



An Automated Approach for an Online Grievance System for Categorization, Tagging and Analysis of Sentiments of Grievances Through a Web and Mobile Portal Using Deep Neural Network

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Abstract: A grievance is a discontent or dispute that may arise at any level in any organization. In many circumstances, people of an organization fail to state their issues and cannot seek support for the issues they are facing in an organization. Surveying the already implemented grievance redressal systems, it can be said that the people want to remain anonymous, however there is no provision as such for now. The management of the institutions and organizations are constantly on the lookout for various issues its people are facing, track them down, work on them and update their status, however no current systems address this. Also, these systems are not autonomous and need human intervention for classifying the issues into various categories.

Thus, we have come up with a novel approach that keeps all these factors in mind and developed a grievances tracker and redressal system. The end users can post their issues on the portal completely anonymously and the authorities at their various levels can provide solutions to those. Others facing the same issue can upvote the issue for higher visibility. The management can easily track the issues that are currently ongoing, completed, or invalid and can have statistics and reports on one click. The system having natural language processing capabilities can easily and autonomously categorize the various issues based on the content. Also, NSFW content that might be uploaded by the rogue end users can be hampered by using a deep neural network for classifying images before uploading. You can use this document as both an instruction set and as a template into which you can type your own text.

Keywords: Grievances Tracking, Issues Tracking, Neural Network, Portal, Management

I. INTRODUCTION

A. Motivation.

People in the organization face various issues in their day-to-day college activities. Majority of the end users are scared to come up with the issues and report it to the higher authorities. They want to remain anonymous, however no such provision is available now for this. Also, an issue can be department level specific, maybe management level specific or something similar. The severity of these issues is also a point to be noted, as if someone raises an issue personally with the authority, there is no way to find out that, that same issue is faced by many others as well. Traditional methods like WhatsApp have proven to be ineffective in the past as there is no mechanism to track the status of the issue. Getting the issues in the public forum can attract views from other students and help the management understand the student level problems. Public forums may also make the authorities feel the need to address the issues as soon as possible. An Effective and Efficient response to the complaints is an essential index of an organization's performance. provided. In the digital world, it is very important to manage problems through the Digital Way that is through the Mobile app and Website. The Grievances Redressal System will have the ability to minimize people's dissatisfaction and on the other hand, it can encourage people to participate in controlling the quality of the service provided.

B. Problem Definition.

To develop an autonomous grievance redressal system that can address the issues faced by the users of any organization to post, track, manage and provide solutions to the various grievances faced by them. To develop a portal that can help the higher management to easily track the grievances based on categories and easily manage and generate statistics and



reports based on the data in the system. To develop an automated system which can stop users from abusing the system by uploading NSFW content using deep convolutional networks. To develop a system which can categorize the issues and grievances posted by the end users of an organization using Natural Language Processing and generating the statistics based on the same.

C. Literature Survey.

We did a thorough check for any previous establishments related to the topic of concern. Learning from experiences is and has always been a great method of diving deep into something quickly. We checked a few papers on the previously developed grievance management systems, grievance redressal systems and grievance redressal mechanisms in practice today. We also scoped out for the state-of-the-art methodologies for detecting and recognizing NSFW and gore images. This was followed by finding the state-of-the-art Natural Language Processing methodologies that would extract key phrases from unstructured text and as well as sentiment analysis for the same.

In [1] Takwani et al., provided a digital solution to the-then traditional methodology of grievance redressal systems in place. They decided to go with the android architecture for the same. They developed an Application Programming Interface (API) for communicating with the Android device. Their project was scoped to be implemented for a particular area. It concluded by saying that the CRS will provide an efficient way to solve problems in day-to-day life.

A more focused approach based on college grievance redressal systems was projected by [2] in their prototype for developing a grievance management system. They surveyed some of the prestigious institutes of Madhya Pradesh and thus developed their own framework. They used the technologies such as HTML, CSS, PHP and SQL for developing their prototype.

Fear of revealing the identity makes the complainant go anonymous or pseudonymous. It becomes a tough job for the authorities to know the authenticity of the complainant. Therefore, Dipankar in [3] presents a solution so that complainants can complain being intrepid, at the same time allowing the authorities to examine the originality of the complaints.

K. Aravindhan [4] developed a web portal for addressing the student's grievances by developing an effective way of handling all the complaints. In the web application, students can effectively post their issues and the committee will forward these complaints to the Institute management for handling. They believe the project provides transparency to the students. The system shows the status of the grievances lodged in the system.

CNN, the Convolutional Neural Network, is a model that simulates the visual processing process of living things and has the advantage of being able to recognize when patterns change in size or position [5].

