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Smart Police Complaint System

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Abstract:
The police in India have a problem with dealing with complaints. They do this using paper. It takes up a lot of time. Police officers spend a lot of time doing office work. People who make complaints have a time finding out what is happening with their case. It is also hard to make sure people are doing their jobs properly.
The Smart Police Complaint System was made to solve these problems. It is a website that people can use to make a complaint and track what is happening with it. People can make complaints, from their phone or computer. They can add pictures. Say where they are. They can also get updates on their case without having to go to the police station.
The police get a page that shows them all the complaints. People can see how complaints there are and which ones are important. The system helps them figure out which police officer should handle each complaint.
The Smart Police Complaint System uses computer code to make everything work. It uses something called Naïve Bayes to figure out which complaints are serious and which ones are not. The system then decides which complaints need attention away. It also uses a Greedy Algorithm.
This algorithm sends complaints to the police officer who's closest to the person who made the complaint.So people get help quickly because the police officer is, near them.The Smart Police Complaint System helps people get help from the police officer quickly.
The Smart Police Complaint System is made with React.js and TypeScript. These are used on the end. The system also uses Node.js and Express. These are used on the end. The system uses MongoDB to store information. It stores all the details in this database. Socket.IO is also used by the system. It helps the system send messages to people and police officers so they know what is happening with a case.

Keywords: NLP, Naïve Bayes Classification, React.js, Node.js, MongoDB, WebSocket, REST API, Role-Based Access Control, Geolocation, Real-Time Notifications, Crime Classification, JWT Authentication.

Introduction:

When you walk into police stations in India you will still see a lot of paper work. Police stations in India have complaint registers and handwritten logs. They also have forms that need to be processed and filed and then tracked manually. Police in India do want to modernise. However police in India have not found an practical system to replace these old ways of working at police stations, in India.

The problem is also big for citizens. Filing a complaint means taking time off work going to a police station waiting in a queue and then not having a way to follow up. People usually give up on following up on their complaints because they do not have a reference number or any way to communicate digitally. This is why people start to lose trust in the police.

The Smart Police Complaint System was made to solve these problems. Now people can file complaints using their phone or laptop. They will get a confirmation. They can also check what is happening with their case at any time. The system also lets people talk to the police officers who are handling their case through a messaging system.

For the police officers the system has a dashboard that shows all the information, about complaints. It shows how many complaints are being solved and how work each police officer has to do.

The system is able to understand what people are saying in their complaints. It figures out if people need to make a report or not. The Smart Police Complaint System also checks how people are feeling and how urgent their problem is. The system does this to make sure the police know what to do with the Smart Police Complaint System. The police can use the Smart Police Complaint System to help people with their complaints.

The system gives each complaint a priority score. Then it uses a set of rules to assign each complaint to the officer who is closest and available to help with the Smart Police Complaint System. The Smart Police Complaint System does this based on where the officers are so people can get help with the Smart Police Complaint System quickly.

Motivation:

The idea for this project came from a fact. The police complaint process in India still uses a lot of paper. This is strange because most government services like tax filing, driving licence applications and passport renewals can be done online.. Police complaints mostly cannot be done online.

This gap causes a lot of problems. For example complaints get sent to the people. Police officers have to do the work multiple times because they cannot see what other officers are doing. People who live in areas have to travel very far to file a report. Supervisors need to make decisions based on data not on updates.

The main goal of the SPCS project was to help people. We aimed to build a system that any citizen can use in, than five minutes.

The SPCS system should be easy for a police officer to use during their shift without needing any training. Police officers should be able to use the system like they use a smartphone. The SPCS project is very important to us because it is about the police complaint process, in India and the SPCS system.

Problem Statement:

The old way of handling police complaints is really annoying. It involves a lot of paperwork and visiting police stations and making phone calls. This system has a lot of problems that a new system wants to fix.

- Filing a police complaint is not easy for people who want to do it from home or from else that is not a police station. They have to go to the police station in person which's very hard for people who live far away or have trouble walking around.

