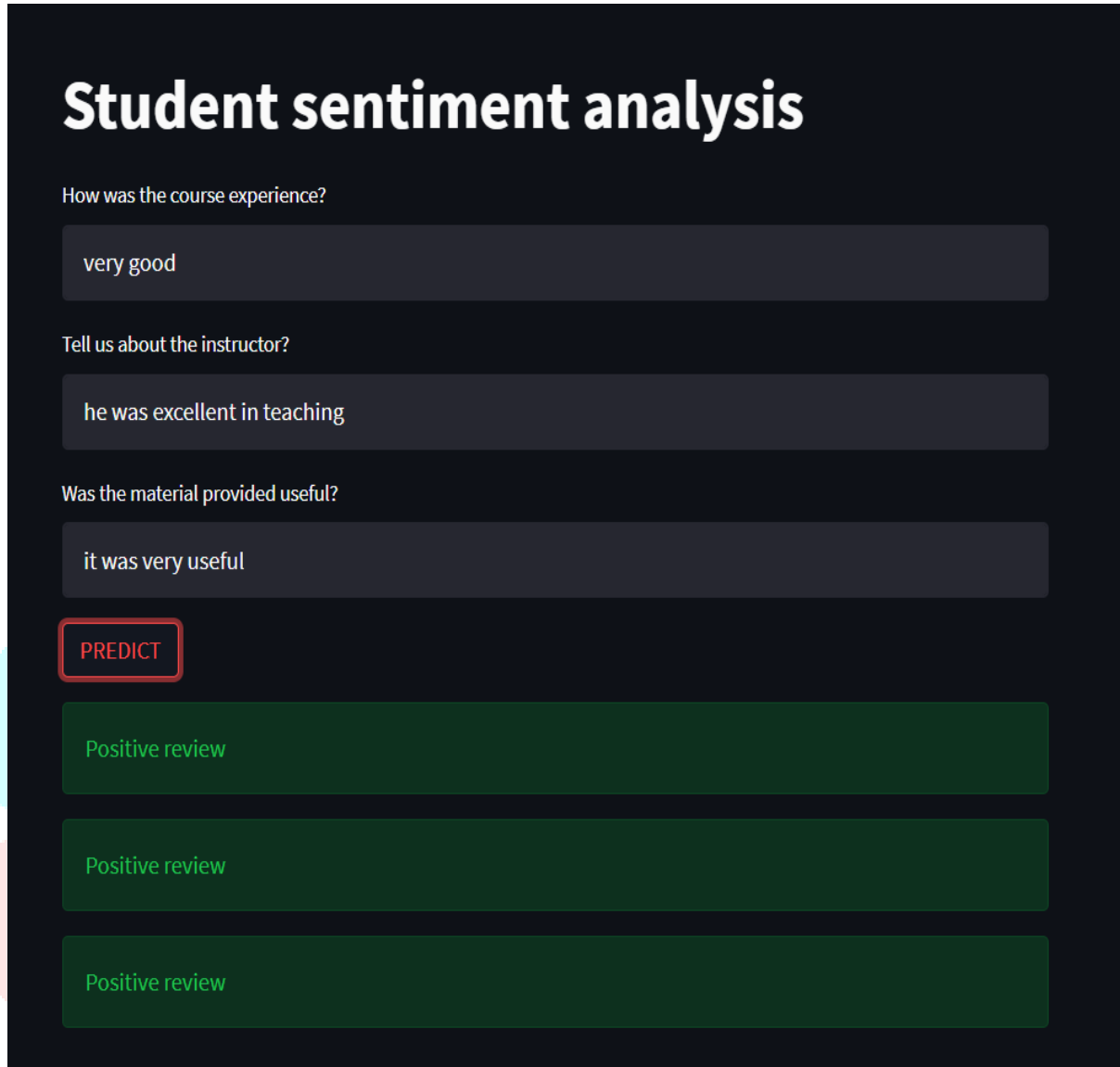
PREDICT

##### a) Login page

We can type the feedback about the course experience and even we can type the feedback about the course instructor and then we need to predict about the material that was provided by the group.

