



Vivekanand Education Society's Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai, Approved by AICTE & Recognised by Govt. of Maharashtra)
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Title of the Project: App Ratings Prediction Model

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Content

- Overview
- Introduction
- Problem Statement
- Objectives
- Requirements
- Literature Survey
- Proposed System
- Proposed Design (along with UML Diagrams)
- Implementation
- Results and Analysis
- Conclusion
- References



Introduction to Project

Mobile applications have become an integral part of daily life, serving various purposes like communication, entertainment, and business. With millions of apps on platforms like the Google Play Store, users rely on ratings to assess quality before downloading. These ratings are influenced by factors such as user experience, functionality, and performance, impacting an app's visibility and success. Understanding these factors helps developers create better, more user-friendly applications.

This project aims to predict app ratings based on key attributes like category, reviews, size, installs and genre. Using machine learning regression, we analyze these factors to develop a predictive model that helps identify what influences app success. By leveraging data-driven insights, our model assists developers in optimizing their apps to meet user expectations effectively.



Problem Statement

With millions of mobile applications available on platforms like the Google Play Store, users often rely on app ratings to make informed choices. However, predicting an app's rating based on its attributes remains a challenge due to the diverse factors influencing user satisfaction. Developers and businesses lack a clear understanding of how different features such as app category, number of reviews, installs, and content rating contribute to an app's overall rating.

This project addresses the need for a predictive model that can estimate app ratings based on these key attributes. By analyzing historical data and applying machine learning regression techniques, we aim to develop a system that can accurately forecast app ratings. This will help developers optimize their apps, improve user satisfaction, and enhance decision-making in app development and marketing strategies.



Objectives of the project

- Train a regression/classification model using machine learning techniques on the Play Store dataset.
- Analyze key features like app category, reviews, installs, price, and size to predict app ratings accurately.
- Optimize Model Performance using feature engineering, hyperparameter tuning, and ensemble learning techniques.
- Ensure Model Interpretability by identifying the most influential factors affecting app ratings.



Objectives of the project

- Validate Model Accuracy using evaluation metrics like RMSE, MAE, and R^2 score for reliable predictions.
- Provide Insights for Developers to enhance app quality and user satisfaction based on data-driven recommendations.



Requirements of the system (Hardware, software)

◆ Software Requirements

- **OS:** Windows 10/11, Linux (Ubuntu), macOS
- **Languages & Frameworks:** Python, Flask, Streamlit
- **ML Technologies:**
 - Regression Model
- **ML Libraries:** Pandas, NumPy.
- **Dataset:** googleplaystore.xlsx
- **Development:** Jupyter Notebook, Google Colab.



Requirements of the system (Hardware, software)

◆ Hardware Requirements

- **Basic Training:** i5/i7 (10th Gen+), 8GB RAM, 100GB SSD, No GPU needed
- **Advanced Training:** i7/i9, 16GB+ RAM, NVIDIA RTX 3060+, 500GB SSD
- **Cloud GPU:** Google Colab, AWS EC2 GPU
- **Backend Server:** 2-4 Core CPU, 4GB RAM, 50GB SSD (AWS EC2, Render)
- **Frontend Hosting:** Vercel, Netlify



Literature Survey

1. App Review Prediction Using Machine Learning

Published in: Journal of Pharmaceutical Negative Results Volume 13 Issue 4 2022

Published by: S. Shiva Prakash , Dr.C. Siva Kumar

The research paper "App Review Prediction Using Machine Learning" focuses on classifying and predicting user reviews on the Google Play Store using machine learning techniques. By analyzing user feedback, the study categorizes reviews into positive, neutral, or negative sentiments, helping both developers and users understand app performance and user satisfaction.



Literature Survey

The methodology involves data cleaning, validation, and visualization, followed by applying various machine learning models such as Logistic Regression, Decision Trees, Random Forest, K-Nearest Neighbors (KNN), and deep learning models like RNN and LSTM for sentiment classification. The study finds that RNN and LSTM models provide the highest accuracy in predicting sentiment.