In [6] the researchers introduced the overall concept of the classification for safety judgement, object detection, and captioning can all be handled through one dataset definition. The images or videos are input by CNN, summarized, and the results are input into RNN for printing out meaningful sentences by the researchers.

An Explicit Content Detection (ECD) system has been proposed by Bhatti et al. [7]. The proposed system uses residual network which returns a probability to indicate the explicitness in media content. The experimental result shows that the proposed model provides an accuracy of ~ 95% when tested on our image and video datasets.

II. METHODOLOGY

Automated Grievance redressal system is a system that can help users to post their issues, comment on them, upvote them for better reach and help the higher authorities to provide solutions to these issues faced by the people in their organization, keep a track of them, generate statistics and reports based on the data and help in increasing the quality of the services provided by an organization to its people. It is notable to understand that automated here stands for "without human interaction" marking an issue inappropriate, not allowing the end users to upload NSFW content to the system and classifying the issues based on the categories using natural language processing.

A. User Classes and Characteristics.

In our system the users can be classified as below: -

1. End users: -

The end users are the people of the organization who can post their grievances and seek for a solution from the authorities.

2. Moderators: -

The moderators are the ones who keep the forum clean and moderated. Any public forum requires moderation, and these are the ones who will perform this duty.

3. Authority Level 1: -



The authority level 1 has the access to provide solutions to the end users of their own specific department. They can view the organization level issues and the department level issues, however only comment on the organization level issues. They have the access to change a user’s password.

4. Authority Level 2: -

All the functions of authority level 1 are extended to authority level 2. In addition to this the authority level 2 can view other department’s issues. Provide solutions to any issue posted by any level from any department or at organization level. They also have the access to add users to the system. They can also generate reports for their own department level grievances.

5. Authority Level 3: -

The highest access level is given to the authority level 3. They can view any issue posted by any user in the organization and provide solutions to them. They can track any issue in the system, get its status and update them. They can view the statistics and reports generated by the system for effective management of their organization.

B. System Architecture.

The system has been designed keeping in mind the ease of use for the end users, while taking all the precautions to ensure all the requirements stated in the System Requirements Specification work as expected.

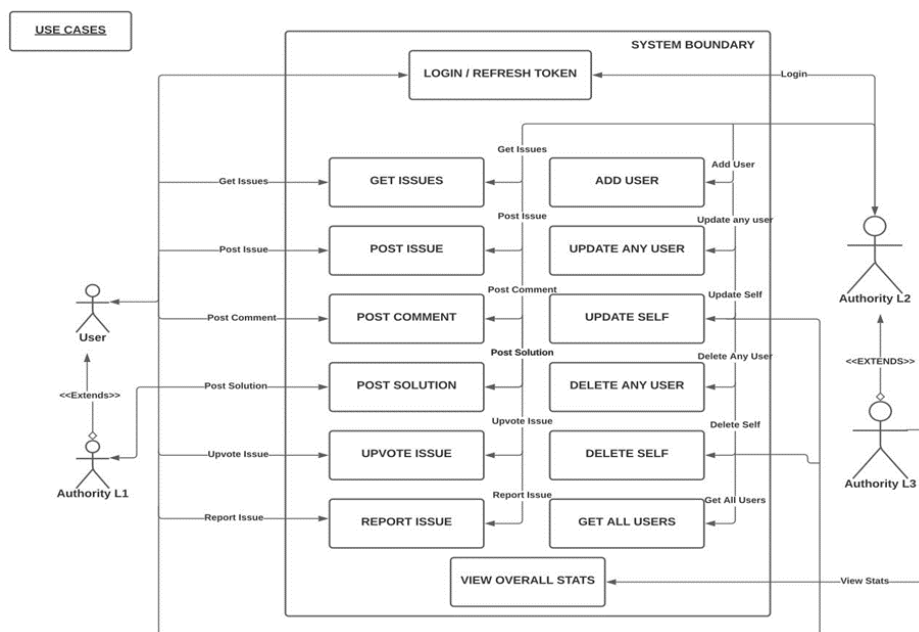


Fig. 1 Use Case Diagram

The system architecture, on a higher level, follows the 3 tier “Client-Server” architecture. The system has been segregated into three components:

1. Client Interface

The Client Interface would be a mobile application and a web app.

2. Web Server

The Web server would be a REST API with which the client would be interacting for all the operations.

Client Interface

The system would provide the end users a mobile application and a web application for interacting with it. The authority would create a profile for all the users in the system. They would then provide all the users of the system with an userID and password for the first-time login. The end users on login can then change their password to ensure that the authority may not track their usage of the system.