Police officers spend a lot of time doing paperwork. They have to keep track of all the complaints by hand which takes a lot of time away from the work they are supposed to be doing outside the office. There is no way to figure out which complaints are really urgent.

- All complaints are treated the way no matter how serious they are. This means that it takes a time to respond to complaints and the response times are not consistent.

Police supervisors do not have the information about what is happening. They have to rely on reports that are only updated every week or every month which's not helpful when they need to make quick decisions. They need to have the updates not old spreadsheets.

The police complaint management system is based on paperwork and phone calls. A new system is trying to solve the problems with the system.

1. People cannot file complaints from else they have to go to the police station. This is a problem, for people who live in areas that're far away or for people who have trouble moving around.
2. Police officers spend a lot of time doing paperwork they have to prioritize complaints by hand. There is no system to help them do this automatically.
3. Complaints are not assigned to the people all complaints go to the same queue. This means that it takes a time to respond to complaints.
4. Supervisors do not have the information they have to rely on reports they need to have the latest updates so they can make informed decisions.

The current police complaint system uses a lot of paperwork it is hard for people to file complaints police officers have to do a lot of paperwork supervisors do not have the information they need. A new police complaint system can fix these problems.

The police complaint process is hard for citizens and police officers citizens have to go to the police station to file a complaint police officers have to do a lot of paperwork. A

new police complaint system can make it easier for people to file police complaints and for police officers to do their job.

Review of Literature:

The field of complaint and crime management has really taken off in the last five years. This is because more people are using the internet of things, mobile computers and natural language processing in safety. We looked at twelve projects that are similar to this one. We found that they all have some things in common and some problems that they have to deal with. These things helped me decide how to design the system we are proposing.

Some systems use machine learning models like BERT. These systems work well when you are just testing them.

We wanted to find a way to make a system that's in the middle of these two. We used something called Naïve Bayes classification. This method is not too hard on computers it is easy to understand

This will help us see what works and what does not work in complaint and crime management systems.

The table will show the following information

1. The name of the project
2. The tools they used
3. The problems they had

Sr.	Paper Title [Year]	Technology Used	Advantages	Limitations
1	AI-driven Complaint Classification and Analysis [2025]	NLP, BERT, Python	Auto-categorises complaints; saves officer time	May misclassify due to language or context issues

2	Smart City Crime Monitoring Using IoT [2024]	IoT, Cloud, Big Data Analytics	Monitors urban crime patterns in real time	Privacy concerns; expensive sensor hardware
3	AI-Based Crime Prediction and Reporting System [2022]	ML (SVM, K-Means), Python	Predicts hotspots; aids proactive policing	Accuracy depends heavily on data quality
4	Smart Crime Reporting and Management System [2023]	MERN Stack	Complete citizen-police interaction portal; scalable	Needs multilingual and accessibility support
5	Geo-tagged Emergency Reporting Application [2023]	Android, Google Maps API, Firebase	Location-aware reporting; faster police response	GPS errors in weak signal areas
6	Smart Police Station Automation System [2022]	IoT, NodeMCU, Cloud	Automates station-level operations	High maintenance; connectivity required
7	Police Service Automation System [2022]	ASP.NET, SQL Server	Streamlines police records and document management	Outdated UI; no notification system
8	Real-Time Citizen Complaint Management System [2022]	Angular, Spring Boot, MySQL	Live tracking and notifications for complaints	Lacks predictive analysis; limited scalability
9	Web-based Public Grievance Redressal System [2021]	React.js, Express.js, MongoDB	Real-time tracking; secure login; analytics dashboards	Lacks voice input or mobile capture features
10	Intelligent Crime File Management System [2021]	Python, Flask, MySQL	Stores and retrieves complaint and case details efficiently	No real-time notifications or geolocation integration
11	Smart e-Police Reporting System Using Android [2020]	Android Studio, Firebase, Java	Mobile-based complaint filing with image upload	Limited backend scalability; no AI complaint categorisation
12	Online FIR Registration and Tracking System [2019]	PHP, MySQL, HTML, CSS	Citizens can register FIRs online anytime	Lacks real-time updates; no mobile support

Table I: Review of Literature

Existing System:

Each station does things a little differently. It is hard to look at all the complaints together.