The paper concludes that machine learning can effectively analyze app reviews, making it a valuable tool for app developers. Future enhancements could include AI-driven sentiment analysis and cloud-based solutions for real-time predictions. While our project focuses on predicting app ratings, this research provides useful insights into data preprocessing, model selection, and sentiment-based app evaluation.



Literature Survey

2. Play Store App Analysis & Rating Prediction Using Classical ML Models & Artificial Neural Network

Published in: Proceedings of the 2023 7th International Conference On Computing, Communication, Control And Automation (ICCUBEA), August 2023

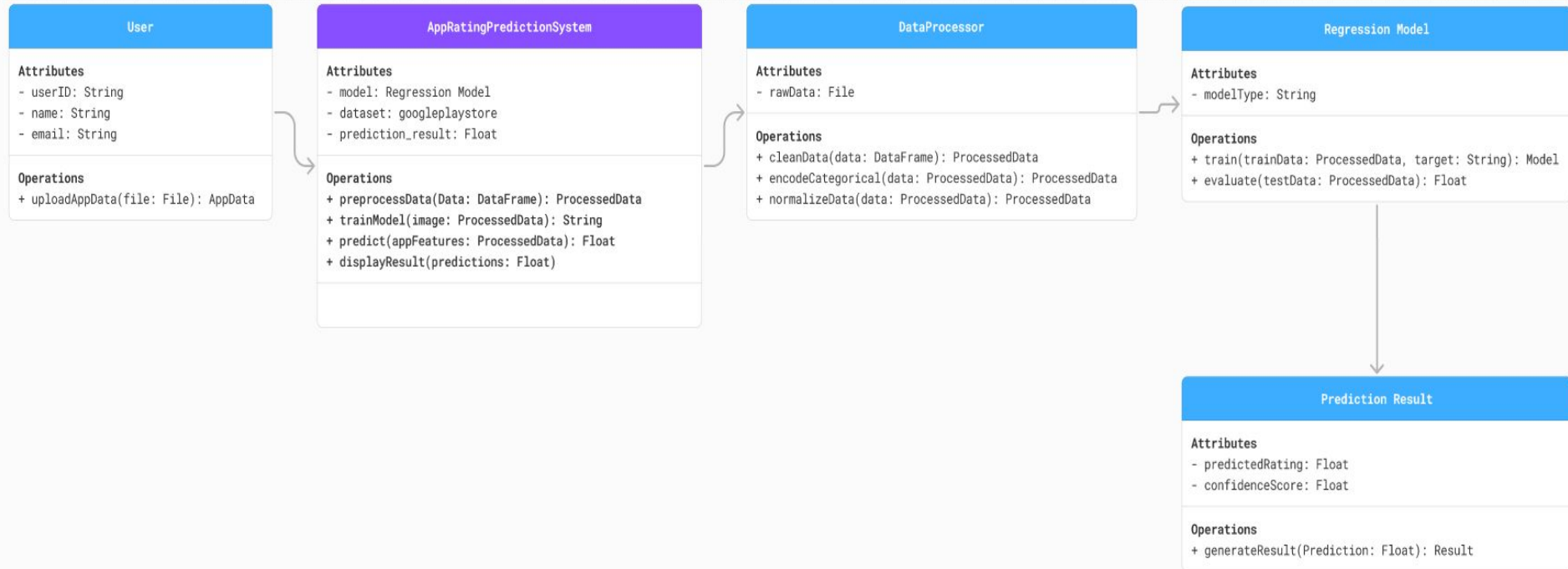
Published by: Bhimasen Moharana, Bhramara Bar Biswal, Snehasis Dey, Manas Kumar Rath, Shobhan Banerjee

The research paper "Play Store App Analysis & Rating Prediction Using Classical ML Models & Artificial Neural Network" focuses on analyzing various attributes of apps available on the Google Play Store, such as version, category, number of installations, and genre, to predict app ratings. By employing both classical machine learning models and artificial neural networks, the study aims to provide reliable rating predictions, assisting developers and users in understanding app performance and user satisfaction.



