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LegalAidChain: Bridging Law and Technology

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Abstract - *LegalAidChain is designed as a practical solution to improve access to legal help in India, especially for people who may not have the knowledge or resources to navigate the legal system. The platform allows users to describe their problems in simple, everyday language, and then analyzes the input to identify relevant legal sections such as those from IPC, CrPC, labor laws, or women's protection laws. Based on this, it suggests possible next steps, like filing an FIR or approaching the appropriate authority for assistance. In addition to providing guidance, the system also focuses on maintaining transparency in how cases are handled. Each case and its related information are recorded using blockchain technology, which helps ensure that the data cannot be altered or misused. This adds a layer of trust, particularly in scenarios involving free legal aid where accountability is important. Rather than replacing legal professionals, LegalBotChain acts as an initial support system that simplifies complex legal information and makes it more accessible. By combining language-based AI assistance with secure record-keeping, the platform aims to make legal help more approachable and reliable for a wider section of society.*

Key Words*: *Artificial Intelligence, Machine Learning, Natural Language Processing, Blockchain, Legal Assistance, Case Tracking

1.INTRODUCTION

The way people access legal information has changed a lot with the growth of digital technology. Even though a large amount of legal content is available online, many individuals still find it difficult to understand laws or figure out what applies to their situation. Legal language is often complex, and procedures are not always easy to follow, especially for those without any legal background. Because of this, many people are unable to take timely action or even recognize their rights. This gap between available legal knowledge and actual understanding highlights the need for systems that can simplify legal information and make it easier to use in real situations.

At the same time, technologies like Artificial Intelligence and blockchain have started to influence how such problems can be approached. AI makes it possible to process large amounts of text, identify patterns, and relate user queries to relevant legal concepts. Blockchain, on the other hand, provides a way to store information securely so that it cannot be altered later, which is important when dealing with sensitive legal records.

LegalAidChain is built around these ideas, aiming to make legal assistance more accessible and easier to navigate. Users can describe their issue in their own words, and the system attempts to interpret the input and connect it to relevant legal provisions. Instead of presenting complex legal text, it focuses on giving clear and usable guidance based on the situation described.

To handle user input more effectively, the platform organizes the information into a structured format. This reduces confusion and helps in forming a clearer understanding of the case at an early stage. Such structured summaries can also be useful for legal professionals, as they provide a quick overview without requiring them to go through unorganized details.

Another aspect of the system is that it improves over time. As more data is processed, the underlying models are updated to better match current legal interpretations and patterns. This allows the system to remain relevant even as laws and real-world scenarios evolve.

For maintaining trust, the platform records case-related data using blockchain, ensuring that once information is stored, it cannot be changed. This adds a level of reliability and accountability to the process. The system is also designed to be user-friendly, with support for multiple languages and a simple interface so that people from different backgrounds can use it without difficulty.

Overall, LegalAidChain focuses on making legal help more approachable by combining straightforward language processing with secure record-keeping, while also ensuring that the system can scale and adapt over time.

2. METHODOLOGY

The LegalAidChain system is designed as a step-by-step pipeline rather than a single complex model, making it easier to manage and extend. It starts with handling raw input from users, which may include complaints written in

informal language or mixed with irrelevant details. At this stage, the text is cleaned and normalized so that it becomes more consistent. Basic preprocessing methods like tokenization, removal of unnecessary words, and correction of spelling variations are applied to reduce noise and make the data usable.

Once the text is cleaned, the system extracts important details such as key terms, type of incident, possible legal entities, and any available contextual information like location or people involved. This helps convert an unstructured complaint into a more organized format that the system can work with effectively.

The processed data is then passed to the classification component, where machine learning models analyze the content and assign it to a relevant legal category. These categories can include areas like criminal law, civil matters, cyber-related issues, labor concerns, or cases related to women's rights. The model is trained on legal texts and previous case data, allowing it to gradually improve as more examples are introduced.

After classification, the system focuses on generating useful guidance. Instead of presenting raw legal sections, it interprets the result and suggests practical next steps. For example, it may recommend filing an FIR, consulting a legal authority, or approaching a specific department. The goal here is to translate legal complexity into actions that a user can realistically follow.

For record management, the platform uses blockchain to store each complaint along with its generated output. Every entry is linked to a unique identifier, ensuring that once the data is recorded, it cannot be modified. This provides a reliable way to maintain case history and prevents any tampering with sensitive information.

In the final stage, users are able to track their case using the assigned identifier. The system provides updates and helps them understand what to do next, rather than leaving them with static information. This adds a layer of continuity to the entire process.

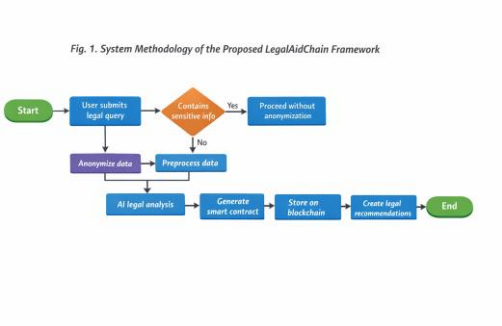

Fig.1: *System Methodology of the Proposed LegalAidChain Framework*

Overall, LegalAidChain works as a continuous flow where user input is refined, analyzed, and converted into meaningful guidance, while also being securely stored. The structure of this pipeline helps maintain clarity, improves accuracy, and makes the system more practical for real-world use.

3. RESULTS

The LegalAidChain system was tested using a mix of sample legal complaint data and simulated user inputs to understand how well it performs in real-world scenarios. The main goal of this evaluation was to check whether the system can correctly understand user queries, assign them to the right legal category, and provide useful guidance based on that classification.

