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PRIVACY-PRESERVING ON-SCREEN ACTIVITY TRACKING AND CLASSIFICATION IN E-LEARNING USING FEDERATED LEARNING

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ABSTRACT

In the evolving landscape of remote and online learning, the ability to monitor and assess students' productivity has become increasingly. This project is used for "Privacy-Preserving On-Screen Activity Tracking and Classification in E-Learning Using Federated Learning." It aims whether students are utilizing their time for knowledge development or wasting it. E-learning platforms have gained popularity, especially in remote education. However, students are actively focused during online sessions. Our approach uses Federated Learning, to user privacy while accurately classifying onscreen activities. By this technique, we address the challenge of preserving user privacy and providing valuable insights into the efficiency of online learning. Federated Learning uses to our system to train machine learning models across multiple user devices, eliminating the need to centralize sensitive data on a single server. keywords using CNN, decision tree, and linear discriminant analysis.

1. INTRODUCTION

In privacy-preserving on-screen activity tracking and classification in e-learning, the goal is to monitor and analyze the activities of learning during online courses while maintaining their privacy. Machine learning algorithms are used to automatically track and classify the on-screen activities such as mouse movements and keyboard inputs, without compromising the learner's personal information. It develops on-screen activity tracking and classification mechanisms into e-learning platforms while prioritizing user privacy through the implementation of federated learning. Federated learning also known as collaborative learning is a decentralized approach to training machine learning models.The proposed system leverages advanced machine learning algorithms to analyze on-screen activities, including mouse movements, keyboard inputs, and other relevant metrics, to understand user engagement and learning patterns. Through federated learning, these algorithms are trained collectively without exposing individual data points, preserving the privacy of each learner. This innovative approach not only enhances the adaptability of e-learning content but also addresses the critical concerns surrounding data privacy in educational technology. The project aims to contribute to the broader discourse on the responsible integration of technology in education by providing a privacy-centric solution for on-screen activity tracking.

2. EXISTING SYSTEM

The existing method for on-screen activity classification relies on Stochastic Gradient Descent (SGD), a widely used optimization algorithm in machine learning.

However, while SGD has been effective in various applications, it presents several limitations when applied to the task of on-screen activity classification in e-learning environments.

Disadvantages of the existing system:

- Privacy Concerns: SGD requires centralized data, posing a significant privacy risk as user data is stored and processed on a central server.
- Scalability Issues: It may not scale well for large-scale e-learning platforms with numerous users and diverse activities.
- Data Imbalance: SGD may struggle to handle imbalanced datasets, affecting the accuracy of classification. accuracy.

3. PROPOSED SYSTEM

Our proposed system harnesses the power of three advanced machine learning techniques: Convolutional Neural Networks (CNN), Decision Trees, and Linear Discriminant Analysis (LDA) for the purpose of on-screen activity classification. This ensemble of methods brings a multi-faceted approach to the task, ensuring accurate and comprehensive

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4. WORKING PRINCIPLE

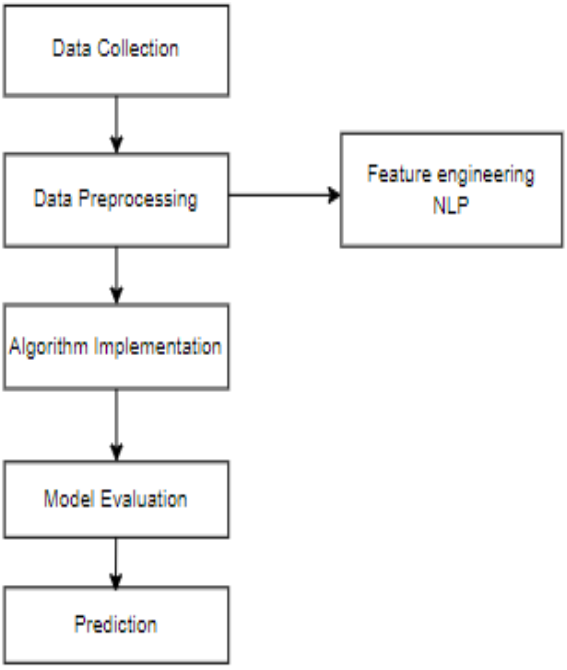

Fig 1: Work Flow

Advantages of the Proposed System:

- Privacy-Preserving: Federated Learning ensures that user data remains on local devices, preserving individual privacy.
- Accuracy: CNN excels at feature extraction from on-screen activities, while Decision Trees and Linear Discriminant Analysis enhance classification
- Scalability: The combination of these algorithms allows the system to scale effectively, accommodating a large number of users and diverse learning activities.

