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Review & Rating Based Film Sentiment Classification using Machine Learning Technique

Abdul Nasir[1], Hemanth Kumar[2]

Student, Department of MCA, JNN College of Engineering, Shivamogga, Karnataka, India[1]

Associate Professor, Department of MCA, JNN College of Engineering, Shivamogga, Karnataka, India[2]

ABSTRACT: In today's world, there is a possibility that the success of a film has increased more and more about numbers. There are many ways from which these films are classified as a hit or flop using the audience review and rating score through ML methods. Rather than relying on the box office alone as a cure, this function assigns weight to the influence of public opinion in determining how well a movie actually performs. We applied standard NLP methods including word tokens, stop-ward elimination, Term Frequency – Inverse Document Frequency to translate text reviews into numeric features. The ratings with text features to enhance the prediction model were also generalized and combined. Two classification algorithm logistic regression and support vector machine were utilized for classification. The accuracy of the SVM model is attained at 96.36% while logistic regression was 98.18% - impressive performance in predicting the categories of the film's success. This mixture of a combination of reviews and ratings is an intelligent, scalable method for predicting the success of the film with the opinion of the real audience through the user input and the user input.

KEYWORDS: NLP, Term Frequency - Inverse Document Frequency, Logistic Regression, Support Vector Machine, IMDb & Kaggle Datasets.

I. INTRODUCTION

The modern era of social media noticed people overrated with a constant flow of information and constant state of sharing, often sharing their thoughts and views on films. The advent of movie streaming services such as Netflix and Amazon Prime has led to an explosion of ratings and reviews contributed by users. But such an abundance of information is not often conveniently and systematically available. Producers like to be able to tell that a film is going to become a success well in advance of the launch, or that is indeed becoming a success quite soon after it is released, however, viewers frequently wrestle with the problem of whether a film will be a good one. It is here where sentiment analysis comes handy. Through an application of machine learning methods to both the numeric ratings, and the textual content of user-generated reviews, we can estimate the aggregated attitude toward a movie. This route assistance in prediction.

Film Recommendation systems used to make film suggestions based on user inputs. To realize a film level of success or general acceptance, however more research is required by examining what viewers say and how they rank a movie. Sentiment analysis helps us better understand the audience's fillings by capture the reviews emotional tones. Incomplete data results from a customer’s usually rating or reviews a small number of movies. This is higher problem on this strategy. another difficulty is classifying the words or phrase in the reviews that are most relevant to understanding sentiment. By employing machine learning models such as the ones listed below, this study tackles these issues: with the help of natural language processing techniques such as TF-IDF to identify those features and natural language processing techniques such as SVM and Logistic Regression to classify the text key points. This problem is solved by this study by extracting issues from the text and classifying them with the help of ML models such as SVM and Logistic Regression. With the help of developing a data-driven and rational approach to predicting whether a film will be successful or not, this study aims to provide film producers with key insights.

II. LITERATURE SURVEY

R. Saputri et al. Authors focusing on use an Ai based model to understand the viewers text and find out which part of the film Avatar2 are like or unlike. They used IMDb star ratings and user reviews for this. A author’s use a Deep Learning methods that’s merges LSTM and gated recurrent unit. This model looked at feeling content means characters & onions. However there was a big technical issue with this model [1]. A. M. Sarhan, et al. develop a intelligent movie

