

Voice Of Justice: Ai-Based Legal Aid System For Improved Access To Justice And Legal Guidance

Don Brightson.G¹, Santhosh.P², Mrs. S.P. Audline Beena³,Dr.D.Rajiniginath⁴

^{1,2}Dept of Computer Science and Engineering

⁴Professor, Dept of Computer Science and Engineering

³Assistant Professor, Dept of Computer Science and Engineering

^{1,2,3,4} Sri Muthukumaran Institute of Technology

Abstract- *The project endeavours to create an advanced AI-driven legal chat application available across various platforms including Android, iOS, web, and desktop. The application offers a comprehensive range of functionalities, such as real-time legal news updates, direct consultation with lawyers, an AI chatbot for legal inquiries, access to an extensive legal dataset, multilanguage support, and audio capabilities. To gather real-time data on lawyers, the application employs sophisticated web scraping techniques from relevant sources. For legal research, it utilizes cutting-edge machine learning algorithms to efficiently search and retrieve laws based on user queries. Furthermore, the application harnesses GPT for the generation of contextually appropriate responses within the legal chat interface. Security measures are paramount in the application design, with the implementation of JWT authentication to ensure the protection of user data and interactions. The main purpose of the application in moderated communities is to provide accessible legal knowledge, empowering users with a deeper understanding of applicable laws and regulations.*

I. INTRODUCTION

In today's digital era, the demand for accessible and trustworthy legal assistance has never been greater. Recognizing this need, the development of an advanced AI-driven legal chat application aims to fill this gap by providing users with a comprehensive suite of features tailored to their legal needs. Accessible on Android, iOS, web, and desktop platforms, this application offers a holistic solution for individuals and communities seeking legal guidance and information.

A. Overview

At its core, the application serves as a one-stop destination for all things legal, offering real-time updates on legal news, direct consultation with lawyers, an AI chatbot for legal inquiries, and access to tailored legal information for moderated communities. This comprehensive approach ensures that users can easily access the resources they need,

whether they require immediate legal assistance or seek to enhance their understanding of local laws and regulations. One of the key features of the application is its ability to gather real-time data on lawyers through sophisticated web scraping techniques. Additionally, machine learning algorithms power the application's legal research capabilities, allowing users to retrieve relevant laws and regulations based on their specific queries.

The integration of GPT within the chat interface further enhances the user experience by generating contextually appropriate responses to legal inquiries. This not only streamlines communication but also ensures that users receive accurate and relevant information in real-time. For moderate communities, the application serves a unique purpose by providing accessible legal knowledge tailored to their specific needs. By empowering users with a deeper understanding of applicable laws and regulations, the application aims to facilitate informed discussions and decision-making within these communities. The development of this AI-driven legal chat application represents a significant advancement in the accessibility and delivery of legal services. By leveraging cutting-edge technology, it aims to democratize access to legal assistance and empower users with the knowledge they need to navigate the complexities of the legal system effectively.

B. Objective

1. Accessibility: Ensure that legal assistance and information are easily accessible to users on Android, iOS, web, and desktop platforms.

2. Accuracy: Provide up-to-date legal expertise through real-time data gathering on lawyers and efficient legal research capabilities powered by machine learning algorithms.

3. Efficiency: Streamline communication and enhance user experience by utilizing GPT for generating contextually appropriate responses within the legal chat interface.

4. Security: Implement robust security measures, including JWT authentication, to protect user data and interactions.

5. Empowerment: Empower users with a deeper understanding of local laws and regulations, particularly within moderate communities, to facilitate informed discussions and decision-making.

C. Scope

1. Platform Development: Creating a legal chat application for Android, iOS, web, and desktop platforms to ensure seamless functionality and user experience across all devices.

2. Data Gathering and Processing: Implementing sophisticated web scraping techniques for real-time data on lawyers. Integration of GPT for generating contextually appropriate responses within the legal chat interface.

3. Security Measures: Implementing JWT authentication with RS256 algorithm to protect user data and interactions.

II. EXISTING SYSTEM

The current legal assistance landscape in India is fraught with challenges, particularly in rural areas where resources and exposure to legal expertise are limited. With millions of pending cases across the district and Taluka courts, and a significant backlog in the High Court, the system faces immense pressure. Many individuals involved in legal disputes lack strong representation, which often leads to delays in proceedings and unfavorable outcomes. In rural areas, where access to legal services is scarce, people may struggle to find competent lawyers or may not be aware of their legal rights and options. As a result, they may face difficulties navigating the complex legal system, further exacerbating the issue of delayed justice.