Proposed Design

UML diagram





Implementation

```
# Example usage  
print(predict_app_rating_ridge("Angry Birds Rio"))
```

```
4.3  
/usr/local/lib/python3.11/dist-packages/sklearn/utils/validation.py:2739: UserWarning: X does not have valid feature names, but StandardScaler was fitted w.  
warnings.warn(
```

```
# Example usage  
print(predict_app_rating_rf("Angry Birds Rio")) #
```

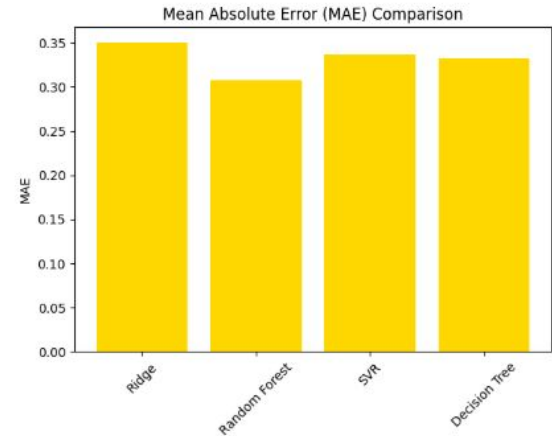
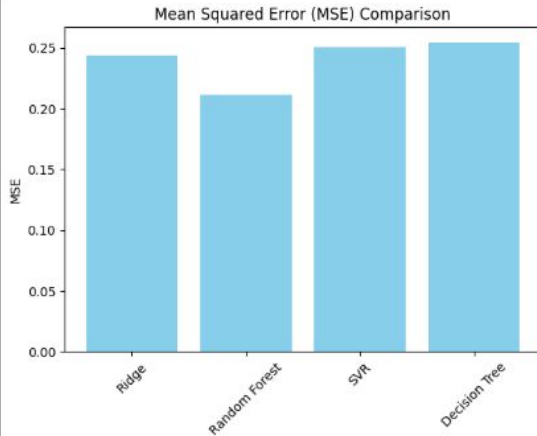
```
4.4  
/usr/local/lib/python3.11/dist-packages/sklearn/utils/validation.py:2739: UserWarning: X does not have valid feature names, but StandardScaler was fitted w.  
warnings.warn(
```



Implementation

```
plt.bar(results_df['Model'], results_df['MAE'], color=gold)
plt.title('Mean Absolute Error (MAE) Comparison')
plt.ylabel('MAE')
plt.xticks(rotation=45)

plt.tight_layout()
plt.show()
```





Result Analysis

To ensure the reliability of our prediction system, we evaluated the trained Random Forest Regressor using appropriate regression metrics. The model achieved a Mean Squared Error (MSE) of 0.2110 and a Mean Absolute Error (MAE) of 0.3081, indicating a low average prediction error and strong overall performance. These results demonstrate the model's effectiveness in accurately predicting app ratings based on various features. Since this is a regression problem, traditional classification metrics like accuracy or confusion matrix were not applicable; instead, MSE and MAE provided a more meaningful assessment of model performance. Overall, the evaluation confirms that the Random Forest model is dependable and suitable for real-world rating prediction tasks.



Conclusion

With the growing number of mobile applications, understanding what influences app ratings is crucial for developers and businesses. This project utilized machine learning techniques to analyze key app attributes and predict ratings, offering a structured approach to evaluating app performance. By leveraging data-driven insights, developers can make informed decisions to enhance user experience and app success.

Beyond rating prediction, this study highlights the broader potential of machine learning in app analytics, from sentiment analysis to market trend predictions. Future advancements could explore real-time data integration, user behavior analysis, and personalized recommendations to further refine app evaluation and optimization.



References

1. **S. Shiva Prakash , Dr.C. Siva Kumar**, "App Review Prediction Using Machine Learning" , Journal of Pharmaceutical Negative Results Volume 13 Issue 4 2022 , DOI: 10.47750/pnr.2022.13.04.174
2. **Play Store App Analysis & Rating Prediction Using Classical ML Models & Artificial Neural Network** ,August 2023 ,DOI:10.1109/ICCUBE58933.2023.10391960, Conference: 2023 7th International Conference On Computing, Communication, Control And Automation (ICCUBEA)