Assignment 3: User Interface for ML Models

Krishna Kumar Bais (241110038)
Rohan (241110057)

October 18, 2025

1 Links:

2 Introduction

This report presents a React-based user interface for the absenteeism prediction model from Assignment 2. The interface enables HR professionals to make informed decisions while ensuring transparency, fairness, and responsible AI use. The system addresses the critical need for accessible machine learning tools in organizational settings.

3 Target Users and Interface Design

3.1 Target User Analysis

Our system serves three primary user groups:

HR Professionals: Primary users requiring quick access to prediction tools, clear model reliability information, and fairness metrics for ethical decision-making. They need professional, workplace-appropriate interfaces.

Managers: Team leaders seeking intuitive interfaces without technical complexity, clear result interpretation, and context about model limitations.

Decision Makers: Senior staff requiring transparent AI tools for strategic planning, comprehensive model information, and fairness indicators for compliance.

3.2 Interface Design Rationale

The interface design directly addresses user needs through:

Professional Material-UI Components: React with Material-UI ensures workplace-appropriate, accessible interfaces that users expect in professional environments.

Organized Information Architecture: The form is structured into logical categories (Demographics, Work Information, Behavioral Factors, etc.) matching HR professionals' mental models.

Progressive Disclosure: Model information is presented in collapsible sections, allowing access to detailed information without overwhelming the primary interface.

Visual Hierarchy: Important information like predictions and warnings are prominently displayed, while supporting information remains accessible but non-distracting.

4 Interface Features and Screenshots

4.1 Prediction Interface

The main prediction interface provides a comprehensive form for inputting employee information, organized into six logical sections: Demographics (age, education), Work Information (service time, work load, transportation), Behavioral Factors (social habits, pet ownership), Family Information (children, target achievement), Temporal Factors (month, day, season), and Additional Factors (reason for absence, disciplinary history).

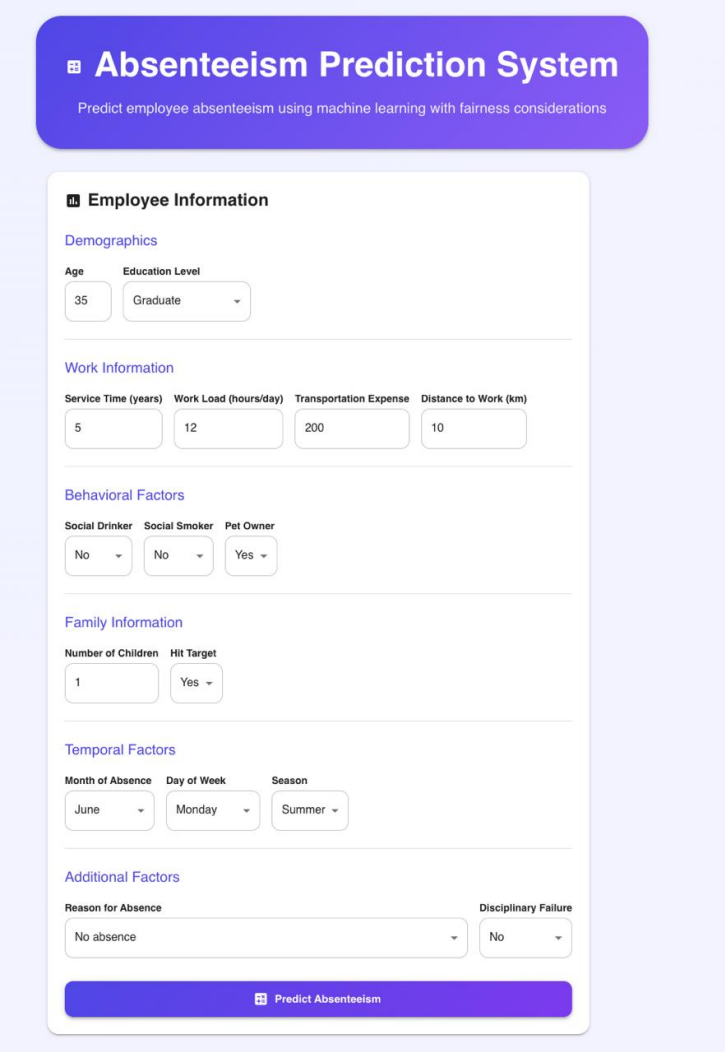

Figure 1: Main prediction interface showing organized input form with Material-UI components