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alerts system Model that doesn't just find similar films, but also understands how people thing about this film. It scans reviews, both positive and negative, ratings using AI models and then uses emotional insides to recommend the best films based on mood or interest. researcher group developed an advanced deep learning model to automatically analysing the sentiment in online films comments or viewers reviews. Peter Atandoh, et al. aimed to improve how machines understand feelings and opinions. To do this, they do a new model called positional embedding system (which use word order) Multichannel CNN, Attention based BiLSTM [3]. Authors in [4] developed a smart method that can read and understand the opinions and emotions in movie reviews. I Steinke and others found that the good model was SVM, which correctly detected whether reviews were positive or negative with 86% accuracy. They also looked at people's reviews during the pandemic in 2020 and compared them with reviews from before the pandemic [5] proposed a model for full sentiment detection in movie reviews. They utilized various methods and one approach, Naïve Bayes, was the most successful achieving an accuracy of 81%. P. Baid and others created an intelligent system that reads reviews and then automatically generates explanations as to whether opinions are positive or negative. This is a time saving model. Authors in [6] developed a wicked AI model that reads movie reviews word by word. forA. Timmaraju et al.found that the emotion of each word and integrated it to understand the overall opinions of the comments and star ratings. Their model was accurate and relied a handmade features like flexibility and accuracy. Authors paper in [7] designed and developed a model that uses how often words appear and what those text mean emotionally. This helps them create a better & smart model that understands the context and feelings of movie reviews. H. M. Keerthi Kumar and others do they a hybrid model called SVM plus ME that was good for analysing positive and negative sentiment, faster in feature extraction, and more reliable in processing large data sets. Authors in [8] developed a smart system that reads and classifies thousands of film reviews as either positive or negative. Alif Kahan and others. Authors created short summaries made of most useful sentences and words to help peoples easily read opinions and reviews. M.J. Awan and others in paper [9] developed a sophisticated model known as Movie Recommendation Engine System Using Collaborative Filtering & Alternating Least Squares, which was connected to Apache Spark and works do on large data. The ALS model determined the top-rated movies. Authors paid special attention to high-rate films and recommended using deep learning models or MMD in feature work or research part. This system was even more intelligent. Authors in these articles compared two models: one was Random Forest and the other was XGBoost. Zahabiya Mhowwala and others in [10] aimed for best accuracy. The XGBoost algorithm gave the highest accuracy of 95%. Their work was extended to include a greater number of movies. Authors explained where their work could be helpful, like in the entertainment industry and for investors. A. Sharma and U. Ghouse designed a deep learning model called CNN-BiGRU that helps automatically analyze Hindi movie reviews using NLP methods. This paper [11] fills the gap between non-English and Hindi languages with the help of natural language processing methods such as TF-IDF, which assists in classifying the sentiment of Hindi films as positive or negative. Authors in [12] constructed a model named Support Vector Machine (SVM) that has an accuracy of 89% to classify sentiment as positive or negative, which is higher than Naïve Bayes. D. Subedi and others attempted to get the best accuracy among SVM and Naïve Bayes. Authors stated that SVM was more accurate and better in other metrics of evaluation. Authors in [13] created a model with IMDb data with Support Vector Machine (SVM) that is able to classify movie ratings and reviews from sentiment. TF-IDF features were also coupled with the right preprocessing steps and the results were obtained by S. K. Wardhana and others. They proposed further work using sophisticated models or deep learning principles. M. Sanwal and others developed an advanced system for recommending films and predicting their popularity. This is an intelligent system. Authors in this research analyzed basic movie information such as genre, actors, directors, and plot in comparable films. In [14], the authors used rating and voting of similar movies. They used IMDb and TMDB sets and obtained an accuracy of 96. 61, when used with them. creating a new dataset by the maximum accuracy. S. Sahu, A. K Mohapatra et al built movie recommendation system depending on the conventional ML and deep learning methods to improve the rating prediction by utilizing various IMDb and movie review & rating datasets. In [15], the users are labeled as "average" and "no average" users' ratings, which correspond to their individual ratings on IMDb.

III. PROPOSED METHODOLOGY

Fig. 1 shows the flowchart of my work ‘reviews and ratings-based film sentiment analysis using machine learning’ first we collecting dataset different platforms such as IMDb and Kaggle, IMDb famous & hit for film watching platform. They offering big amount of film reviews data, which are helpful for analyzing movie watchers’ reviews and opinions in words. Kaggle is best platform for collecting different types of datasets which some time clean and some non-clean, but it can helpful for machine learning projects.