The people who make complaints do not know what is happening with their case. They have to call or go to the station to find out which's a lot of trouble. A lot of people give up and stop trying so they do not trust the system.

All complaints are treated the same no matter how serious they are. The police have to read each one and decide what to do which takes a time. This means that some cases are not handled well.

When a lot of people make complaints, the system gets slow. The police do not have a way to handle all the cases so things get worse.

The police and the people who make complaints do not have a way to talk to each other. They do not have a place to write down what they say to each other so it is hard to keep track of what happened.

Proposed System:

The Smart Police Complaint System has four parts. These parts all work together. They help people when they want to register a complaint and they help solve the complaint. The Smart Police Complaint System is made to be something that people can count on.It can handle a lot of users at the time. This makes it easy for people to use the Smart Police Complaint System and get their complaints solved.

The four parts of the Smart Police Complaint System make sure that the Smart Police Complaint System is reliable and easy to use for citizens.

1. The part where people put in their complaints

People use their phones to get into the system. The system is really easy to use. They have to fill out a form with some details. On this form people write down what their complaints are about. They also write down when the problem happened. They put in their contact information so they can be reached. People can also add pictures to their complaint. They can even add where they are located. The system works in English, Hindi and Marathi which're three different languages. The system checks to make sure all the information is filled in. After that people can submit their complaint, about the issue they are having with the system and the complaint they want to report.

2. The part where the system processes complaints

Now comes the part where complaints move through Node.js with Express.js. Each complaint gets checked none are skipped. How serious is it? That depends on what the software decides. The urgency level comes from a model that does some math quietly. It gives every report a value between 0 and 1. If the number is high the system labels it urgent. If its, in the middle it's still urgent. Even if the number is low it still gets labeled urgent. Where the issue happened decides which officer handles it.

3. The part where the system keeps everything

The system is like a box. It uses codes called tokens to remember who the users are. It also uses passwords to keep everything. The system is very picky about which websites can get in. The system lets you log in with your Google, GitHub or Apple account which's pretty cool. This way the system makes sure that each user can only see the things that are meant for them to see. The system keeps all the information in one place. The system uses passwords and these special tokens to do this. The system is really good, at keeping everything safe and sound.

4. The part where the system stores all the information

The system uses a database called MongoDB to store all the information. This MongoDB database has parts.

One part is for police officers.

Another part is for police stations.

There is also a part for complaints and more.

Every piece of information in the MongoDB database has its special ID and a timestamp. When someone makes a
complaint the status of that complaint in the MongoDB database changes as people work on it.
The complaint can be pending. Sometimes it can be in progress. Times it might be under review. It could be solved. The Smart Police Complaint System uses the MongoDB database and all these different parts. This helps to make sure that complaints are handled quickly and fairly. People can trust the Smart Police Complaint System. Feel safe. The Smart Police Complaint System is really good at using the MongoDB database to help people. The MongoDB database helps the Smart Police Complaint System to work. It makes sure that all complaints are handled properly. The system uses MongoDB to store and manage all information. This helps