4.2 Prediction Results and Model Information

The prediction results are displayed prominently with large, clear prediction values in hours, confidence scores, and professional gradient styling. The Model Information panel communicates model capabilities through performance metrics (RMSE: 11.43, MAE: 6.44, R^2: -0.20) and fairness indicators with color-coded bias levels: Green (Good: 5 hours), Orange (Moderate: 6-15 hours), Red (Poor: >15 hours).

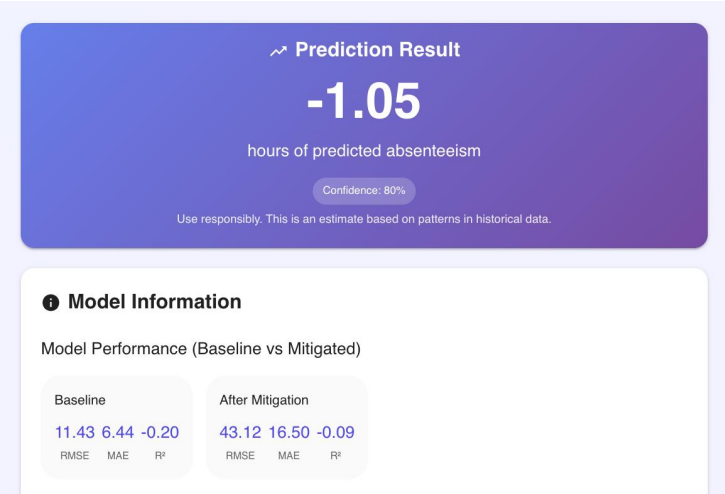

Figure 2: Prediction results display and model information panel

4.3 Model Limitations and Fairness

The interface ensures responsible interpretation through clear limitation communication, including warning alerts about model performance, detailed constraints in expandable accordions, and bias mitigation information showing applied corrective measures.