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After this next stage preprocessing and cleaning the clean the data utilizing a variety of techniques, including remove nullna, find NaN fields in dataset, et al. preprocessing is best for achieving high accuracy, matrix, recall, et al. Feature extraction and tokenization in this stage extracting useful features using Bag-of words, TF-IDF, more advance python library's, these libraries are best for word tokenization's. In this stage we can train & test, Two different model such as Logistic Regression and support vector machine (SVM).

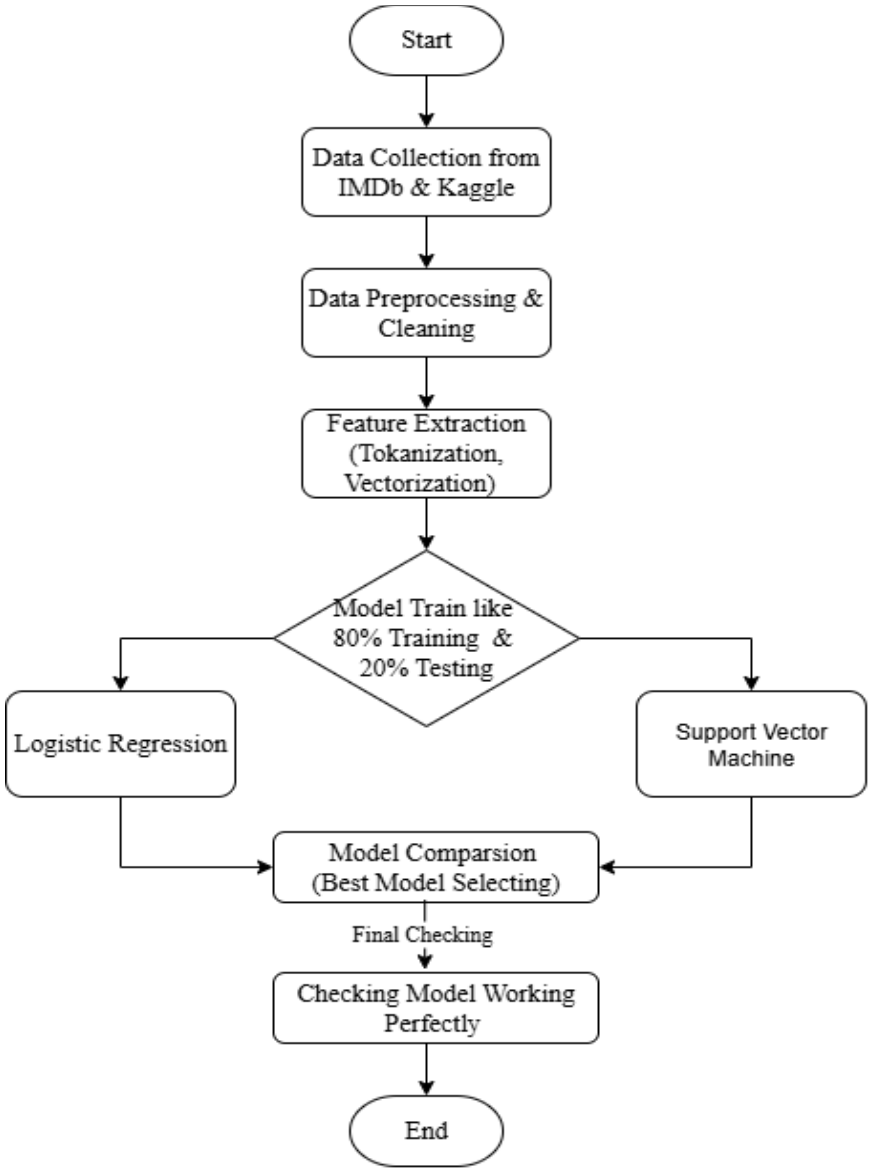

Fig. 1 Flowchart for proposed methods.

