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ENGINE MARGIT: AI-BASED COMPLAINT PRIORITIZATION AND ROUTING SYSTEM

Computer Science

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ABSTRACT

The rapid growth of digital governance platforms has significantly increased the volume of citizen complaints, making manual processing inefficient and time-consuming. Existing systems primarily follow First-In-First-Out (FIFO) mechanisms, which fail to consider the urgency of complaints. This paper proposes ENGINE MARGIT, an AI-based complaint prioritization and routing system that utilizes Natural Language Processing (NLP) techniques along with local LLM integration using Ollama (TinyLLaMA) to analyze complaint text and determine urgency levels. The system classifies complaints into priority categories such as High and Normal and applies a hybrid scheduling approach combining priority-based processing with FIFO to ensure fairness. The proposed solution improves response time, enhances accuracy, and ensures efficient grievance handling.

KEYWORDS

NLP, Complaint Prioritization, FIFO, E-Governance, Ollama, TinyLLaMA, Automation

INTRODUCTION

The rapid growth of digital grievance platforms has significantly increased the number of complaints submitted to government departments. These complaints vary in urgency and importance. However, most systems still rely on manual processing or simple FIFO mechanisms, which fail to prioritize urgent issues.

This results in delays in handling time-sensitive complaints such as job verification, income certificates, and land disputes. Additionally, manual classification often leads to errors and inefficient routing of complaints.

To address these issues, this paper proposes ENGINE MARGIT, an AI-based system that automatically analyzes complaint text, detects urgency, assigns priority, and ensures fair processing using FIFO within each priority level. Recent advancements in Local Large Language Models (LLMs) such as TinyLLaMA using Ollama enable better contextual understanding of complaint data compared to traditional keyword-based systems. This enhances the accuracy of urgency detection and decision-making.

RELATED WORKS

Existing complaint management systems primarily rely on manual or rule-based approaches, which are inefficient for handling large volumes of data.

Traditional machine learning models such as Naïve Bayes and SVM have been used for text classification. Recent advancements include deep learning models like BERT, which provide better contextual understanding but require high computational resources.

Keyword-based urgency detection is commonly used but lacks accuracy in understanding context. FIFO ensures fairness but ignores urgency.

Hybrid approaches combining priority and FIFO have been proposed, but they are not widely implemented. This highlights the need for a simple, efficient, and fair system.

PROPOSED SYSTEM

The proposed system integrates NLP-based text analysis with priority-based FIFO scheduling.

The system performs the following tasks:

- Analyzes complaint text using keyword-based NLP
- Detects urgency using predefined keywords
- Assigns priority levels (High / Normal)
- Applies FIFO within each priority group

Complaint data is stored in a CSV file containing:

- Complaint ID
- Description
- Submission Time

The system processes complaints and generates a prioritized list where urgent complaints are handled first while maintaining fairness**.** Additionally, the system integrates Ollama-based TinyLLaMA models for advanced text understanding. This allows the system to move beyond simple keyword detection and perform semantic analysis of complaints, improving prioritization accuracy.

METHODOLOGY

The system follows a step-by-step approach:

1. Data Collection

Complaint data is collected from a CSV dataset containing ID, description, and submission time.

2. Data Preprocessing

- Convert text to lowercase
- Remove unwanted characters
- Prepare for keyword matching

3. Urgency Detection

- Uses TinyLLaMA model via Ollama for semantic analysis
- Detects urgency based on context and meaning
- If urgent → High priority
- Else → Normal priority

4. Priority Assignment

- High Priority → urgent complaints
- Normal Priority → non-urgent complaints

5. FIFO Scheduling

- Complaints grouped by priority
- Sorted by submission time within each group

6. Final Output

- High priority complaints first
- Then normal complaints
- Maintains fairness using FIFO

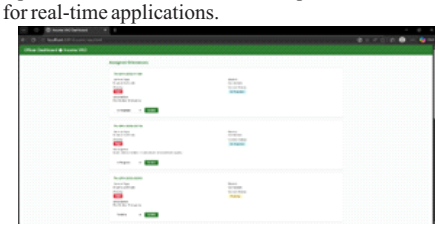
RESULTS

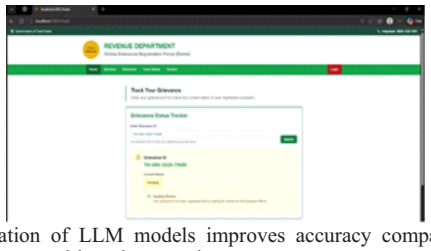
The system effectively prioritizes complaints and ensures fair processing.

- Reduces delay in handling urgent complaints
- Improves efficiency compared to manual processing
- Ensures fairness using FIFO

- Provides structured output for decision-making

The system performs well with minimal computational resources and is suitable for real-time applications.





The integration of LLM models improves accuracy compared to traditional keyword-based approaches.

DISCUSSION

The proposed system successfully combines simplicity and efficiency. Unlike complex AI models, it uses lightweight NLP techniques, making it easy to implement and scalable.It improves transparency in complaint handling and ensures that critical issues are not delayed. However, accuracy depends on keyword selection, which can be improved using advanced NLP models in the future. The inclusion of Ollama-based LLM models significantly enhances the system's capability to understand complex complaint contexts.

CONCLUSIONS

ENGINE MARGIT provides an efficient and practical solution for complaint management. By integrating NLP-based urgency detection with FIFO scheduling, the system ensures both prioritization and fairness.The system reduces manual effort, improves response time, and enhances citizen satisfaction. It is lightweight, scalable, and suitable for real-time government applications. Future improvements can include advanced AI models and multilingual support.

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