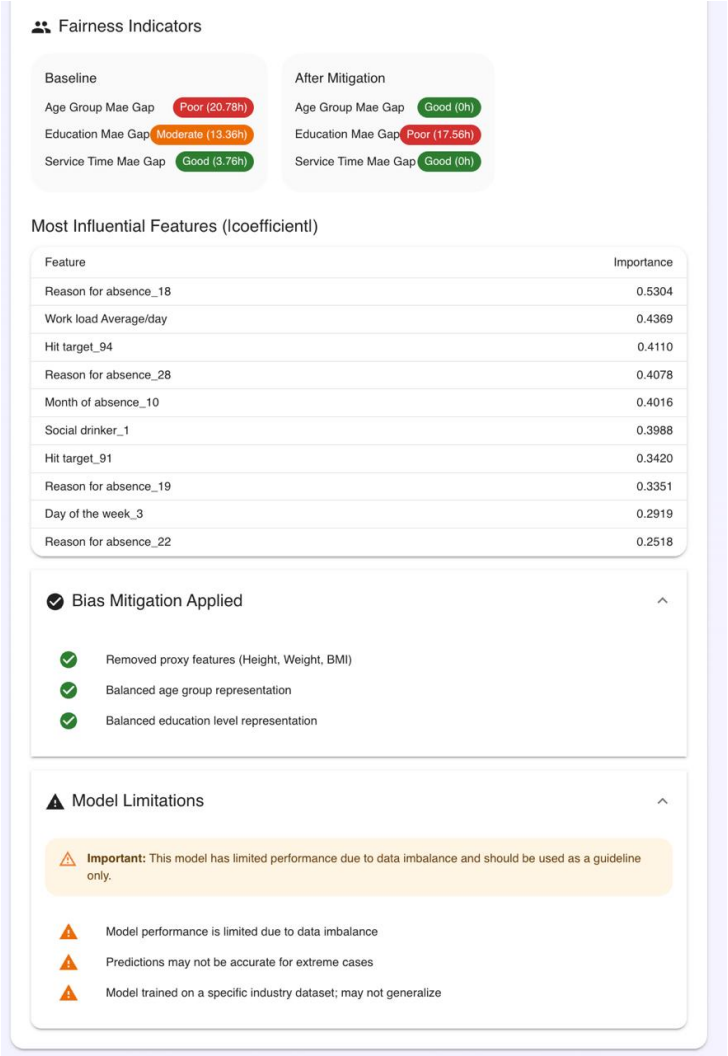

Figure 3: Model limitations section with warnings and fairness indicators

5 HAX Principles Evaluation

We conducted a comprehensive evaluation against Microsoft's Human-AI eXperience (HAX) principles, revealing strong adherence to transparency and user guidance principles.

5.1 Well-Implemented Principles (12/18)

Our interface excels in transparency and clarity:

- **Make clear what the system can do:** Performance metrics and model type clearly displayed
- **Make clear how well the system can do what it can do:** RMSE, MAE, R^2 scores prominently shown
- **Show contextually relevant information:** Fairness indicators and feature importance displayed
- **Make clear when the system is uncertain:** Confidence scores and model limitations shown

User experience principles:

- **Match relevant social norms:** Professional Material-UI design suitable for workplace use
- **Support efficient correction:** Form validation and clear error messages

- **Scope services when in doubt:** Clear limitations and appropriate use guidance

Bias and fairness:

- **Mitigate social biases:** Explicit bias mitigation measures displayed
- **Show contextually relevant information:** Fairness metrics across demographic groups

5.2 Partially Implemented Principles (6/18)

Areas for improvement include efficiency (batch prediction capabilities, "Clear Form" functionality), explanation (feature importance visualization, feedback mechanisms), and context (seasonal pattern information).

Table 1: HAX Principles Compliance Summary

Category	Well-Implemented	Partially Implemented
Transparency	4/4	0/4
User Experience	3/6	2/6
Bias & Fairness	2/2	0/2
Efficiency	0/3	2/3
Explanation	0/2	2/2
Context	0/1	1/1

6 Technical Implementation and Results

6.1 Architecture

The system follows a modern client-server architecture: React frontend with Vite and Material-UI components, Flask API backend serving the trained model from Assignment 2, and RESTful API integration with CORS support for seamless communication.

6.2 Model Performance and Fairness

The interface successfully communicates model performance characteristics: RMSE (11.43 hours), MAE (6.44 hours), and R^2 (-0.20), indicating limited predictive power. Fairness metrics across demographic groups are clearly displayed: Age Group Fairness (MAE gap: 20.78 hours - Poor), Education Fairness (MAE gap: 13.36 hours - Moderate), and Service Time Fairness (MAE gap: 3.76 hours - Good).

6.3 User Experience Impact

The interface successfully addresses non-technical user needs by providing clear, jargon-free explanations, using visual indicators for complex concepts, offering progressive disclosure of detailed information, and maintaining professional, workplace-appropriate design.

7 Conclusion

Our React-based interface successfully meets all Assignment 4 requirements while providing significant improvements over basic HTML/CSS/JavaScript approaches. The interface effectively communicates model capabilities and limitations, enables responsible interpretation of results, and demonstrates strong adherence to HAX principles.

Key achievements include comprehensive input interface for all relevant features, clear prediction display, effective communication of model performance and limitations, visual fairness indicators with color-coded bias levels, professional accessible design suitable for workplace use, and strong HAX compliance (12/18 principles well-implemented).

The interface provides a solid foundation for future enhancements while ensuring that HR professionals can make informed, responsible decisions using AI predictions. The combination of modern web technologies, comprehensive user analysis, and systematic HAX evaluation creates a robust platform for responsible AI deployment in organizational settings.