SARMAD Web Application

Team: SARMAD

Project Name: SARMAD

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1. Project Overview

Sarmad is a **web-based platform for researchers and students**, designed to enhance **exoplanet detection and data analysis** through AI and ML technologies. The system combines **secure authentication**, **predictive modeling**, **collaborative features**, and an **AI-powered voice and text assistant** to support scientific discovery and streamline workflows in the exoplanet research community.

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2. Objectives

- Provide a **secure, web-based environment** for researchers to access and analyze exoplanet data.
- Support **model performance updates** and **predictions** via manual or CSV data uploads.
- Enable **real-time interaction** with an AI-powered voice and text assistant connected to recent research via **RAG (Retrieval-Augmented Generation)**.
- Foster **collaboration and community engagement** among researchers and students.
- Automate data analysis, improving the **accuracy and efficiency of exoplanet detection**.

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3. Architecture and Implementation

3.1 Frontend

- Developed a responsive **web interface** with authentication and dashboards.
- Users can submit **manual records** or **CSV files** for exoplanet prediction or model updates.
- Provides **visualizations** for model performance, including statistics and metrics.

3.2 Backend

- Processes incoming data, updates the machine learning models, and generates predictions.
- Integrates **RAG-based AI assistant**, enabling real-time voice/text queries using latest research.

3.3 AI and ML Features

- **Predictive Modeling:** Uses trained ML models to detect exoplanets from user data.
- **Model Updating:** Supports incremental updates to improve predictive accuracy with new data.
- **Voice and Text Assistant:** Handles user queries and guides users through data exploration and insights.
- **Feature Analysis:** AI tools like **ChatGPT** assist in analyzing features and optimizing model performance.

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4. Platform Features

4.1 Core Operations

- **User Authentication:** Secure login ensuring that only verified researchers and students can access features.

- **Prediction:** Predict exoplanets based on input data using ML models.
- **Model Updating:** Update existing model performance with new CSV datasets.
- **Manual Data Entry:** Enter single records for instant predictions.

4.2 Community and Collaboration

- **Social Networking Hub:** Researchers can share insights, discuss findings, and collaborate.
- **Interactive Dashboards:** Display model metrics, prediction results, and exoplanet statistics.

4.3 AI Integration

- **Voice Agent:** Supports natural language queries, providing guidance, predictions, and insights.
- **RAG Integration:** Connects users with the latest research, retrieving relevant information for enhanced accuracy.
- AI models that used to predict the exoplanets “the notebook provided in the Repository”

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5. Workflow

1. **User Login:** Authenticate to access platform.
2. **Data Input:** Users submit data manually or via CSV.
3. **Prediction / Update:**
    - If prediction: ML model returns exoplanet detection results.
    - If update: Model incorporates new data to improve performance.
4. **AI Interaction:** Voice/text assistant provides guidance and additional insights.

5. **Community Interaction:** Users share results and collaborate through the platform.

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6. Conclusion

Sarmad is an innovative platform that combines **AI, ML, and community-driven features** to accelerate exoplanet research. By automating predictions, updating models with new data, and integrating voice and text assistance, the platform provides a **comprehensive, collaborative, and intelligent research environment**. It empowers researchers and students to explore, predict, and analyze exoplanets efficiently, fostering collaboration and accelerating scientific discovery.