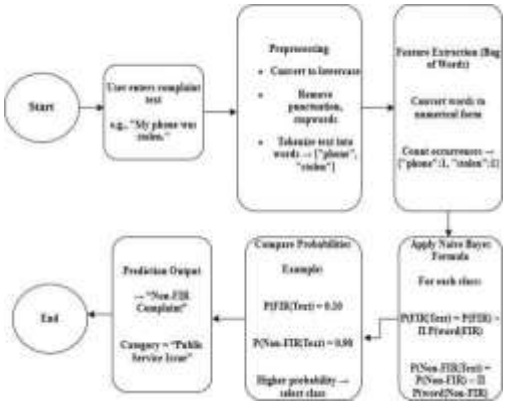


Fig 4 Naïve Bayes FIR Classification Flow

1. NLP Priority Detection to build trust, with the people who use it.
When we categorize something, we do a
Algorithms and Techniques: keyword and emotion analysis to determine how serious the NLP Priority Detection is. We assign scores to words that mean something's wrong or Speech-to-Text someone is hurt in the NLP Priority Detection.
For example the word 'attacked' gets a score of People , Their voice complaints are turned into text. This 0.9 in the NLP Priority Detection the word happens because of speech recognition. We use either 'injured' gets a score of 0.8 in the NLP Priority Whisper or DeepSpeech to do this job. When someone speaks what they say becomes words that we can read. Detection. The word 'badly' gets a score of 0.7 in Those words are then sent to tools that look at language. the NLP Priority Detection. We then calculate These tools are called language analysis tools. They get the the score of these NLP Priority Detection words, from the speech recognition. The words that keywords to get a score for the complaint in the someone says are turned into text. This text goes to the NLP Priority Detection. If the score is than 0.7
language analysis tools.So reporting something with your we mark the NLP Priority Detection as HIGH voice is the same as typing it out. priority. This means that the NLP Priority Detection will be at the top of the dashboard Naïve Bayes FIR Classification that the officers use so they can see the NLP Priority Detection incidents first and not miss First we get the complaint text. Make it simpler. We make all them because they are hidden under a lot of less the letters small. Remove the punctuation. We also remove important complaints, in the NLP Priority the words that do not mean much. Then we break the text Detection.

into words. The classifier looks at these words. Figures out how likely it is that the complaint is a First Information Report. It does this by looking at each word and how often it is used in First Information Reports. For example if someone says 'My phone was stolen' the classifier thinks it is probably not a First Information Report. This is because the words, in this complaint are often used for public service issues.

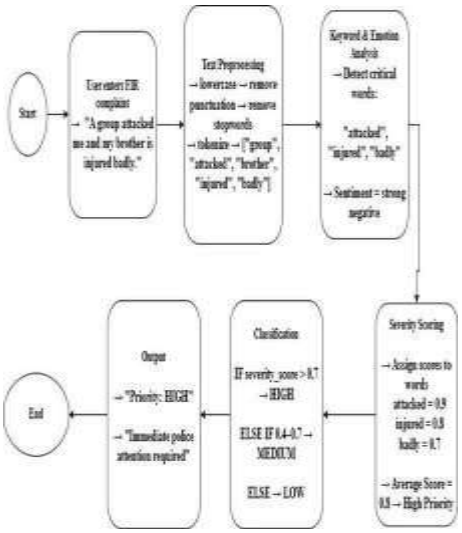


Fig 5 NLP Priority Detection Flow

1. **Greedy Officer Assignment Algorithm :** When we get a complaint with a valid location the algorithm checks which officers are free. It then figures out how far each free officer is from the complaint location. The complaint is given to the officer who's closest. This all happens quickly in just a few seconds. The officer who gets the complaint gets a notification away through Socket.IO. The Greedy Officer Assignment Algorithm uses the Greedy Officer Assignment Algorithm to assign complaints to officers. Officers get complaints based on how close they're, from where the complaint is.
2. **K-Means Crime Hotspot Detection** : When the police look at all the places where people make the complaints over and over they start to see patterns. The police make a map that shows where these patterns are happening. When they see a lot of complaints in one area they send officers to those locations. They use reports to figure out which areas have the most problems. The map is not a bunch of random spots it shows the police which locations keep having problems. The police use this information to decide where to send patrols every night. By looking at where the problems are they can make good decisions, about who should go where without having to say much.
3. **Time-Series Forecasting with ARIMA and LSTM:** on the police department studies Time-Series Forecasting with ARIMA and LSTM by looking at complaint numbers over different times. Of just guessing Time-Series Forecasting with ARIMA and LSTM helps spot trends in how crimes repeat over time. TimeSeries Forecasting with ARIMA and LSTM is used to find these trends. Because of Time-Series Forecasting with ARIMA and LSTM teams can adjust their staffing before things get really busy. Knowing what is going to happen of time means that help can arrive sooner not later. This is because preparation is better than waiting around for chaos to happen. Time-Series Forecasting, with ARIMA and LSTM really helps with preparation.