5. RESULTS

Data need to be pre-processed according to the models it helps to increase the accuracy of the model and better information about the data.

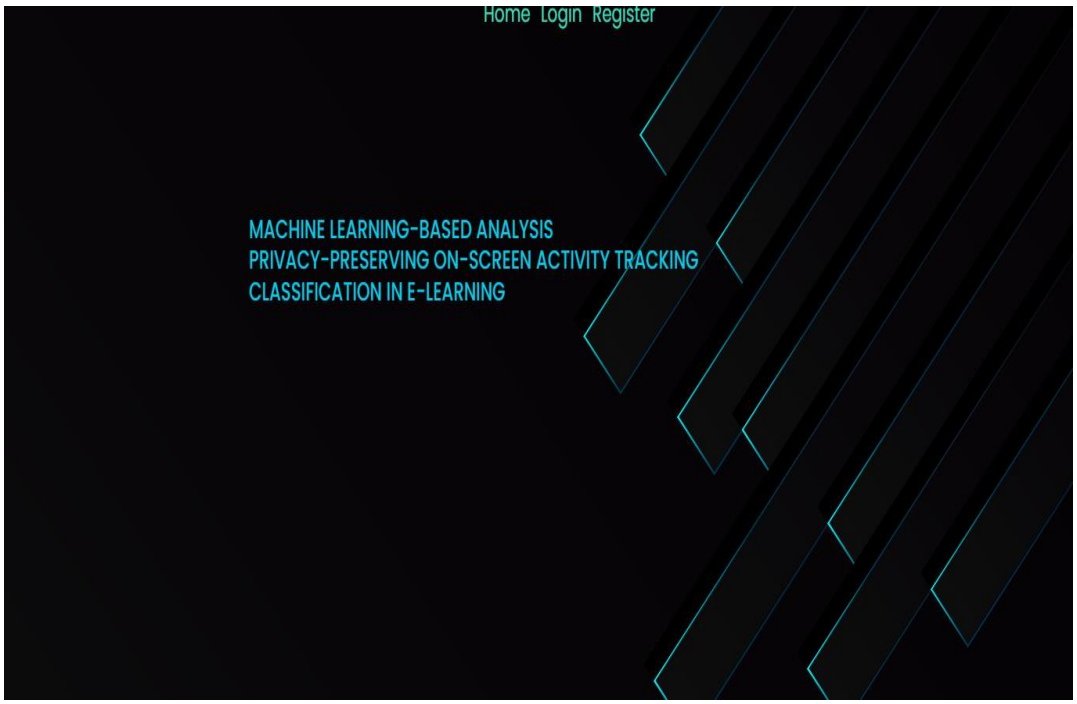

Fig 2: Home Page

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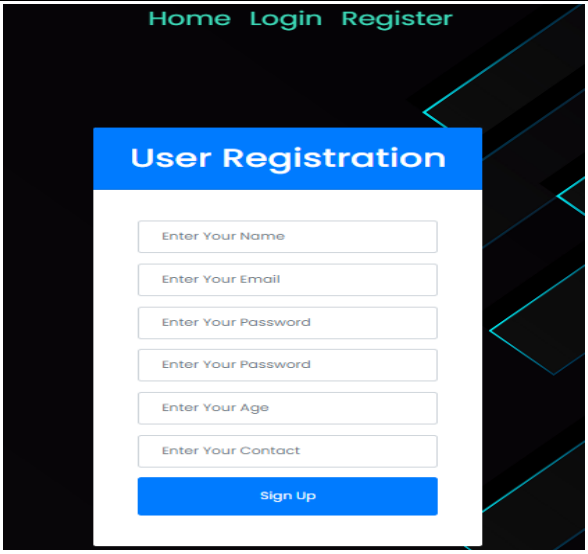

