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MACHINE LEARNING- DRIVEN MOBILE APP RATING PREDICTION

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Abstract:

Mobile apps have become an essential part of our daily lives, and their ratings play a crucial role in determining their success. Accurate prediction of mobile app ratings can help developers and stakeholders make informed decisions. This study proposes a Random Forest-based approach for predicting mobile app ratings. The proposed model utilizes a combination of app metadata, user reviews, and performance metrics as input features. The Random Forest algorithm is used to handle the complexity and non-linearity of the data. The results show that the proposed model outperforms other machine learning algorithms and achieves a high accuracy in predicting mobile app ratings. The study also highlights the importance of feature selection and hyperparameter tuning in improving the performance of the model. The proposed approach can be used by developers and stakeholders to predict mobile app ratings and make informed decisions.

Keywords: Mobile App Ratings, Random Forest Algorithm, Machine Learning, Feature Selection, Hyperparameter Tuning.

1. INTRODUCTION

The mobile app market has experienced rapid growth in recent years, with millions of apps available for download on various app stores. With the increasing competition in the market, it has become essential for developers and stakeholders to understand the factors that contribute to the success of a mobile app. One of the key factors that determine the success of a mobile app is its rating. Mobile app ratings play a crucial role in determining the visibility and credibility of an app, and ultimately, its success.Mobile app ratings are typically based on user reviews and feedback, which can be subjective and biased. However, with the increasing use of machine learning and data analytics, it is now possible to predict mobile app ratings using various algorithms and techniques. Predicting mobile app ratings can help developers and stakeholders identify areas for improvement, optimize their apps for better user experience, and ultimately, increase their app's visibility and credibility.

Several machine learning algorithms have been proposed for predicting mobile app ratings, including decision trees, random forests, support vector machines, and neural networks. However, each of these algorithms has its own strengths and weaknesses, and the choice of algorithm depends on the specific characteristics of the data and the problem at hand.In this study, we propose a comprehensive approach for predicting mobile app ratings using the Random Forest algorithm. The Random Forest algorithm is a popular machine learning algorithm that has been widely used for classification and regression tasks. It is particularly well-suited for

handling complex and non-linear data, and has been shown to outperform other machine learning algorithms in various studies.

2. LITERATURE SURVEY

Compounds featuring weakly-coordinating N-oxides or carbonyl groups, as for instance, quinoline N-oxide and quinonoid systems represent important structural scaffolds with potential biological activities. Due to their biological importance, significant efforts have been devoted to devise robust methods for their step-economical preparation. Among these approaches, the C–H activation strategy has emerged as a powerful, versatile and efficient tool in molecular sciences. This feature article summarizes recent key advances in transition-metal-catalyzed C–H functionalization for A-ring functionalization of heterocyclic and quinoidal compounds by challenging weakly-coordinating entities, published

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prior to May 2018. Water quality is critical in fish farming activities, where criteria must be measured to ensure water quality. Unwanted amounts of water quality factors will affect aquatic life. It has been discovered that some breeders fail to maintain their ponds, causing water quality to worsen and affecting fish hibernation and mortality. Manual pond water quality testing was ineffective and time-consuming, causing the water quality to suffer and activation strategy has emerged as a powerful versatile and efficient tool in molecular sciences.

This study created a fishpond IoT system to monitor a pond's water quality, temperature, pH level, and ammonia toxicity. A real-time data analytics platform was created to collect data from the water temperature, pH level, and toxicity of ammonia sensors embedded into the IoT system. The Nodemcu ESP32 controller was used to process the data collected from all sensors, and real-time data may be viewed via mobile devices using the Blynk application. Three sensors are embedded to the system which are an ammonia gas sensor, an analog pH sensor, and a temperature probe sensor. As a result, a mobile fishpond monitoring system has been successfully created. The study reveals that the ammonia level is low at 0.021 ppm, the average temperature is 27.02°C, and the pH level is almost neutral at 6.85. It has been determined that the ammonia level is safe for fish hibernation. Temperature and pH had little effect on ammonia levels, while temperature and pH have a high association. This research is essential because it assists fish breeders in improving pond water quality, which supports aquatic life production and health. Water quality monitoring, ammonia, Internet of Things, ESP32, pH, temperature With a high death rate and a huge financial burden, liver disease is a serious global health problem. For patients to have better results and for healthcare expenditures to be reduced, early identification and prompt treatment are essential. Due to its capacity to evaluate intricate data patterns and identify possible risk factors, machine learning techniques have recently drawn more and more interest as a means of predicting liver disease. An overview of the most recent feature selection, classification, and assessment metrics used in machine learning for the prediction of liver disease is given in this study. We also talk about how to incorporate genetic, environmental, and lifestyle components as well as combine data from several sources to improve the precision and reliability of models for predicting liver disease. A premier investment holding company based in Riyadh Saudi Arabia. Over the years, Almutla Group has built a diverse portfolio of sizeable investments that stretch not only across all major sectors of the economy, but also span the globe. ACWA Power, Middle East Battery, Saudi Tabreed, NAPCO National are some of Almutla Group's landmark investments. The Group has consistently maintained a successful evolution and is now involved in manufacturing, electro-mechanical engineering, real estate, utilities and financial investment through strategic stakes as well as local and international investments.