We can train models to dividing a dataset into two different parts such as train the model with 80% data and test the model with 20% data. After this next stage comparing the two models which can performs best for movie data analysis. In my case Logistic Regression performs the higher accuracy like 98.18%. We are comparing two distinct machine learning methods, such as Logistic Regression with 98.18% accuracy and SVM with 96.36% accuracy.

1.Numerical Analysis

A simulation of SVM and L R models in determining work result the movie's success based on rating and review was then evaluating using the measures symbolized by Accuracy, Precision, Recall and F1-Score.

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Table 1. Models Performance Analysis.

Model	Accuracy	Precision	Recall	F1-Score
Logistic Regression	98.13%	98%	98%	98%
Support Vector Machine	96.36%	96%	96%	96%

Performance Checking

Accuracy

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN} \longrightarrow \textbf{(1)}$$

Accuracy is a performance measure that indicates the ratio of correct predictions a model produces out of the total number of predictions.
TP – True Positive.
TN – True Negative.
FP – False Positive.
FN – False Negative.
Measures the general correctness of the model. Logistic Regression in our work attained 98.13% and SVM attained 96.36%, reflecting very high reliability.

Precision

$$precision = \frac{TP}{TP + FP} \longrightarrow \textbf{(2)}$$

Precision calculates the ratio of correct positive predictions (True Positives / (True Positives + False Positives)).
TP – True Positive.
FP – False Positive.
Informs us about the number of movies identified as Hit actually being Hit; precision for both models was over 96%, reflecting low false positives.

Recall

$$Recall = \frac{TP}{TP + FN} \longrightarrow \textbf{(3)}$$

Recall calculates the ratio of real positive instances that were predicted correctly by the model (True Positives / (True Positives + False Negatives)).
TP – True Positive.
FN – False Negative.
Shows how many positive Hit movies actually were correctly identified; LR slightly surpassed SVM, correctly capturing nearly all positive cases.

F1-Score

$$F1 = 2 \times \frac{Precision \times Recall}{Precision + Recall} \longrightarrow \textbf{(4)}$$

The F1 score is an evaluation metric used in machine learning for classification models, calculating the harmonic mean between precision and recall in order to give a single figure that balances both.

Balances Recall and Precision; at levels nearly 98% for LR and 96% for SVM, both models had very good consistency.

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IV. RESULT AND DISCUSSION

Results And Discussion Sentiment Analysis Performance to assess the effectiveness of our sentiment classification system, it was compared against 2 supervised machine learning (ML) classifiers: Support Vector Machine and Logistic Regression. The information is obtained from IMDb and Kaggle as well as token views and ratings of the movies to formulate an equal feature set. Data Our main source was two corpuses: Before using the data, we cleaned and pre-processed using common technique in NLP like tokenizing the characters, removing stop.

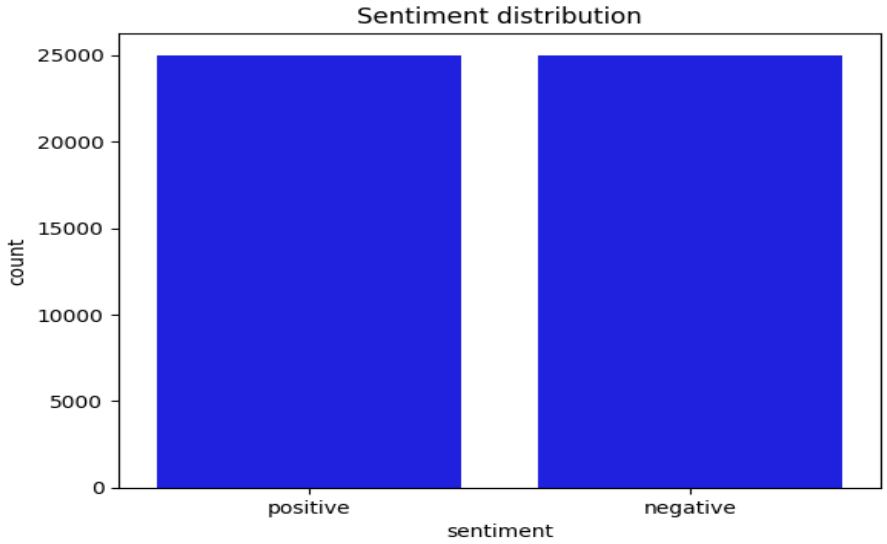

Fig. 2 Positive and Negative Sentiment Distribution.