Techniques and Tech Stack: Techniques:

NLP (NATURAL LANGUAGE PROCESSING) :

Figuring out what type of document it is can be tricky. That's where NLP classification comes in. LayoutLMv3 does some of the work.

Spacy helps out too. A tool that makes educated guesses handles this task using language processing. Finding groups makes it easier to pull out items. When you sort things into categories spotting parts gets simpler. Sorting documents into types makes extracting named items like names and places easier. NLP Tools like LayoutLMv3 and Spacy help, with document sorting.

Sometimes shaky signals give messy locations. That first reading might not be right. Instead of trusting just one point, several readings are gathered over time. These points form a cluster, floating near each other. From that group, a middle ground appears - more stable than any single try. Once settled, it gets compared to known spots like offices or sites. If it lines up close enough, confidence grows. An officer nearby can now be linked properly to what needs doing.

Updates arrive instantly since timing matters. Right away, people see what's happening thanks to live signals sent through Socket.IO. When a complaint shifts stage, news spreads fast - within moments, not minutes. Information flows without delay so both users and staff follow along clearly, powered by natural language processing. Speed makes the difference here Classification and Geolocation Smoothing.

Tech Stack:

- When you want to start something you can begin by making user interfaces with React. It is an idea to use TypeScript with React because it helps make things clearer. There are tools like Vite that can help you work faster without making your project too big. Each part of your project can be a module and you can put these parts together to make a single page that people can use. This way you can build a page experience, with React and make it work really well.
- We like to give my website a look, by adding new CSS rules. This makes custom properties work smoothly so we can change themes easily. We can swap colors quickly because they are available away .
- We use Chart.js. It is really helpful because it makes charts that pop up. These charts help us track complaints in a way that's easy to understand. We can see the complaints in pictures of just numbers. Sometimes pictures say more than numbers do. This tool helps us draw lines and bars on the charts so we can see patterns in the complaints from Chart.js. The patterns from Chart.js start to make sense when we look at the charts, from

Chart.js .

- Notifications get to users quickly with the help of socket.io-client. This tool makes sure people get alerts on time. The system is set up so that messages keep coming without any pause. Users get updates away when they are sent. Speed is important here. It is taken care of by the socket.io-client connection. People can stay updated because the socket.io-client helps messages reach them fast.
- When we are not dealing with the user the server is doing its job. This is taken care of by things like Node.js. On Node.js we use Express.js to make a plan, for building the parts of the website that the user does not see. This is where the server does its work and it has to follow some rules. The server gets requests. Then it sends back answers. The server uses Node.js and Express.js to make sure everything works correctly and the logic of the server is easy to understand where requests come in and the server sends back responses using Express.js and

Node.js .

- A signal goes through the system whenever something happens. This keeps users updated without any delay. Messages get to people away because the system is always connected. Each alert shows up at the time. Speed is important here. People do not have to wait. The flow of things never stops once it gets started. The system keeps going. The signal keeps moving through it so the flow of the system never breaks once the signal has started it .
- We Use JWT And Passport Js With Google GitHub And Apple For Authentication
- Bcrypt.js turns passwords into scrambled code. This scrambling happens before anything else does. Safety lives inside each hash made here. No clear password travels through systems now. Every login attempt gets checked against these hidden versions instead.
- Storing data happens through MongoDB paired with Mongoose. Twelve separate collections handle different parts of the system - users appear here, along with complaints, alerts, and steps in support tasks.
- Getting who you are happens through Google, GitHub or Apple using OAuth. Locations pop up on maps thanks to Google Maps Embed. Where you are shows up live via your browser's geolocation tool. Photos snap right from device cameras using built-in web features.
- Running the backend means using Node.js on Render.com. Frontend lives online through Vercel every time it goes live. Code moves safely because GitHub holds changes, while Docker wraps apps into boxes. That render.yaml file? It sketches out steps so building each update feels familiar.

