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Smart Civic Issue Reporting System

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Abstract: Reporting road and citizen issues was no longer an easy process for citizens. Reporting problems such as road damage, street cleaning, dents, trash can overflows, street lightpost damage, or anything under the supervision of a municipality requires lengthy steps and procedures. There is still no guarantee that this is the case. Reported complaints will be processed by the competent authority. If daily 1000 complaints get registered then Because of this, most complaints are unheard, unanswered, and unresolved because the company is too large to handle small complaints from one person. To facilitate this grievance, we will implement an Smart Android application that citizens can use to report infrastructure issues in their city to relevant authorities. Therefore, whenever people encounter urban infrastructure, transportation, environmental cleanliness, or disruptions in their daily lives, they can share, discuss, and resolve issues with relevant authorities through this online Android portal. Complaints are registered via the mobile application. A hybrid CNN-RNN image processing algorithm & using the SVM-NLP model detects the severity of registered problems, so based on that higher severe issues get addressed first. The GPS (Global Positioning System) sensor on smart mobile devices can pinpoint the exact location of the problem zone and use the camera to record the problem area as visual evidence. The system then generates a form containing all the data and location and visual evidence entered by the user and sends it to a central server. The central server notifies the relevant agencies.

Keywords: CNN-RNN Hybrid Image Processing Algorithm, GPS, SVM, NLP, Android Application, Camera, Civic Complaints, Smart City.

I. INTRODUCTION

Today's smartphones can unlock the full potential of crowdsourcing and take eParticipation to a new level. Users can transparently contribute to solving complex and novel problems. Citizen involvement remains a challenge, but with the proliferation of geo-located smartphones, it has never been easier. Complaints are a valuable source of feedback to improve the infrastructure and condition of our city. Citizens may be dissatisfied with the surrounding or urban infrastructure, but may not prefer traditional grievance systems that have to go through lengthy procedures such as going to the office and waiting in line for hours. .. Valuable time and effort. So to fill the gap, we devised an Android application that introduces a new platform for exchanging problems between civil servants and the general public with just two clicks. It is optimal and easy to use without the public knowing the background process. And details. Because everyone has a smartphone in the smartphone era. Among several existing mobile phone platforms, Android is one of the largest platforms running on some smartphones and tablets in the world. Therefore, by developing Android applications to achieve this goal, we will maintain a satisfying relationship between citizens and government agencies and accelerate the process of civil development. In this process, everyone contributes to improving the condition and infrastructure of the city. Help and problems. There are several existing systems that are increasingly trying to enable the donation process for administrators and users. But this is still inefficient today. We also encourage you to use the latest technology and available tools to close the gap and find the latest systems that provide user-centered solutions. Our system provides a quick way to easily find workers based on their nearest location, available time, and the same admin type, making the search process for people in need easier than ever before. I am doing it. Increase the number of workers by expanding the facilities available and raising public awareness of the importance of administrative donations. Our system facilitates the donation process in our country.

II. PROBLEM STATEMENT

Maximize the potential of crowdsourcing and take eParticipation to a new level. Complaints are a valuable source of feedback to improve the infrastructure and condition of our city. Therefore, the most important task to maintain regular hygiene in the city is to efficiently report citizens' problems to public service authorities. To bridge the gap between government and citizens, we have developed an Android application that introduces a new platform for exchanging issues between civil servants and the general public with just two clicks. It is easy and optimal to use so that the public does not notice it. Background processes and details.

Simplifying & automation of analysing, classification task & Detecting severity of reported Civic Issues using Advance Image Processing & Natural Language processing algorithms (Severity Detection Algorithm).

Maintaining Geo Locality of reported issues for getting easily resolved & maintaining record Efficient Report management.

III. SYSTEM ARCHITECTURE



Figure 1: System Architecture

The system architecture is based on a three-tier client-server architecture and maps the user-server-officials (workers) model. The system consists of three phases, each phase using different technologies to perform specific predefined tasks and synchronize the work of each layer to form a compact system. The system follows the ModelViewController (MVC) architecture design pattern. This pattern organizes the interactive application into three separate modules. One is for application models with data representation and business logic, the second is for views that provide data display and user input, and the third is for controllers to send requests and control the flow.