Fig. 2 is the IMDb-50k-movie-reviews dataset which is divided into two equal halves, each of which contains Post and Neg, and has a total of 50,000 film reviews. This Dataset is well balanced for model learns data Post and Neg words that enable the model to make a better prediction.

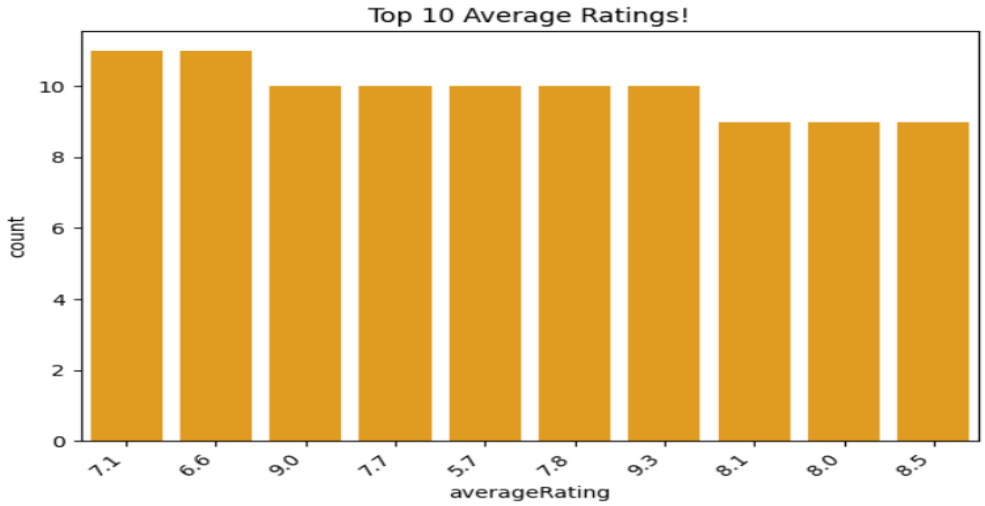

Fig. 3 Top 10 Movies by Average Ratings

Fig. 3 chart that displays the top 10 average films ratings. This chart averages the films ratings from the movie and audience counts dataset. The scores of the majority of the films are over 7 meaning movie hits. this indicates that the movie generally received good reception from 5.7 to 9.3. We may gain a deeply understanding of the popularity and quality of films by merging datasets of the ratings and reviews, which enhances the best result.

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Fig. 4 This chart indicates the performance of Logistic Regression and Support Vector Classifier on analysing sentiment of movie reviews & ratings. Logistic Regression R good with the highest accuracy of 98.18%, and SVC worst with 96.36%. Given that Logistic Regression seems to do marginally better for an analysis of ratings and reviews, the higher the accuracy. fillings, or opinions, and thus the less frequency of errors. There, Logistic Regression is the most suitable model for understanding audience opinions and thoughts in this dataset.