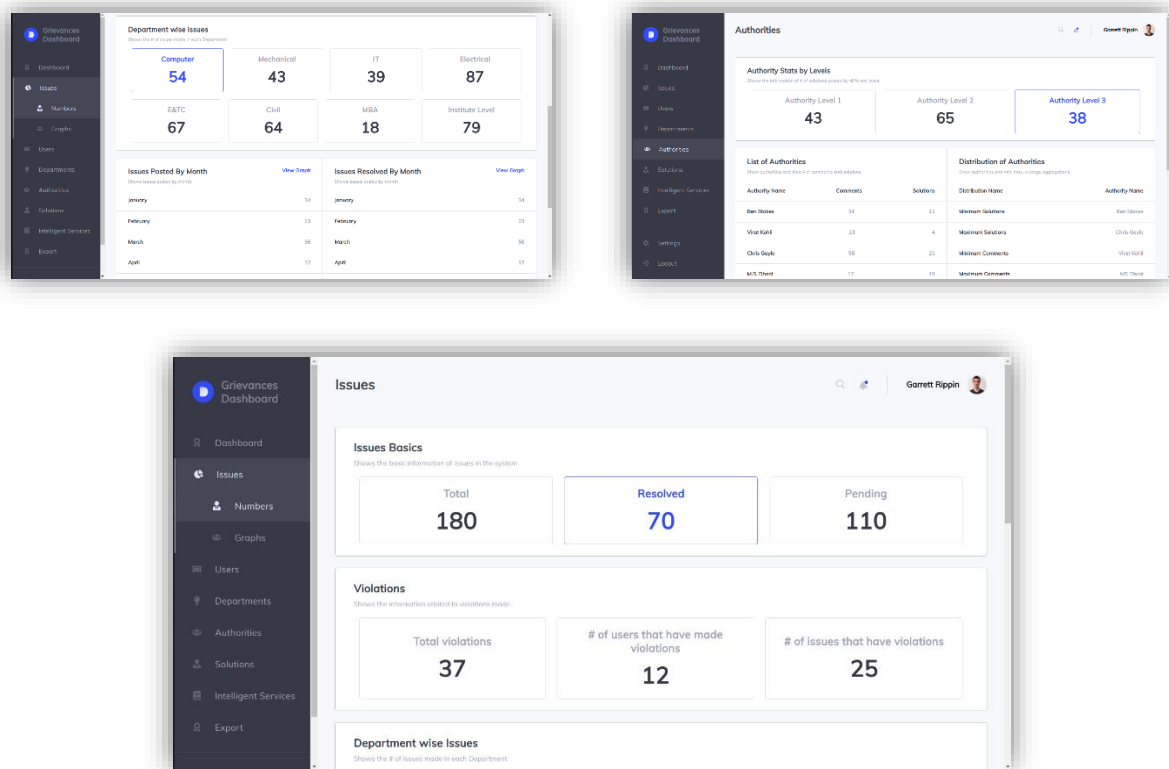


Fig 2: Client Web Application

For the authority personnel, the Web application would provide all the above-mentioned facilities. Also, they would also be able to view the stats of the overall grievances in the system.

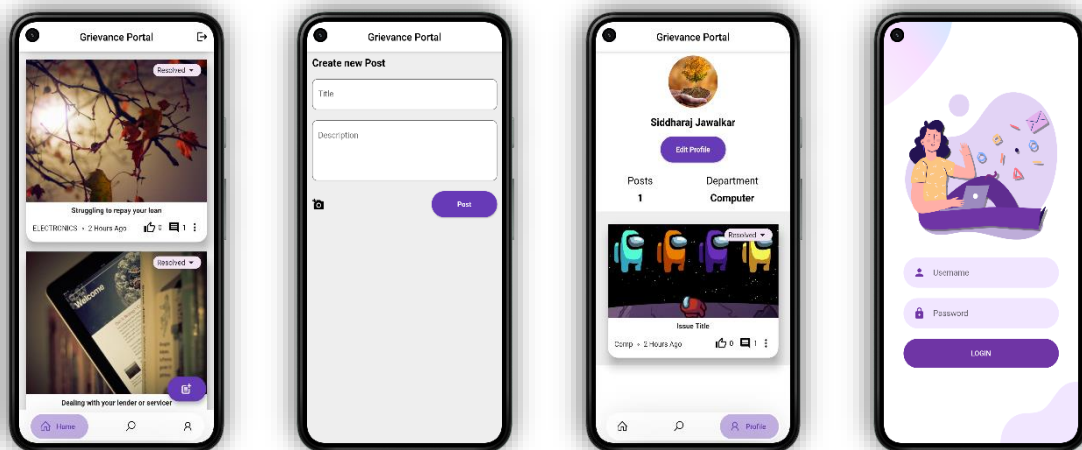


Fig. 3 Client Mobile Application

The mobile application would be for general end users, while the web application would be for the authority personnel only.