3.1 User

The user will primarily use the GUI for registering a new complaint by providing the necessary data. If user is not a registered user then he will have to register first and then sign in to the app and look for all registered complaints and their results. The user can also keep track of the registered complaints and its status.

3.2 Officials

These are the actual people working for the app. When a complaint is registered, it will be notified to the officials of respective department. Accordingly they will inspect and analyze the report and will take further action like addressing the problem, scheduling to fix it and directing the nearest worker etc.

3.3 App

The application system has two major components, the first one is the server application and the second one is the mobile application. The server application will run on the web server. The client application will run as a web application or an android application on a standalone PC or on an android based mobile phone respectively.

3.4 Admin

The task of the admin is to deal with the server side application and handle database related operations and managements, update entries, maintain users' accounts, etc.

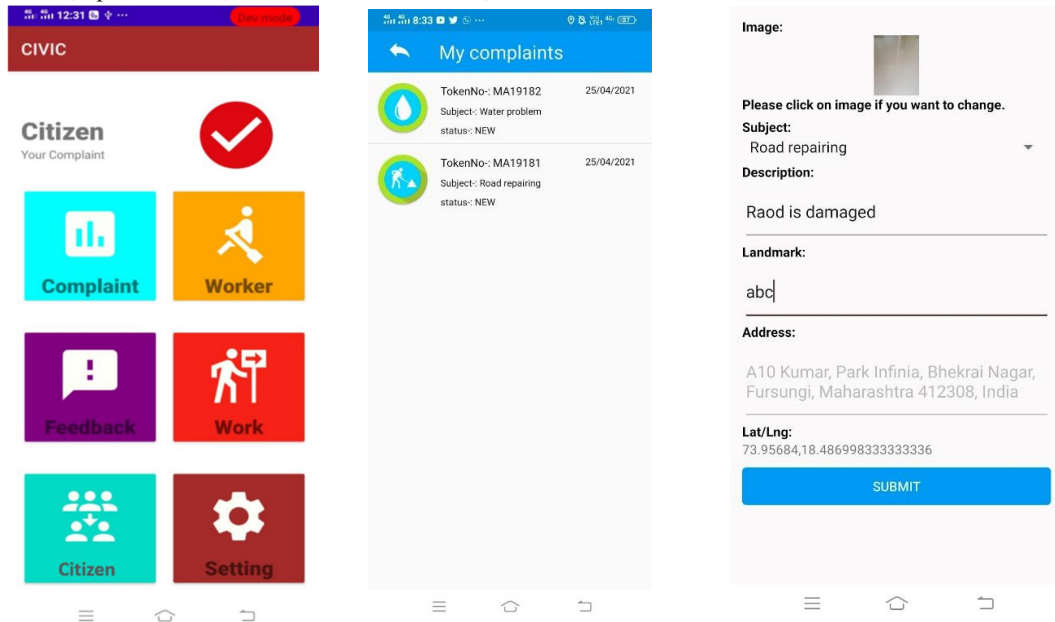


Figure 2: Android Architecture UI

IV. LITERATURE SURVEY

1. Civic Complaint Application under Smart City Project Satish Kumar Prasad, Ritesh Patil , Sagar Beldare, Prof. Anita Shinde

Complaints are a valuable source of feedback to improve the infrastructure and condition of our city. Citizens may be dissatisfied with the surrounding or urban infrastructure, but may not prefer traditional grievance systems that have to go through lengthy procedures such as going to the office and waiting in line for hours. ... Valuable time and effort. So to fill the gap, we devised an online application that introduces a new platform for exchanging problems between civil servants and the general public with just two clicks. It is best used by citizens without knowing the background steps or details. Because everyone has a smartphone in the smartphone era. Among several existing mobile phone platforms, Android is one of the emergency medical care that can occur anytime, anywhere.. In emergency care, blood transfusions may be needed to treat the patient. Especially in rural hospitals and clinics in India, it is difficult to get managers immediately, especially from negative or rare manager group types. The problem is exacerbated when life is lost due to the lack of an administrator's supply. Various authors have proposed several solutions to solve this. The static contact details of the management staff are managed by multiple agencies or management banks. However, these solutions were not appropriate because they provided a list of workers based on the static contact location of the workers provided at the time of registration. In a real-world scenario, the actual location of the employee may be far from the patient's location. The paper [4] proposed a system for dynamically finding and notifying the closest worker to the manager's requirements. The system tracks the location of workers (volunteers) via GPS or cellular network locations, allowing requesters to find the closest worker based on their actual location when needed. This proposed solution provides a reliable way to find