Furthermore, the reliance on traditional methods of legal assistance, such as consulting local lawyers or seeking advice from friends and family, may not always yield satisfactory results. Lawyers may be overburdened with cases, leading to limited availability and attention for each client. Moreover, the quality of legal representation can vary widely, with some individuals receiving inadequate advice or assistance due to the lack of expertise or resources of their chosen lawyer. This disparity in access to legal services contributes to an unequal playing field, where those with greater financial means or connections may have an advantage over others in legal disputes.

In addition to the challenges of accessibility and quality of legal assistance, the existing system also grapples

with the issue of procedural inefficiencies and bureaucratic red tape. Court processes can be lengthy and convoluted, further delaying the resolution of cases. Moreover, the lack of transparency and accountability in the legal system can erode public trust and confidence, leading to disillusionment with the judiciary.

II. PROPOSED SYSTEM

The proposed AI-driven legal chat application endeavors to revolutionize the provision of legal services by integrating a multifaceted suite of features tailored to diverse user needs. Building upon the existing framework, the proposed application will incorporate several refinements to further enhance accessibility, accuracy, efficiency, security, and empowerment. This includes refining the user interface for improved navigation and usability across various platforms, ensuring seamless access to legal assistance and information for individuals from all walks of life.

To enhance accuracy, the application will continue to leverage sophisticated machine learning algorithms and Natural Language Processing (NLP) techniques for legal research and response generation. By continuously updating its repository of legal professionals and refining its algorithms, the application will provide users with the most up-to-date and pertinent legal expertise available. Efficiency will be further bolstered through the optimization of communication channels within the application. The integration of Generative Pre-trained Transformer (GPT) models will enable the system to generate more nuanced and contextually appropriate responses to legal inquiries, thereby diminishing the need for manual intervention and streamlining the user experience.

Regarding security, the proposed system will maintain its commitment to safeguarding user data and interactions. Advanced encryption protocols and robust authentication mechanisms, including JSON Web Tokens (JWT) with RS256 algorithm, will be implemented to fortify the protection of sensitive information and ensure user privacy. This application will continue to empower users with tailored legal information, particularly within moderated communities. By fostering informed discourse and decision-making, the application will promote legal literacy and engagement among users, ultimately fortifying community cohesion and collective understanding of legal complexities. The proposed system represents a substantial advancement in the accessibility, efficiency, and security of legal assistance. By harnessing cutting-edge technology and incorporating user feedback, the application aims to meet the evolving needs of

users and provide a reliable and authoritative platform for navigating the intricacies of the legal landscape.

III. SYSTEM ARCHITECTURE

This legal chat application utilizes a SQLite3 database with Django's ORM for data management, storing user info, legal data, and lawyer profiles. It employs external APIs and Python libraries for real-time lawyer data. Security is ensured through Django's authentication system. The web platform uses React, UI libraries, and NPM packages, with Webpack for optimization. Mobile apps for Android and iOS are built with React Native for cross-platform compatibility. Desktop app is built with Electron, using web technologies. Installation builders are used for easy installation. Overall, it blends Django, React, React Native, and Electron for a comprehensive and accessible user experience.

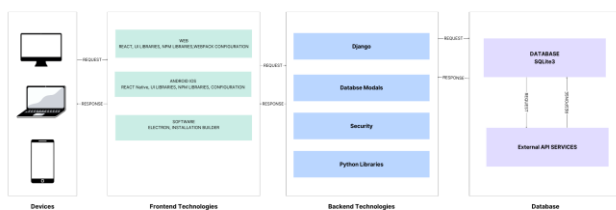


Figure 4.1.

V. METHODOLOGY

1. Requirement Analysis:

User Research: Conduct surveys, interviews, and market analysis to understand user needs and preferences regarding legal assistance and information.

Feature Identification: Define features such as real-time legal updates, lawyer consultation, AI chatbot, and community-specific legal information based on user requirements.

Platform Selection: Choose React for web development, React Native for mobile apps, and Electron for desktop to ensure cross-platform compatibility.

2. Design Phase:

UI/UX Design: Create wireframes and prototypes for web, mobile, and desktop interfaces using tools like Sketch or

Adobe XD. Ensure intuitive navigation and consistent design across platforms.