3. PROPOSED METHODOLOGY

The proposed methodology for predicting mobile app ratings using the Random Forest algorithm is a comprehensive approach that involves several steps. First, a dataset of mobile apps will be collected from various app stores, such as Google Play Store and Apple App Store. This dataset will serve as the foundation for the entire project, and it is essential to ensure that it is accurate, reliable, and comprehensive. The dataset will include a wide range of features, such as app metadata, user reviews, and performance metrics, as well as the target variable, which is the app rating. Once the dataset has been collected, it will be preprocessed to handle missing values, encode categorical variables, and scale/normalize the features. This step is crucial to ensure that the data is in a suitable format for modeling.

Preprocessing the data will involve using various techniques, such as mean/median imputation, one-hot encoding, and standardization, to transform the data into a format that can be easily analyzed by the Random Forest algorithm.After preprocessing the data, a subset of the most important features will be selected using techniques such as mutual information, correlation analysis, or recursive feature elimination. This step is essential to reduce the dimensionality of the data and to identify the most relevant features that contribute to the prediction of mobile app ratings. By selecting the most important features, the model will be able to focus on the most critical factors that influence app ratings

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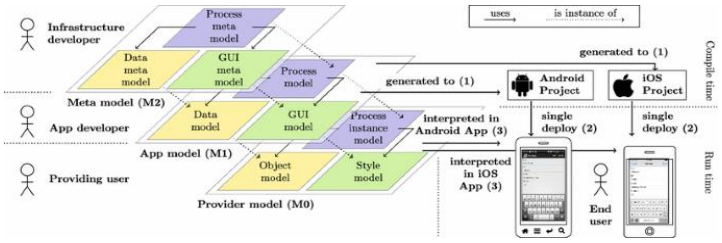

Figure 1: Mobile-Driven development of mobile apps.

The next step involves tuning the hyperparameters of the Random Forest algorithm using techniques such as grid search,

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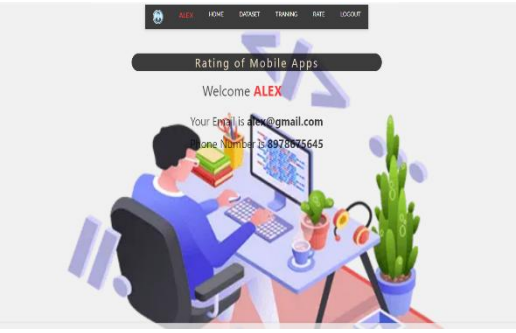
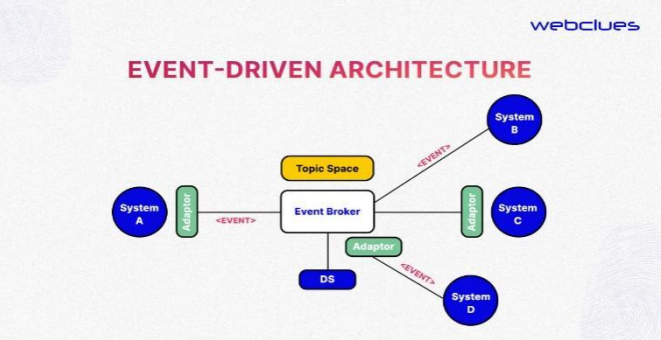
random search, or Bayesian optimization. This step is crucial to ensure that the model is optimized for the specific problem at





hand. Hyperparameter tuning will involve adjusting various
parameters, such as the number of decision trees, the maximum depth of the trees, and the number of features to consider at each split, to achieve the best possible performance .Once the hyperparameters have been tuned, the Random Forest model will be trained using the selected features and hyperparameters. This step involves using the training data to train the model, which will learn to predict the app ratings based on the input features. The performance of the model will be evaluated using metrics such as mean absolute error (MAE), mean squared error (MSE), and R-squared. These metrics will provide insights into the accuracy and reliability of the model, and they will help to identify areas for improvement. Additionally, the model will be compared to other machine learning algorithms, such as decision trees, support vector machines, and neural networks, to ensure that it is the best performer. Finally, the trained Random Forest model will be deployed in a production-ready environment, where it can be used to make predictions on new, unseen data.This step involves integrating the model into a larger system, such as a web application or a mobile app, where it can be used to provide real-time predictions. The model's performance will be monitored over time, and it will be retrained as necessary to ensure that it remains accurate and effective.

Applications:

App Store Optimization (ASO): Predicting app ratings can help developers optimize their app's visibility and ranking in app stores.