**b. Predicting the positive Review**

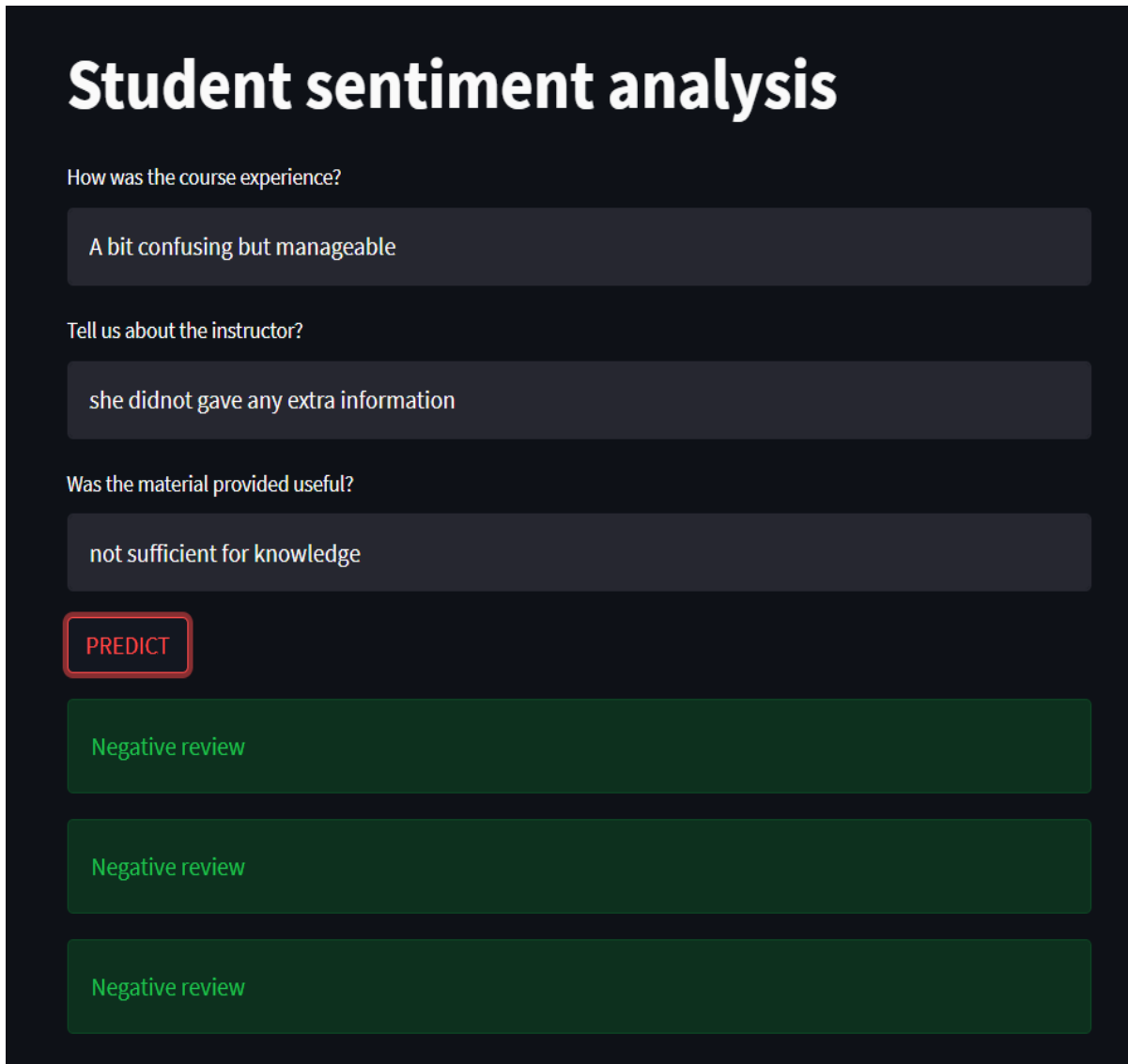
Here we are giving the feedback then that will predict that the feedback is positive or negative and here that has predicted that the given feedback is positive.



**b) predicting review**

**c. Predicting negative Review**

Here we are giving the feedback then that will predict that the feedback is positive or negative and here that has predicted that the given feedback is negative. It has identified and gave that all the following are negative.



**c) Predicting review**

**d. Predicting both positive and negative Review**

Here we are giving the feedback then that will predict that the feedback is positive or negative and here that has predicted that the given feedback has negative as well as positive. It has identified and gave that above following has both negative and positive. For in this given below figure that has shown that course experience is a positive review and about the instructor is a negative review and for the material provided during that period of course has the positive review.

# Student sentiment analysis

How was the course experience?

everything was okay

Tell us about the instructor?

not soo good in experience

Was the material provided useful?

it was useful for studies

**PREDICT**

Positive review

Negative review

Positive review

d) Predicting review

## V. CONCLUSION

Based on the analysis of the ANN-based model for student sentiment analysis, it can be concluded that the model shows promising results in accurately predicting the sentiment of students towards a particular topic or event. The model was trained on a dataset of student feedback and comments, and achieved a high level of accuracy in classifying sentiments as positive, negative or neutral. The model was also able to identify specific keywords and phrases that contributed to the sentiment expressed by the students. The ANN-based model has potential applications in various industries, such as education, market research, and social media analysis. In the education sector, it can be used to track student sentiment towards specific courses, teachers, or assignments, and provide valuable insights for improving the learning experience. In the market research industry, it can be used to analyze customer feedback and identify trends in consumer sentiment towards products and services. In social media analysis, it can be used to monitor public sentiment towards brands or events. However, it should be noted that the accuracy of the ANN-based model is heavily dependent on the quality and size of the training data. Therefore, it is important to ensure that the training data is representative of the target population and that it is properly labeled to avoid bias in the model's predictions. In conclusion, the ANN-based model for student sentiment analysis is a valuable tool for analyzing and predicting student sentiment towards a variety of topics and events, and has potential applications in various industries.

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