Database Design: Design database schema using Django ORM for storing user data, legal information, and lawyer profiles.

3. Development:

Backend Development with Django: Set up Django project with necessary models for user authentication, legal data storage, and lawyer profiles. Implement web scraping modules for real-time lawyer data gathering. Develop RESTful APIs for communication with frontend applications.

Frontend Development: Develop responsive web interface using React and to Develop mobile applications for Android and iOS platforms using React Native. To Develop desktop application using Electron, sharing codebase and functionalities with web and mobile versions for consistency.

Database and API Services: SQLite3 is used as the database management system. The Django ORM facilitates data management, allowing for the storage of user information, legal data, and lawyer profiles.

4. Integration and Testing: Integrate frontend interfaces with backend APIs. Conduct unit tests, integration tests, and user acceptance tests to ensure functionality across platforms and devices. Test security measures, including JWT authentication, to ensure data protection.

5. Deployment: Deploy backend on cloud infrastructure (e.g., AWS, Heroku) with scalability and reliability considerations. Deploy frontend applications to respective platforms (App Store, Google Play Store, web hosting services). Implement continuous integration and delivery pipelines for automated deployment and updates.

VI. MODULES

A. User Registration Module:

The user registration module begins with the user initiating the process, offering two paths: registering with a Google account or filling out a registration form. If the user chooses the Google option and the registration is successful, they're instantly registered. Otherwise, they provide details in a registration form, which the system validates, ensuring information accuracy. If errors occur, the user is prompted to correct them. Upon successful validation, the system sends a verification email. The user must click the verification link within a timeframe to complete registration; otherwise, it fails,

prompting reminder emails or new verification links. This process ensures a smooth and secure registration experience, whether through direct authentication or traditional form submission, maintaining data accuracy and user engagement.

B. User Login Module:

1. Authorization Check: The process begins by checking if the user needs authorization. If authorization is required, it proceeds to verify if a valid JWT is present.

2. Valid JWT Check: If a JWT is present, the system validates its authenticity. If the JWT is valid, the process moves on to perform the requested action.

3. User Login: If no valid JWT is found or authorization is not required, the user is directed to a login page where they can enter their credentials (username, password, and application user type if applicable).

4. Login Success: Upon successful login, the system generates a JWT and includes it in the user's login credentials.

5. Request: The user makes a request to the system.

6. Authorization Header: The JWT is included as part of an authorization header attached to the request.

7. Request Success: If the request is successful (status code 2xx), the process ends.

8. Request Failure (4xx/5xx - not 401): If the request fails due to a general error (4xx or 5xx status code, excluding 401 Unauthorized), the process ends as a legitimate request failure.

9. Refresh Token: If the request fails with a 401 Unauthorized status code, it indicates a possible expired JWT. The system tries to refresh the token.

10. Refresh Success: If the token refresh is successful, the request is retried with the new JWT in the authorization header.

11. Refresh Failure: If the token refresh fails, the user is logged out of the system.

C. Forgot Password Module:

The user initiates the process by entering their email address in the forgot password field. The system sends a one-time password (OTP) to the user's email address to verify their identity. The user receives the OTP and enters it into the

designated field on the website or application. If the OTP is valid, indicating that the user has access to the email associated with the account, the user is prompted to create a new password. If the OTP is invalid or expired, the user is prompted to try again, ensuring the security of the process. Once a new password is created and confirmed, the user can log in using their new credentials.

D. Legal Chat AI Module:

1. User Query: The process begins with the user entering a query.

2. GPT AI Model: The query is then directed to a GPT AI model, likely referring to a large language model OpenAI's, designed to provide informative and comprehensive responses.

3. Preferred Language: The system identifies the user's preferred language to ensure the response is generated in the appropriate language.

4. NLP Translation: If the user's preferred language differs from the language in which the query was submitted, the query may be translated using Natural Language Processing (NLP) techniques.

5. Generated Output: After processing the query, the GPT AI model generates a response based on the input and context.

6. Store Data: The data from the interaction, including the query and generated response, may be stored for analysis or future reference.

7. Voice Enabled: The system may offer the option for the user to enable voice output, allowing the generated response to be read back to the user audibly.

E. Legal Chat AI Module:

1. User Query: The process begins with the user entering a query, likely through a text interface.

2. Preprocess Text: The query text undergoes preprocessing steps, which may involve tasks like removing punctuation, converting text to lowercase, and stemming words (reducing them to their root form). This can help improve the accuracy of subsequent stages.