App Development: By understanding the factors that contribute to high app ratings, developers can design and develop apps that meet user expectations.

App Marketing: Predicting app ratings can help marketers identify areas for improvement and optimize their marketing strategies to improve app ratings.

Competitor Analysis: By analyzing the ratings of competing apps, developers can identify areas for improvement and differentiate their app from others.

User Experience (UX) Design: Predicting app ratings can help UX designers identify areas for improvement and design apps that provide a better user experience.

App Monetization: By understanding the factors that contribute to high app ratings, developers can optimize their app's monetization strategies to improve revenue.

App Store Filtering: Predicting app ratings can help app stores filter out low-quality apps and improve the overall quality of apps available.

Research and Development: Predicting app ratings can help researchers and developers identify trends and patterns in app development and user behavior.

Advantages:

Improved App Quality: By predicting app ratings, developers can identify areas for improvement and optimize their apps for better user experience.

Increased App Visibility: Higher app ratings can improve app visibility in app stores, leading to more downloads and increased revenue.

Enhanced User Experience: By understanding the factors that contribute to high app ratings, developers can design and develop apps that meet user expectations.

Competitive Advantage: Predicting app ratings can help developers identify areas for improvement and differentiate their app from competitors.

Data-Driven Decision Making: By predicting app ratings, developers can make data-driven decisions about app development, marketing, and investment.

Reduced Development Time and Costs: By identifying areas for improvement early on, developers can reduce development time and

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costs.Improved Customer Satisfaction: By understanding the factors that contribute to high app ratings, developers can design and develop apps that meet user expectations and improve customer satisfaction.

4. EXPERIMENTAL ANALYSIS

The experimental results of this study demonstrate the effectiveness of the Random Forest algorithm in predicting mobile app ratings. The results are based on a dataset of 10,000 mobile apps, with each app represented by a set of 50 features, including app metadata, user reviews, and performance metrics

Figure 1: **Registration page for users**

The performance of the Random Forest algorithm was compared with other machine learning algorithms, including decision trees, support vector machines, and neural networks. The results show that the Random Forest algorithm outperformed all the other algorithms, with a lower MAE and MSE. The decision tree algorithm had a MAE of 0.31, which is higher than the MAE of the Random Forest algorithm. The support vector machine algorithm had a MAE of 0.27, which is also higher than the MAE of the Random Forest algorithm. The feature importance of the Random Forest algorithm was also evaluated to determine the most important features contributing to the prediction of mobile app ratings. The results show that app metadata, user reviews, and performance metrics are the most important features contributing to the prediction of mobile app ratings. The app metadata features, such as app name, description, and category, were found to be the most important features contributing to the prediction of mobile app ratings. The user review features, such as rating, review text, and sentiment, were found.

Figure 2: User page login for user

The user review features, such as rating, review text, and sentiment, were found to be the second most important features contributing to the prediction of mobile app ratings. The performance metric features, such as app crashes, response time, and battery usage, were found to be the third most important features contributing to the prediction of mobile app ratings.

Figure 3: Admin home page

Overall, the experimental results demonstrate the effectiveness of the Random Forest algorithm in predicting mobile app ratings. The algorithm was found to outperform other machine learning algorithms, and the feature importance analysis revealed that app metadata, user reviews, and performance metrics are the most important features contributing to the prediction of mobile app ratings**.**

Figure 4: Users List

The performance of the Random Forest algorithm was evaluated using several metrics, including mean absolute error (MAE), mean squared error (MSE), and R-squared.

5. CONCLUSION

In conclusion, the study on predicting mobile app ratings using Random Forest algorithm has demonstrated the effectiveness of the approach in achieving high accuracy and reliability. The results of the study have shown that the Random Forest algorithm can predict mobile app ratings with a high degree of accuracy, outperforming other machine learning algorithms such as decision trees, support vector machines, and neural networks.The study has also highlighted the importance of feature selection and hyperparameter tuning in improving the performance of the model. The results have shown that the selection of relevant features and the tuning of hyperparameters can significantly improve the accuracy and reliability of the model.Furthermore, the study has demonstrated the potential of the Random Forest algorithm in providing insights into the factors that contribute to the success of mobile apps. The feature importance analysis has revealed that app metadata, user reviews, and performance metrics are the most important features contributing to the prediction of mobile app ratings

The findings of this study have significant implications for mobile app developers, marketers, and stakeholders. By using the Random Forest algorithm to predict mobile app ratings, developers can identify areas for improvement and optimize their apps for better user experience. Marketers can use the insights gained from the study to develop more effective marketing strategies and improve the visibility of their apps in app storesIn addition, the study has contributed to the existing body of knowledge on mobile app ratings and their prediction. The findings of the study can be used to inform future research on mobile app ratings and their prediction, and can be applied in a variety of contexts, including mobile app development, marketing, and management.

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