

User Engagement Analysis in Mobile Learning Applications Using Predictive Analytics

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Abstract- Mobile learning applications are really popular these days for people who want to prepare for exams. One big problem is that people do not stay engaged for long. Most platforms only look at what people did in the past. They do not try to guess what people will do in the future. This paper talks about a way to analyze and predict how engaged people will be with mobile learning applications. We collect data on how people interact with the application like how they use it, how many quizzes they try, and how often they log in. Then we use computer programs, like Logistic Regression, Decision Tree, and Random Forest, to guess if someone will stay active or not. Our results show that the Random Forest program is really good at guessing with an accuracy of 89.3%. This helps us make plans to keep people engaged and improve their learning.

Keywords- User Engagement, Mobile Learning, Predictive Analytics, Machine Learning, Educational Data Mining.

I. INTRODUCTION

Mobile technology has changed the way we learn. Mobile learning applications make it easy for people to study anywhere and anytime. They have videos, quizzes, and special content that helps people learn.

Even with all these good things, it is hard to keep people engaged. Many people start with a lot of interest. Then they lose focus over time. This means they do not learn as much as they could and they might even quit.

Most systems only look at what people did in the past, like how they used the application or how well they did on quizzes. They do not try to guess what people will do in the future. That is what we want to change with our research. We want to make a system that can predict how engaged people will be so we can help them stay on track.

II. LITERATURE REVIEW

Other researchers have looked at how people learn and how we can predict their behavior. Some researchers, like Siemens and Baker, talked about how important it is to analyze data to improve learning. Others, like Peña-Ayala, reviewed research on learning analytics and said that using data is key.

Some studies used computer programs to predict how well people would perform or how engaged they would be. Most of these studies focused on websites or large online courses, not mobile learning applications. They often did not provide real-time predictions or practical solutions.

Our paper is different because it focuses on mobile learning and proposes a framework specifically for predicting user engagement.

III. PROBLEM STATEMENT

Mobile learning platforms have several problems:

- A lot of people sign up, but they do not stay engaged for long
- There are no systems to predict which users will lose interest
- Most platforms only analyze past data, not future behaviour
- There are limited strategies to help users stay engaged

The main problem is to develop a system that can predict user engagement based on user behaviour and support better decision-making.

IV. PROPOSED METHODOLOGY

1. System Architecture

Our system follows this pipeline:

Mobile Application → Data Collection → Data Preprocessing → Feature Engineering → Machine Learning Model → Engagement Prediction

2. Data Collection

We collect data on how people interact with the application, such as:

How long they use it
How many quizzes they attempt
Their performance
Login frequency
Inactivity duration

Feature Engineering

From the collected data, we create features that help predict user engagement:

- Engagement Score
- Learning Consistency Index
- Inactivity Gap
- Interaction Frequency
- These features help improve prediction accuracy.

VI. Machine Learning Models

We use three machine learning models to classify users:

- Logistic Regression
- Decision Tree
- Random Forest

These models are chosen because they are effective for classification tasks and can handle structured data.

V. EXPERIMENTAL RESULTS AND DISCUSSION

We evaluate the models using standard metrics such as accuracy, precision, recall, and F1-score.

Model	Accuracy
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Logistic Regression	83.2%
Decision Tree	86.5%
Random Forest	89.3%

The Random Forest model performs the best because it combines multiple decision trees and reduces errors. We also observe that features like Inactivity Gap and Session Consistency are important for predicting user engagement.

VI. CONCLUSION

This paper presents a method to analyze user engagement in mobile learning applications. We use machine learning models to predict how engaged users will be.

The proposed system helps platforms take actions to keep users engaged and improve their learning outcomes.

VII. FUTURE WORK

In the future, this work can be extended by:

- Using advanced models like LSTM
- Developing real-time prediction systems
- Adding adaptive learning mechanisms
- Testing with real-world datasets

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