management staff, especially in remote rural areas with few management staff. In Germany, the name of the available software of this type is "MarkaSpot" and can be accessed from <http://mascity.com/>. "MarkaSpot" uses several new technologies in terms of GUI and technology. This application has the following advantages: Gives users the freedom to choose between Google Maps and OpenStreetMap. This software is license-free, creates transparency and documents active management measures. Using images with AdHoc is another great addition to this application. One of the main features of this application is voting for suggestions. MarkaSpot is now increasingly evolving into a platform for online dialogue with a focus on georeference. MarkaSpot also integrates the system with Facebook and Tweeter. With the addition of tweeters, the system will have a new user experience.

2. Analyzing Civic Complaints for Proactive Maintenance in Smart City

In order to transform a city into a smart city, it is important to focus on the citizenship issues of the inhabitants. Citizen complaints include issues related to road conditions, traffic, noise, water, and more. Your analysis can contribute to the positive decisions made by the city government. Urban computing is used in many areas such as transportation, environment, and security, but further research on urban planning is needed to analyze the root causes of civil problems and reduce concentration. In this paper, different urban areas are separated and serious problems are identified in one area. Two-phase clustering was mainly performed. The first phase performs dynamic grid-based clustering based on spatial attributes to analyze diseases that may show strong interdependence. In the second phase, location-based clusters are further grouped based on complaint categories. This helps identify urban areas that mimic similar complaint behavior. The analysis is performed using actual data collected in two cities, New York (USA) and Bangalore (India). The experimental results are visualized to give a better interpretation. The results help to develop strategies to increase population satisfaction and, as a result, improve quality of life. With the advanced human lifestyle of the city, we are faced with many major challenges such as traffic congestion, huge air pollution, immeasurable energy consumption and overwhelming noise pollution. Efficient management of common needs such as water, electricity, gas and clean air will make cities smarter. Urban computing manages these key issues using specific computing strategies such as data collection, data preprocessing, data interpretation, and service delivery [1]. The motivation for implementing these strategies in smart cities is to improve the environment and turn it into a smart city. To ensure the operation of smart cities, we acquire data from different sources such as transportation systems, weather forecasts, etc. to monitor, analyze, and control. Several techniques for accumulating data, organizing data, interpreting and representing data are applied recursively to data retrieved from heterogeneous sources. This study analyzes a large dataset of citizen issues registered in two cities, New York, USA and Bangalore, India.

3. Social Middleware for Civic Engagement

Social Media, Social Networking, and Messaging Applications Social media makes it easy for people to share, discuss, organize, collaborate, and stay in touch with their ideas. It is not surprising that social media is playing an increasingly important role in the involvement of citizens, supporting the growth of large digital networks of activists, both technically and economically. USNB is middleware that enables "social interoperability" by enabling interoperability between heterogeneous and decentralized social media and messaging applications. Still, supporting the involvement of large-scale citizens, from information to empowerment to organizations, continues to be a challenge that Civic Technologies aims to address. B. Civic Technology Unlike general-purpose social media, Civic Technology (also known as Civic Tech) is designed with the specific purpose of supporting the involvement of citizens. They aim to improve the relationship between citizens and government by providing mechanisms that enhance cooperation and participation in public decision-making. Over the last decade, various CivicTech platforms have emerged. They can be categorized according to the key functions they support: (1) connectivity and information provision for communication with citizens, (2) contributions and actions to empower people, (3) Organize and manage people to work to change the system. Social media often serves the first function. A well-known example of the second category is Make.org (<https://make.org>). This is a petition platform that allows users to launch campaigns and collect signatures. Most platforms in the third category adopt the software paradigm as a service. A well-known example is NationBuilder (<https://nationbuilder.com/>), which is dedicated to managing the campaign. In the above context, we launched the service-oriented AppCivist platform to allow us to

aggregate the most relevant third-party civic tech services to support a particular civic action. AppCivist enables you to configure a workflow focused on citizen involvement, consisting of all or part of a set of proposal generation, proposal collaboration, consulting, voting, and implementation operations. All operations are especially leveraged in the AppCivist PB adaptation of the platform focused on enabling online participation in participatory budget campaigns.