3. WordNet: The preprocessed text is then likely routed to WordNet, a lexical database that groups English words into synonym sets (synsets) along with their semantic relations.

WordNet can help identify the different senses of a word and potentially disambiguate the user's query.

4. Combine Text: It's unclear from the diagram what exactly is being combined here. It's possible that the preprocessed query and the results from WordNet are merged into a single representation.

5. TF-IDF Vectorizer: The text is then processed by a TF-IDF vectorizer. TF-IDF (term frequency-inverse document frequency) is a numerical statistic that reflects the importance of a word to a document in a collection. This process converts the text query into a numerical vector, which can be used for tasks like information retrieval.

6. Search: The TF-IDF vector is then used to search for documents or information relevant to the user's query. This likely involves matching the vector against a database of documents that have also been vectorized using TF-IDF.

7. Optimal Results: The system retrieves the documents or information that best match the user's query based on the TF-IDF vector comparison. These are then presented to the user as the search results.

F. Legal Chat AI Module:

The Lawyer Information Web Scraper module is a powerful tool designed to automate the process of gathering comprehensive data about lawyers and law firms from various online sources. With its sophisticated web scraping capabilities, this module extracts detailed information such as lawyer profiles, practice areas, contact details, educational background, experience, and client reviews from legal directories, law firm websites, and other relevant online platforms. Using advanced web scraping techniques, the module navigates through the HTML documents of legal websites, extracting structured data in a systematic manner. It parses and cleans the extracted data to ensure accuracy and consistency, filtering out irrelevant or redundant information.

One of the key features of this module is its ability to aggregate client reviews and ratings for lawyers and law firms. By collecting and analyzing client feedback, it offers valuable insights into the reputation and client satisfaction levels of legal professionals, helping users make informed decisions when selecting legal representation. The scraped data is stored in a structured format, facilitating easy access, retrieval, and analysis. The module's scalability allows it to handle large-scale data scraping tasks efficiently, making it suitable for collecting information on a wide range of lawyers and law firms. It's important to note that while web scraping offers valuable insights, users must ensure compliance with relevant

laws and terms of service when scraping data from websites. By leveraging the Lawyer Information Web Scraper module, users can streamline their data collection processes, save time and effort, and gain deeper insights into the legal landscape.

VII. CONCLUSION

The culmination of the AI-driven legal chat application project marks a significant step forward in addressing the growing need for accessible and reliable legal assistance in today's digital age. A key achievement of the project lies in the accuracy and efficiency with which legal information is delivered to users. Real-time data gathering on lawyers, powered by sophisticated web scraping techniques, ensures that users have access to the most up-to-date legal expertise available. Moreover, the application goes beyond merely providing legal information; it aims to empower users with a deeper understanding of the law. In conclusion, the AI-driven legal chat application represents a significant advancement in the accessibility and delivery of legal services. By leveraging cutting-edge technology, we have sought to empower users with the knowledge and resources they need to navigate the complexities of the legal system effectively. As the application continues to evolve and adapt to the changing needs of its users, it will remain steadfast in its mission to democratize access to legal assistance and promote justice for all.

VIII. FUTURE ENHANCEMENTS

1. Proximity Filtering for Lawyers:

Geolocation Integration: Implement geolocation features to identify users' locations and filter lawyers based on their proximity to the users. **Distance Filters:** Allow users to set distance filters to refine their search for lawyers within a certain radius from their location. **Location-based Search:** Enable users to search for lawyers by specifying a location or region, ensuring they find legal assistance nearby.

2. Live Chat with Lawyers:

Real-time Chat Functionality: Integrate a live chat feature that allows users to connect with lawyers instantly for real-time assistance. **Appointment Scheduling:** Provide users with the option to schedule consultations or appointments with lawyers directly through the chat interface.

3. Registration for Lawyers to Offer Pro Bono Services:

Pro Bono Registration Portal: Create a dedicated registration portal for lawyers interested in offering pro bono

services. Verification Process: Implement a verification process to ensure the eligibility of lawyers and validate their credentials before they can participate in pro bono cases. Case Matching Algorithm: Develop a system that matches pro bono cases with registered lawyers based on their expertise, availability, and location.