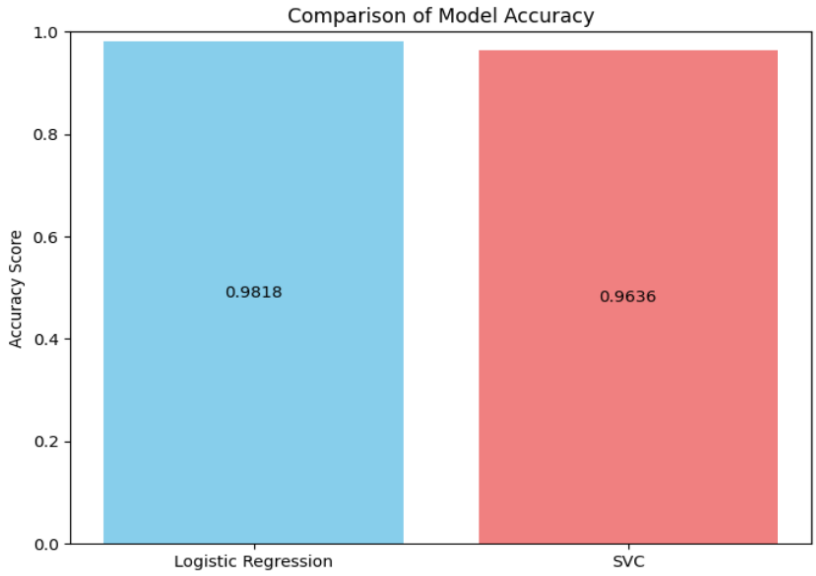

Fig. 4 Comparison of two models Logistic Regression and SVM

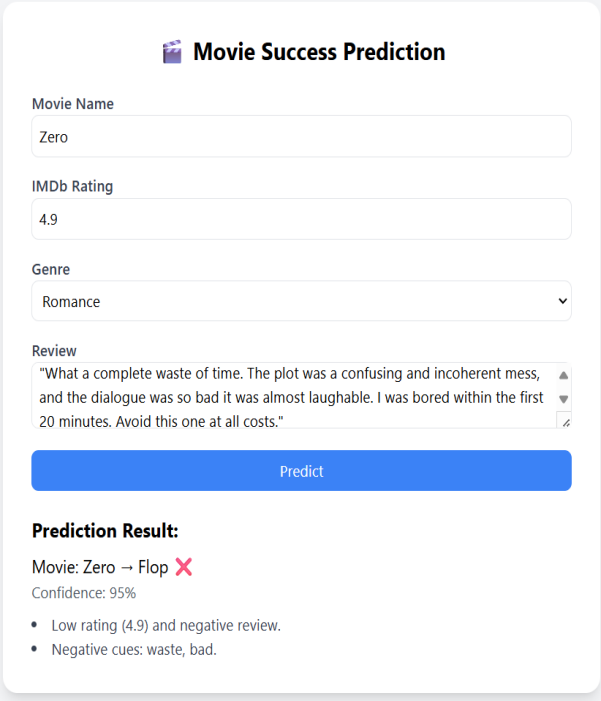

Fig. 5 System Output Movie Flop Prediction Through User Input.

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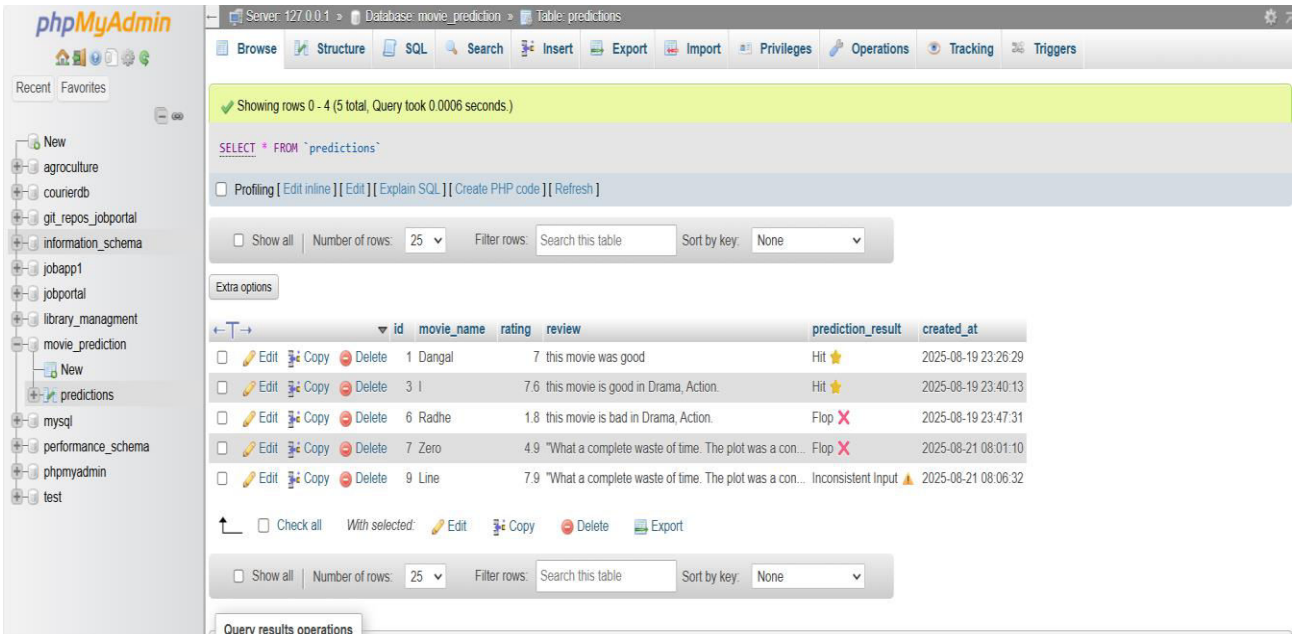