Fig 3: Registration Page

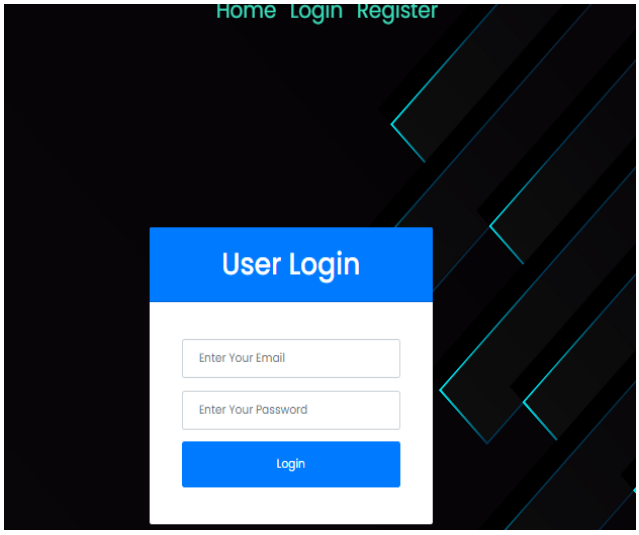

Fig 4: Login Page

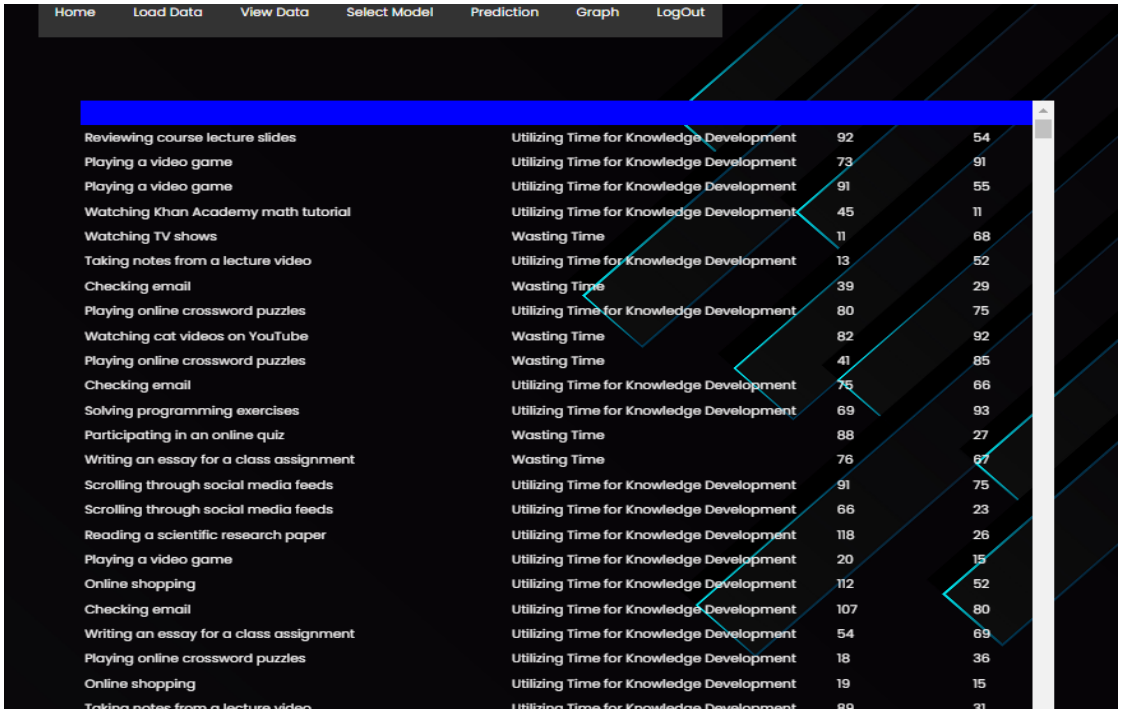

Fig 5: View Data

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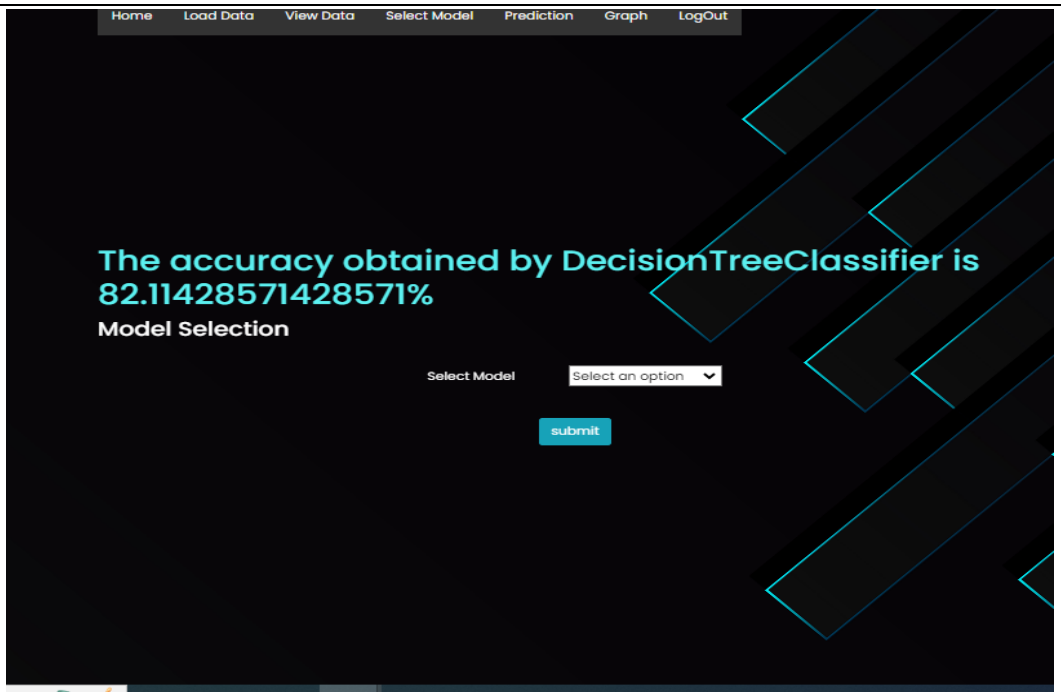

Fig 6: Model Selection

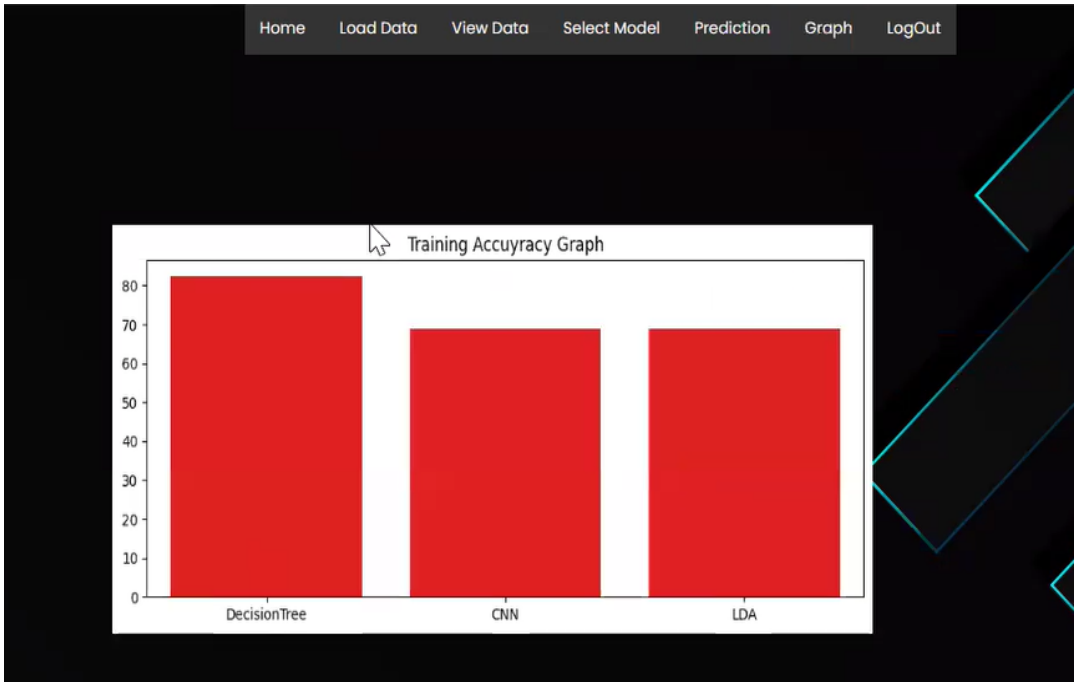

Fig 7: Graph Page

6. CONCLUSION

The implementation of privacy-preserving on-screen activity tracking and classification in e-learning through federated learning represents a significant stride toward addressing the delicate balance between data analytics and user privacy.

This innovative approach not only ensures the confidentiality of users' sensitive information but also fosters a secure and trustworthy e-learning environment. By leveraging federated learning, the model learns and improves without compromising the individual user's data, thereby mitigating privacy concerns that often accompany traditional centralized tracking systems.

The adoption of this methodology contributes to the advancement of personalized learning experiences while upholding the principles of user privacy, paving the way for a more ethical and sustainable integration of technology in education. As technology continues to play a pivotal role in shaping the future of e-learning, this privacy-preserving framework offers a promising foundation for responsible and effective educational analytics.

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