Database Design: Inside MongoDB, we work with documents across twelve Mongoose collections. What holds titles, types, descriptions, contacts, locations, photos, statuses, and time markers sits in the Complaint group. Instead of mixing roles, separate sets exist - one for Users, another for Police Officers - to manage who gets in. Regional data lives apart, tucked into the Police Station set, feeding what assigns tasks later on. Messages travel through two paths: Notification plus Police Notification - each stamped with reading state and linked to complaints.

3. Citizens get to know what is happening in real time

Now updates reach people right away through live alerts tied to their case. When a shift happens, messages pop up without delay. Instead of showing up in person, folks get the news online. Phone lines stay clear since callers drop off. Information moves faster because waiting ends early. No more guessing games about status changes. The fix came straight from spotting gaps during review.

4. We get information

Filling out forms using a device? That involves entering required data step by step. Clear records appear as a result. Location tagging slips into those entries automatically - missing entirely when pens hit paper.

5. Supervisors can make decisions

The officer dashboard shows us what people are complaining about how we solve the problems and where these complaints happen. The officer dashboard tracks all of this information. Supervisors use this information to make decisions. They look at the data. It helps them figure out what to do like looking at a map to find their way. When everything is easy to see it is easier to make choices. When we have all the

Based on the system design and prototype evaluation, the following outcomes are anticipated. T screenshots below illustrate the live system interface as built and deployed.



Fig 1 SPCS Landing Page



Fig 3 Citizen Analytics Dashboard Fig 2 Complaint Registration Form



Automated complaint classification: Complaints get sorted into FIR or non-FIR by the Naive Baye model. A label follows - HIGH, MEDIUM, or LOW - to show urgency. Much less manual effort is neede because of this system. Efficiency jumps by 60 to 70 percent versus human-only sorting.

Faster case assignment: A single moment after you send your report, it moves straight to an officer wh can act. The system picks them fast, using smart steps instead of delays. No need to watch screens waitin - work flows on its own. Urgent matters rise without anyone pushing them up. Speed comes from design not extra effort.

details we do not have to guess much when we decide where to put our efforts. The officer dashboard really helps us with this.

6. Our system can handle a lot of work

The website uses Node.js for the backend. This is where all the work is done that you do not see. The data is stored in MongoDB. This is what stores all the information. The website is running on Render and Vercel. These are the services that keep the website up and running. When a lot of people visit the website at the time the website still works well. The Node.js and MongoDB work together to make sure this happens. Every part of the website works the way. It does not matter where you are when you use the website. The Node.js and MongoDB make sure everything is the same.

Conclusion:

When someone wants to report a problem without making a deal things get easier. In the past making a complaint was a hassle and it was hard to figure out what to do. Now there is a way and it is simple. The forms are easy to fill out. There are not as many steps to follow. Technology is used in a way that helps people and it does not confuse them. The system is better because it pays attention to what people need. The process of reporting a problem used to be slow. Now it is faster and it does not feel like such a burden. Reporting a problem is a problem that is solved by the system.

When you use this tool you get a take on speed because it links smart sorting with instant updates. The responses from the tool move soon as you put in your input. The tool is built for flow. Each piece of the tool fits together like the timing in music. Not every tool runs this smooth. The tool is clear and easy to use, which is better than being complex. The performance of the tool stays sharp because the design of the tool does not have a lot of clutter. Just because the tool is smooth to use it does not mean it is weak. The strength of the tool is in its simplicity. You will see a problems, with the tool now and then but the tool operates fast without needing you to go through a lot of configuration steps. The speed of the tool is really because of the sorting and instant updates that the tool provides.

We who made the system wanted to make something that would work in life not just something that would look good on paper.

The system will also be able to extract text from pictures. Will have a mobile app that does not need to use the browser to take pictures or find locations. The current language classifier is being looked at to see if it can be upgraded to an one that can understand complicated language better. The Smart Police Complaint System is being made to work better over time.

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