

Archives available at [journals.mriindia.com](http://journals.mriindia.com)

## International Journal on Advanced Computer Theory and Engineering

ISSN: 2319-2526

Volume 14 Issue 01, 2025

### AI-Driven Complaint Management for Rail

<sup>1</sup>Prof.D.B.Deshmukh, <sup>2</sup>Chavan Shubham, <sup>3</sup>Gunaware Aryan, <sup>4</sup>Patole Yash, <sup>5</sup>Sutar Manish<sup>1 2 3 4 5</sup>S.B.Patil.College of EngineeringEmail: [dipakcadcamcae@gmail.com](mailto:dipakcadcamcae@gmail.com)<sup>1</sup>, [chavanshubham3321@gmail.com](mailto:chavanshubham3321@gmail.com)<sup>2</sup>, [aryangunaware@gmail.com](mailto:aryangunaware@gmail.com)<sup>3</sup>, [yashpatole420@gmail.com](mailto:yashpatole420@gmail.com)<sup>4</sup>, [manishsutar490@gmail.com](mailto:manishsutar490@gmail.com)<sup>5</sup>

#### Peer Review Information

*Submission: 11 Sept 2025**Revision: 10 Oct 2025**Acceptance: 22 Oct 2025*

#### Keywords

*Railway Complaint Redressal; OCR-based Classification; Natural Language Processing; Logistic Regression; Priority Prediction; Streamlit Dashboard; Passenger Grievance System; Text and Image Processing; LLM-based Enhancement; AI-Powered Complaint Categorization; Intelligent Railway IT Solutions*

#### Abstract

Millions of passengers use India's railways every day, which leads to a high volume of complaints about food, cleanliness, coach conditions, safety, and timeliness. Passengers become dissatisfied with traditional complaint redressal systems because they are frequently manual, slow, and opaque. Our solution to these problems is an AI-Driven Complaint Management System that uses OCR (Optical Character Recognition), Machine Learning, and Natural Language Processing (NLP) to automate the classification, prioritization, and tracking of complaints' resolutions. OCR processes complaints that are submitted as text, photos, or videos and classifies them into the relevant departments (e.g., cleanliness, AC, food, safety). TF-IDF + Logistic Regression models are used to determine priority levels (high, medium, and low), and optional LLM integration improves semantic understanding. Streamlit was used to create an admin dashboard that offers real-time analytics, complaint tracking, and resolution management. This system can be implemented in smart railway operations since it increases passenger satisfaction, efficiency, and transparency.

#### Introduction:

In India and around the world, railways are one of the most popular forms of transportation, carrying millions of commuters and long-distance travelers every day. Given the size of the user base, it is imperative to guarantee prompt grievance resolution and effective service delivery. However, there are a number of issues with the railways' current complaint handling systems. Conventional approaches frequently entail manually registering complaints via helplines, registers, or web portals; this leads to a lack of classification, a delay in responses, and little accountability.

Another level of complexity is introduced by the variety of passenger complaints. Cleaning, food

service, coach upkeep, air conditioning, ticketing, safety, and timeliness are just a few of the problems that can arise and need to be referred to the appropriate department. Ineffectiveness results from handling these diverse complaints by hand, and the lack of priority systems allows important issues (like safety or security) to be handled with the same urgency as less important ones (like seat comfort). In addition to delaying resolution, this has a detrimental effect on passenger satisfaction and railway system trust. Natural language processing (NLP) and artificial intelligence (AI) offer a way around these obstacles. It is now feasible to automatically classify complaints, assign urgency, and forward them to the appropriate department thanks to

the development of text classification models, OCR (Optical Character Recognition), and Machine Learning (ML) techniques. This kind of automation guarantees quicker complaint resolution, lessens reliance on manual procedures, and permits real-time monitoring. Additionally, passengers can submit multimedia evidence through the integration of image and video-based complaint handling, enhancing the grievance system's legitimacy and dependability. The lack of analytics and decision-support tools for railway authorities is another major drawback of the systems in place. Decision-making stays reactive rather than proactive in the absence of complaint statistics, trend analysis, and visualization. In order to help authorities spot reoccurring problems and better allocate resources, our suggested system includes an admin dashboard created with Streamlit that offers bar charts, pie charts, and

complaint statistics.

Furthermore, contextual understanding of unstructured complaints is made possible by developments in large language models, or LLMs. LLMs can improve semantic interpretation, particularly for complex or ambiguous complaint texts, while older ML models such as TF-IDF with Logistic Regression offer dependable baseline performance. Therefore, our method combines both contemporary LLM capabilities for increased accuracy and traditional ML techniques for structured performance.

The AI-Driven Complaint Management System for Rail combines these technologies to guarantee that passenger complaints are handled promptly, efficiently prioritized, and transparently tracked. In addition to enhancing the traveler experience, this increases railway services' operational effectiveness and accountability.