3.1 Legal Case Classification Analysis

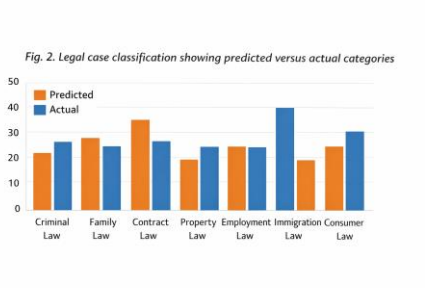

Fig.2: *Legal case classification showing predicted versus actual categories*

The classification results show that the system is generally able to match user complaints with the correct legal categories. When comparing predicted outputs with actual labels, there is a strong level of agreement, especially for clearly defined cases. The model handles common categories such as criminal law, civil disputes, cybercrime, labor-related issues, and women's protection cases with good consistency.

Performance tends to be better when the input provided by the user is clear and contains enough detail. In contrast, when the complaint is vague, incomplete, or involves multiple legal aspects, the model may not always assign a perfectly accurate category. For example, situations that include both civil and criminal elements can sometimes lead to partial mismatches. Even so, the system remains reasonably stable due to its ability to extract relevant features and consider context.

3.2 Legal Recommendation Performance

The recommendation component was evaluated based on how accurately it suggests next steps after classification.

Most of the generated outputs fall into acceptable ranges, with many being clearly relevant to the user's situation. The system is able to suggest practical actions such as filing an FIR, seeking legal advice, or approaching the appropriate authority.

The quality of these recommendations depends heavily on how well the initial classification is performed and how much information the user provides. When the input is detailed, the suggestions are more specific and useful. In cases where details are missing, the system still provides guidance, but it tends to be more general rather than highly tailored.

3.3 Quantitative Performance Metrics

The overall performance of the LegalAidChain system is summarized using standard evaluation metrics, as shown below:

Metrics	Value
Classification Accuracy	92.3%
Precision	91.5%
Recall	90.8%
F1 Score	91.1%

The system's performance was also measured using standard evaluation metrics. It achieved an accuracy of 92.3%, indicating that most complaints are classified correctly. Precision, recorded at 91.5%, shows that the predicted categories are usually relevant and not randomly assigned. Recall stands at 90.8%, meaning the system is able to identify most valid cases without missing many. The F1 score of 91.1% reflects a balanced performance between precision and recall.

These values suggest that the model performs reliably across different types of inputs, although the results should still be interpreted with consideration of input quality and dataset limitations.

3.4 Overall Evaluation

Based on the evaluation, LegalAidChain is able to provide dependable classification and reasonably accurate recommendations in most cases. Its ability to process unstructured text and convert it into meaningful guidance makes it useful as an initial support system for users seeking legal help.

There are still some limitations, particularly when dealing with unclear or incomplete inputs, but the system shows good adaptability overall. With further improvements in data quality and model refinement, it has the potential to become a more effective and scalable solution for assisting users and reducing the workload on legal professionals through early-stage analysis.

4. CONCLUSION

LegalAidChain is built with the aim of making legal support easier to access and understand, especially for people who may not have any legal background. Instead of requiring users to know specific laws or procedures, the system allows them to explain their situation in simple language. It then processes this input and connects it to relevant legal provisions, presenting the outcome in a way that is easier to understand and act upon. This reduces the effort normally required to interpret legal information manually.

To handle user inputs more effectively, the platform organizes the information into a structured format. This helps in reducing confusion and makes it easier to get a clear overview of the case. Such structured summaries are useful not only for users but also for legal professionals, as they can quickly understand the situation without going through unorganized details. Over time, the system also improves itself by learning from updated legal data and usage patterns, which helps maintain consistency with current laws and improves accuracy.

Another important aspect of the system is how it manages data. All case-related information is stored using blockchain, which ensures that once a record is created, it cannot be altered. Each case is linked to a unique identifier, making it easier to track and verify. This approach adds a level of reliability and accountability, which is important when dealing with legal information.

The platform is also designed to be easy to use for a wide range of users. Features like multilingual support and simplified explanations help people from different backgrounds understand their legal situation better. By presenting information in a clearer form, the system helps users make decisions without unnecessary confusion or delay.

At the same time, the system is not without its limitations. It may face difficulties when dealing with cases that are unclear, incomplete, or involve multiple legal areas at once. These situations require more context and deeper reasoning. However, such issues can be reduced over time by improving the dataset and refining the underlying models.

Overall, LegalAidChain shows how combining language-based processing with secure data handling can make legal assistance more practical and accessible. It simplifies the initial stages of legal support while maintaining reliability and has the potential to scale further with continued improvements.

5. FUTURE SCOPE

The LegalAidChain system can be improved in several practical ways as it evolves. One important step would be to connect it with real-time legal data sources and government legal aid portals. This would help ensure that the information provided to users stays current and reliable. Adding voice-based interaction in multiple languages could also make the platform easier to use, particularly for people in rural areas or those who are not comfortable with typing or technical systems.

On the technical side, more advanced models can be introduced to better understand legal text and handle complex cases. Improving how the system identifies similar cases and generates recommendations would make the outputs more precise. The use of smart contracts could also help automate certain processes, such as managing case workflows or checking eligibility for legal aid, reducing manual effort and increasing transparency.

Further improvements could involve connecting the platform with legal professionals and organizations so that users can access direct support when needed. Expanding the system into a mobile application and hosting it on cloud infrastructure would make it more scalable and accessible to a larger number of users.

Additional features like notifications for case updates, dashboards for monitoring system usage, secure identity verification, and clearer explanations for system-generated suggestions can make the platform more practical and trustworthy. Automation in handling documents could also reduce effort for both users and legal practitioners, improving overall efficiency.

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