V. ALGORITHM

5.1 CNN + RNN Hybrid Algorithm

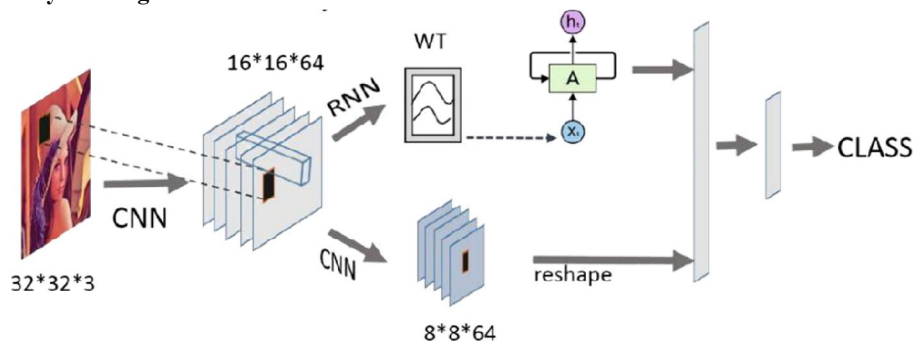


Figure 3: CNN + RNN hybrid algorithm

Convolutional Neural Networks, or CNNs have been at first designed to map photo information to an output variable. They have verified so powerful that they may be the go-to technique for any form of prediction hassle regarding photo information as an input. More typically, CNNs paintings properly with information that has a spatial relationship. Recurrent Neural Networks, or RNNs, have been designed to paintings with series prediction problems.

RNNs in trendy and LSTMs especially have acquired the maximum achievement while running with sequences of phrases and paragraphs, typically referred to as herbal language processing. However they may be used for sort of different applications which include photo processing as properly. A hybrid Algorithm classifies images based on their severity. And Rank higher sever issue with good rank than others.