## Literature Survey

Table 1: Summary of Literature Survey

Sr. No	Paper Title	Author Name	Year of Publication	Problem solved in this paper (Existing Problem Statement)	Technique used to solve problem (Existing Problem Solution)	Future Work (Future Scope)
1	Smart Grievance Redressal in Indian Railways	Nair & Chavan	2021	Inefficient manual complaint workflows	AI + workflow automation	Blockchain-enabled complaint tracking
2	AI Chatbots for Railway Customer Support	Khan & Patel	2021	High workload on human agents	AI-driven chatbots	Context-aware chatbots with memory
3	Sentiment Analysis for Passenger Feedback in Railways	Reddy & Singh	2022	Lack of automated passenger satisfaction monitoring	Sentiment analysis using deep learning	Multimodal sentiment detection (voice + text)
4	Ethical Challenges in AI-Powered Grievance Redressal	Das & Thomas	2022	Data privacy and lack of trust	Privacy preserving AI frameworks	Federated learning for complaint handling
5	Deep Learning for Complaint Categorization in Transport Systems	Verma & Ali	2023	Poor accuracy in complaint classification	Transformer models (BERT, RoBERTa)	Domain-specific fine tuned LLMs

6	AI-Powered Complaint Management in Public Transport	Sharma & Mehta	2023	Slow manual complaint handling	Machine learning based complaint classification	Real-time predictive complaint routing
7	NLP for Multilingual Grievance Redressal Systems	Banerjee et al.	2024	Language barriers in complaint systems	Natural Language Processing (NLP)	Integration with voice-based assistants
8	Predictive Analytics for Passenger Complaint Forecasting	Joshi & Kumar	2024	Recurring unresolved complaints	Predictive analytics models	Complaint prevention through anomaly detection
9	Passenger Trust in AI-Based Complaint Systems	Gupta & Iyer	2024	Low passenger trust in automated systems	Survey + trust modeling	Explainable AI (XAI) for complaint transparency
10	Base Paper: AI Enhanced Complaint Lifecycle Management	Dishant Banga & Kiran Peddireddy	2024	Traditional complaint platforms lack AI	ML + NLP-based complaint management	Expansion to multimodal passenger feedback

### Research Gap:

Advances in automated complaint management across public services are highlighted in the literature. But there are still a number of gaps:

- Limited Multimodality:** The majority of systems only process text; they do not recognize images or videos.
- Priority Handling:** Few models efficiently rank complaints according to their level of urgency.
- Integration Issues:** The end-to-end platforms that integrate complaint intake, classification, and resolution tracking are absent from the current solutions.
- LLM Use:** In order to ensure contextual accuracy when resolving railway complaints, large language models are not fully utilized.
- Analytics & Transparency:** Not many systems offer real-time dashboards for tracking patterns in complaints

By integrating multimodal complaint intake, NLP-based classification, priority prediction, and real-time analytics into a cohesive solution, our system fills these gaps.

### Problem Statement

Every day, railways deal with a large number of passenger complaints, many of which are handled manually, leading to delays and

inefficiencies. Real-time analytics, multimodal complaint handling, and automation are absent from current systems. An AI-driven system that uses NLP, OCR, and machine learning to automate complaint classification, prioritization, and tracking is therefore required. It should also give authorities a clear dashboard for better decision-making.

### Conclusion

A complete solution to increase the effectiveness, speed, and transparency of grievance redressal is offered by the proposed AI-Driven Complaint Management System for Rail. The system guarantees quicker response times and higher passenger satisfaction by combining NLP-based department classification, priority prediction, OCR-based image/video processing, and an admin dashboard. Additionally, analytics dashboards facilitate data-driven decision-making, and optional LLM integration provides contextual accuracy. In addition to being a scalable model for other public transportation sectors, this system has the potential to modernize the handling of railway complaints.

### References:

Sharma, A., et al. (2018). Automated Complaint Classification in Public Transport.

Gupta, R., et al. (2019). A Smart Grievance Redressal System using AI.

Kumar, P., et al. (2020). Railway Passenger Feedback System using Sentiment Analysis.

Li, H., et al. (2021). Image-based Service Complaint Identification.

Rao, V., et al. (2021). Priority Classification of Service Complaints using NLP.

Ahmed, S., et al. (2022). Deep Learning for Public Grievance Management.

Patel, M., et al. (2022). AI-Powered E-Governance Complaint Systems.

Wang, Y., et al. (2023). OCR-Based Document & Image Analysis in Public Services.

Singh, R., et al. (2023). Enhancing Passenger Satisfaction with AI.

Chen, J., et al. (2024). LLMs in Customer Complaint Resolution.