Upon successful login into the system via the mobile app, the end users would be able to perform the following actions.

1. View All Grievances
2. View all grievances their peers may be experiencing.
3. Create a new grievance.



4. Create and post a new grievance on the system.
5. Mark Issue as Resolved
6. If the users may feel the grievance raised by them is resolved, they may mark it as resolved on the system.
7. Delete Grievance Created by them
8. Users can also delete the grievances created by them.
9. Upvote any Grievance,
10. If they agree with any grievance (s) posted on the system, they may show their support by upvoting it.
11. Comment on any Grievance
12. Report a Grievance.
13. Search for any Grievance.
14. Post Solution on any Grievance
15. Change Password
16. Get Own User Info
17. Get my Issues.

III. MODELLING AND ANALYSIS

A. Overview of Project Modules.

1. Web Server

The Web Server would be a REST API providing all the functionalities of the system. The Client interface is required to interact with the web server to be able to perform any operations.

The server is further subdivided into two components.

1. Main Server

This server would provide all the functionalities of the system.

2. Image Server

This server would be responsible for handling all the files-related operations on the server side.

2. Main Server

The main server has been designed keeping in mind scalability, readability and maintainability for the future people who would work on maintenance of the system. To make the system more readable as well as maintainable, the server has been segregated into different modules. Each module has been designed to perform only a single operation and all its related tasks. This modularization would be of immense help for the future development of the system, if any.

3. Authorization Module

The system authenticates and authorizes users using JWT tokens. On login, the user must provide a valid userID and correct password. The system checks the userID and password and, on successful validation of the password, the system responds with a JWT token and a Refresh token. The Client is required to safely store the JWT token and the Refresh token.

4. User Module

The user module handles all the operations that are related to users. The functionalities provided by this module have different levels of accessibility. Some functionalities are accessible to all end users, while some are accessible to authority personnel only.

5. Grievance Module

The user module handles all the operations that are related to grievances. The functionalities provided by this module have different levels of accessibility. Some functionalities are accessible to all end users, while some are accessible to authority personnel only.

This module depends on Azure NLP and NSFW detection APIs for detecting and reporting spam, racist or NSFW content posted on the system.



B. Tools and Technologies Used.

1. Tech stack used in overall development.

1. VS Code
2. IntelliJ
3. Git
4. GitHub
5. Docker
6. Vagrant

2. Tech Stack for the Client Interface

The Client Interface would be implemented using the following tech stack.

1. Flutter - for developing the Mobile application for general end users.
2. React.js - for developing the Web application for authority personnel.

3. Tech Stack for the Web server

The Web Server would be implemented using the following tech stack.

1. NodeJS, Express.js

For developing the Main Server and Image Server.

2. MongoDB

For storing all the data related to the System.

C. Advantages.

1. Easy to use UI.
2. Complete anonymity of the end users
3. Privacy is guaranteed.
4. Modern system architecture
5. Easy to maintain.
6. Loosely coupled architecture.
7. Novel approach
8. Automated System
9. Deployable to larger scopes
10. Uses best coding practices.
11. Statistics and reports generation for management authorities
12. Use of latest tech stack and tools.

D. Limitations.

1. Currently no way to give specific access and/or create custom roles.
2. This end user client is developed specifically for Android devices. iOS is currently unsupported.
3. No caching system is used for the constantly retrieved data.
4. Does not support uploading of audio / video files.

E. Applications.

1. The system being loosely coupled and cohesively developed can be used for a wide variety of applications. The system can be deployed to educational institutions, hospitals, NGOs, training institutes, factories, start-ups, and small-scale industries.
2. Furthermore, if scaled up properly, this system can be deployed to larger government institutes and huge MNCs.

IV. CONCLUSION

Our automated grievance redressal system thus can provide efficient solutions to the various problems faced by people in an organization in their day-to-day life. Deep Learning models coupled with the data that users are feeding to the system can help reduce the manual work of removing the NSFW content from the system. Also, NLP can help in an easy way to categorize the various issues based on the content provided. Tracking, managing, resolving issues can be made much easier with our system deployed to the organization and can help reduce much of the nitty gritty work of the



management. The management can get statistics and reports generated to better manage and handle the issues faced by the people of the organization, thus providing greater quality of service to the people. This can greatly improve the Quality-of-Life index of that organization.

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