Fig. 6 All Output Store in MySQL Xampp Database Server.

Fig. 5 movie flop prediction is shown. In fig. 6 database is storing the all outputs is shown. The system's outputs clearly show that it can cope with different situations when predicting how successful a movie will be. When the inputs include high ratings and good reviews, the system expects the movie to be a hit. In contrast, for movies that have low ratings and bad reviews, the system correctly identifies them as a flop. If there are conflicting inputs, like a high rating but a negative review, the system smartly labels the result as Inconsistent, helping the user know they need to check their inputs again. The different results shown in the images show how strong and dependable the model we created is.

V. FUTURE ENHANCEMENT

This project can be extended in the future using a larger and better-quality dataset comprising a wide variety of reviews (multilingual), coupled with financial indicators such as budget, revenue and eventually even cast and crew popularity, which are familiar hematopoietic factors. The actors and the actresses involved make a difference to a movie. Hyperparameter tuning may also be used to enhance performance of the models, as well as cross validation. and using ensemble methods or deep learning models such as LSTMs/Transformers for more advanced sentiment analysis. Other factors such as social media trend, genre-wise trends and seasonal release patterns could provide more enriched insights. For usability, we can build this into an interactive dashboard or, A web application that inset in which users can input their reviews of a movie and receive a real time prediction of whether it will be a hit or flop, along with explainability tools like Laboratory Information Management System so the users can see why a movie was classified a hit or flop. Finally, generalizing the problem for classification of non-binary multiple kinds of success (like a blockbuster movie, a common movie and a flopping) or even to prediction the box office amount that will be collected.

VI. CONCLUSION

Using the user ratings and reviews, a machine learning approach may be used to determine if a film is a hit or a flop. We used text as features for analysis - tokenizing, removing stopwords, stemming, and extracting important words or turn text into something that can be used in analysis using TF-IDF. We ran two models: A Support Vector Machine and a Logistic Regression, to test which Algorithm works better. The SVM model achieved the lowest accuracy rate (96.36%) and Logistic Regression had the highest accuracy 98.72%. 18%. These findings demonstrate that using review sentiment in conjunction with numerical ratings is a robust method to predict film success. That this model has a high accuracy comparing the predicted value of one movie to the actual value of one movie indicates that its predictions of how well a movie is likely to do so are useful in the field. This strategy is resourceful in helping movie producers, streaming providers, and viewers understand intelligence of what people think. This is a systematic and intelligent method for forecasting a film's success beyond people awareness. Future work could explore improving the model's

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performance via the use of diverse information sources and deep learning techniques. in accounting for variations in languages and forms of films.

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