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Enhancing Rail Madad with AI-powered Complaint Management (SIH1711)

Abstract

The Rail Madad platform plays a crucial role in addressing passenger grievances during train journeys. However, the existing manual complaint registration and resolution process often leads to inefficiencies, delays, and misclassification of complaints, particularly when complainants share multimedia inputs like photos, videos, and audio files. To overcome these challenges, this paper proposes an AI-powered complaint management system to streamline the Rail Madad process through automated classification, prioritization, and resolution of grievances.

The proposed solution integrates AI-powered image and video recognition for complaint categorization and severity assessment, Optical Character Recognition (OCR) for text extraction, and metadata analysis for context enrichment. An AI-based chatbot ensures instant acknowledgment and smart routing of complaints to the appropriate department using content-based algorithms. Additionally, machine learning models predict recurring issues for proactive maintenance, reducing future complaints. Continuous improvement is achieved through sentiment analysis, performance monitoring, and analytics-driven feedback mechanisms. Key performance indicators include the accuracy of AI detection, speed of resolution, user satisfaction, and scalability for integration with existing systems.

Key components of the solution include:

A) AI-Powered Complaint Categorization and Prioritization:

Automates classification and severity assessment of complaints, including multimedia inputs, ensuring efficient resolution workflows.

B) AI-Based Chatbot for Smart Routing:

Provides instant acknowledgment and uses AI algorithms to route complaints to appropriate departments for swift resolution.

C) Predictive Maintenance System:

Analyzes historical complaint data to predict recurring issues and proactively schedules maintenance to minimize disruptions.

D) Sentiment Analysis and Feedback Mechanism:

Performs sentiment analysis to assess complaint urgency and user satisfaction, with analytics dashboards for continuous improvement.

This solution supports the Ministry of Railway's goal of delivering seamless passenger grievance redressal through AI-powered complaint management, smart automation tools, and predictive maintenance systems, ensuring improved efficiency, user satisfaction, and resource optimization for Rail Madad at every operational level.

Modules identified:

1. AI-Powered Complaint Categorization and Prioritization
2. AI-Based Chatbot for Smart Routing
3. Predictive Maintenance System
4. Sentiment Analysis and Feedback Mechanism

Features in each Module:

Modules	Features	Description	AI/ML Models & Technologies
AI-Powered Complaint Categorization and Prioritization	1- Image/Video Recognition	Automates categorization and severity assessment for multimedia inputs.	Image Recognition, Deep Learning
	2- OCR and Metadata Analysis	Extracts textual content and enriches complaints with metadata for context.	OCR Models, NLP Techniques
	3- Automated Complaint Severity Detection	Identifies critical complaints based on content severity to prioritize response.	Deep Learning, Classification Models
AI-Based Chatbot for Smart Routing	4- Smart Routing and Acknowledgment	Provides instant acknowledgment and routes complaints to the appropriate department using content-based algorithms.	Chatbot AI, Machine Learning Models
	5- Real-Time Assistance	Assists users in real time with complaint submissions and status tracking.	NLP (BERT, GPT)
	6- Multilingual Support	Enables complaint registration and resolution in multiple languages for accessibility.	NLP Translation Models, GPT-Based APIs

Predictive Maintenance System	7- Recurring Issue Prediction	Identifies patterns and predicts recurring issues to minimize future complaints.	Time Series Analysis, ML Models
	8- Data-Driven Maintenance Scheduling	Suggests proactive maintenance based on historical complaint trends.	Data Mining, Predictive Analytics
	9- Failure Pattern Analysis	Analyzes common failure modes across complaints to optimize repair strategies.	Clustering Algorithms, Statistical Models
Sentiment Analysis and Feedback Mechanism	10- Sentiment Analysis of Complaints	Analyzes sentiment to determine complaint urgency and satisfaction trends.	Sentiment Analysis, ML Models (Scikit)
	11- Analytics-Driven Feedback	Provides insights for continuous improvement of the system.	Analytics Dashboards, Feedback Models
	12- User Satisfaction Scoring	Generates satisfaction scores to measure and track system effectiveness over time.	Regression Models, Statistical Tools

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