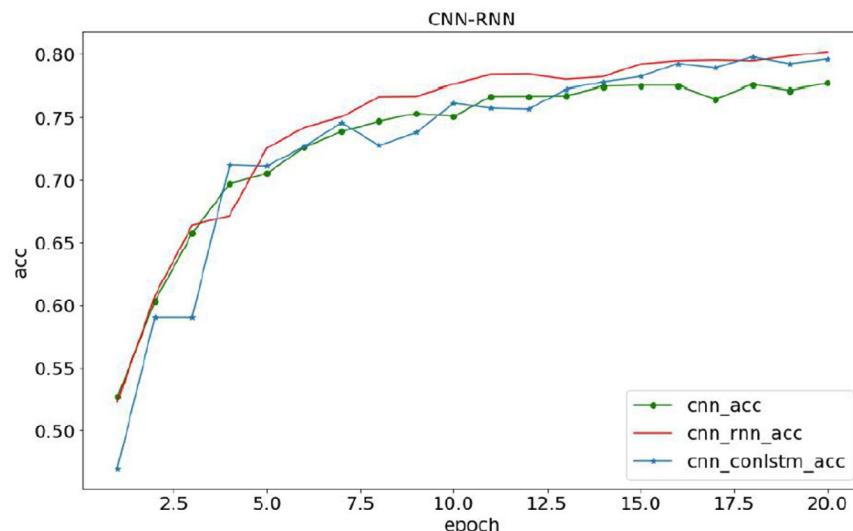


Figure 4: CNN + RNN hybrid algorithm Performance is higher



Figure 5: CNN + RNN hybrid algorithm dataset sample Images

5.2 Support Vector Machine for NLP

Support Vector Machine (SVM) is a supervised machine learning algorithm that delivers state-of-the-art performance for many learning tasks. In particular, SVM is a common learning algorithm for NLP (Natural Language Processing) tasks such as: B. POS (part-of-speech) tagging, word-sense disambiguation, NP (noun phrase) chunks, information extraction, relationship extraction, Semantic-reference labeling, and dependency analysis. Almost all of these applications use the same procedure. First, transform the problem into a multi-class classification problem. Then transform the multiclass problem into multiple binary classification problems. Then, for each binary classification l , the SVM classifier is trained. Finally, combine the classifier results to get the solution to the original NLP problem.

Suppose we have a dataset that has two tags (green and red), and the dataset has two features x_1 and x_2 . We want a classifier that can classify the pair(x_1 , x_2) of coordinates in either green or red. So as it is 2-d space so by just using a straight line, we can easily separate these two classes. But there can be multiple lines that can separate these classes.

Input to SVM is Citizen Complaint Description.

Example: “Road is Damaged very badly. Now it is road of death please do something otherwise we will suffer very badly and local citizens will suffer so much”

Output is Severity of Compliant based on the text used to describe issue.

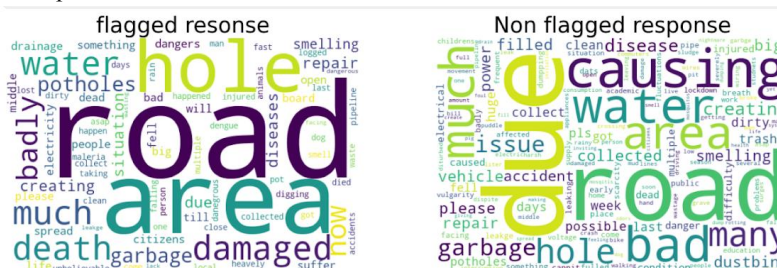


Figure 6: NLP Dataset Text key words

5.3 Android Neural Networks API (NNAPI)

The Android Neural Networks API (NNAPI) is an Android C API designed to perform computationally intensive machine learning operations on Android devices. NNAPI is designed to provide the basic functional layers of high-level machine learning frameworks such as TensorFlow Lite and Caffe2 that build and train neural networks. The API is available on all Android devices running Android 8.1 (API level 27) and above.

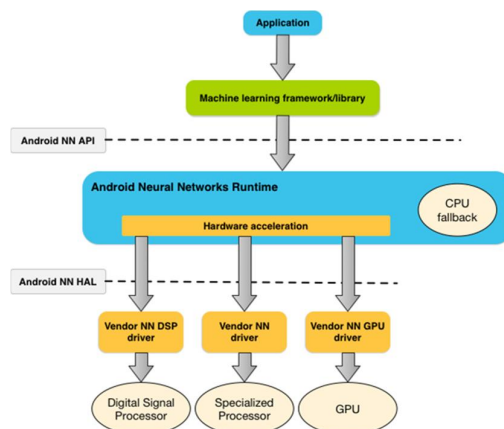


Figure 7: Android Neural Network API Architecture

VI. CONCLUSION

This white paper presents the vision of social middleware as an integral part of supporting large-scale public participation in today's digital age. Therefore, we conclude this paper by providing a very useful platform with new tools and technologies to improve the society with easy access to problem reports and faster results than expected. With the advent of new technologies and innovations, human patience has become shorter. Expect fast and accurate results without human error. The app does exactly the same thing and has several advantages over the traditional manual complaint registration process, increasing efficiency, transparency and convenience. Social middleware enables civic engagement ecosystems composed of diverse actors – human citizens, connected objects, and software services– existing in heterogeneous digital interaction environments –social media and connected object/service platforms.

The ultimate purpose is to enhance the quality of participation by: (i) allowing citizens to use their favorite communication technologies to participate; (ii) allowing citizens to interact not only with other citizens but also with connected objects and software services so as to get access to relevant value-added knowledge; and (iii) leveraging Civic Tech as well as enhancing its capabilities to foster the engagement of people. (iv) And by detecting the severity of issue making faster progress towards resolving the issue with more accuracy.

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