4. AI Reporting/Warn Police for Dangerous Crime Queries:

Sentiment Analysis: Integrate sentiment analysis to detect potentially dangerous or illegal queries from users. Warning System: Implement a warning system that flags and reports suspicious or alarming queries to the appropriate authorities, such as law enforcement. Emergency Hotline Integration: Provide users with emergency contact information or hotlines for immediate assistance in case of dangerous situations.

5. Negative Prompt Handling by AI:

Contextual Understanding: Train the AI to recognize negative prompts or inquiries related to dangerous activities or crimes. De-escalation Responses: Provide pre-defined responses that aim to de-escalate the situation and discourage harmful behavior. Referral to Support Services: Offer resources and referrals to mental health services, legal aid organizations, or crisis hotlines for individuals in distress.

6. Legal Document Analysis:

Document Upload and Analysis: Allow users to upload legal documents such as contracts, agreements, or court documents for AI analysis. Automated Summarization: Implement AI algorithms to automatically summarize lengthy legal documents, highlighting key points, clauses, and potential risks. Clause Comparison: Provide a feature to compare clauses in different legal documents to identify similarities or differences.

7. Virtual Courtroom Simulation:

Mock Trial Feature: Create a virtual courtroom environment where users can participate in mock trials or simulated legal proceedings. Role-playing Exercises: Offer scenarios where users can take on the role of lawyers, judges, or jurors to practice legal arguments and decision-making. Feedback and Evaluation: Provide feedback on users' performance and suggest areas for improvement based on their participation in virtual courtroom activities

REFERENCES

- [1] An Approach to Get Legal Assistance Using Artificial Intelligence, 020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO) Amity University, Noida, India. June 4-5, 2020, Nishant, Gurgaon.
- [2] An Empirical Study on Adaptive Inference for Pretrained Language Model, IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS, VOL. 34, NO. 8, AUGUST 2023 4321, Weijie Liu, Xin Zhao, Zhe Zhao, Qi Ju, Xuefeng Yang, and Wei Lu
- [3] Gradual Syntactic Label Replacement for Language Model Pre-Training, IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS, VOL. 34, NO. 8, AUGUST 2023, Yile Wang, Yue Zhang, Member, IEEE, Peng Li, and Yang Liu
- [4] Boyer, Kristy Elizabeth and Piwek, Paul eds. (2010). Proceedings of QG2010: The Third Workshop on Question Generation. Pittsburgh: questiongeneration.org
- [5] Sameera A. Abdul-Kader and Dr. John Woods, "Survey on Chatbot Design Techniques in Speech Conversation Systems" International Journal of Advanced Computer Science and Applications (ijacsa), 6(7), 2015
- [6] Xiangzhou Huang, Baogang Wei, Yin Zhang, "Automatic Question Answering Based on Wikipedia Data Extraction", Intelligent Systems and Knowledge Engineering (ISKE) 2015 10th International Conference on, pp. 314-317, 2015
- [7] Aletras N, Tsarapatsanis D, PreoŃuc-Pietro D, Lampos V. 2016. Predicting judicial decisions of the European Court of Human Rights: a Natural Language Processing perspective. PeerJ Computer Science 2
- [8] S. Li, H. Zhang, L. Ye, X. Guo and B. Fang, "MANN: A Multichannel Attentive Neural Network for Legal Judgment Prediction," in IEEE Access, vol. 7, pp. 151144-151155, 2019
- [9] N. Zhang, Y. Pu, S. Yang, J. Zhou and J. Gao, "An Ontological Chinese Legal Consultation System," in IEEE Access, vol. 5, pp. 18250-18261, 2017
- [10] Y. Ma, P. Zhang and J. Ma, "An Ontology Driven Knowledge Block Summarization Approach for Chinese Judgment Document Classification," in IEEE Access, vol. 6, pp. 71327-71338, 2018
- [11] DALE, R. (2019). Law and Word Order: NLP in Legal Tech. Natural Language Engineering, 25(1), 211-217
- [12] Wallace. The Elements of AIML Style, Alice A. I. Foundation, Inc., 2003, pp. 1-86

- [13] De Luise, M., Pascal, A., Saad, B., et al. (2016). Intelligent Chatter Bot for Regulation Search. *Open Physics*, 14(1), pp. 473-477
- [14] E. Bevacqua, K. Prepin, R. Niewiadomski, E. de Sevin, C. Pelachaud, , "GRETA: Towards an interactive conversational virtual companion" in *Close Engagements with Artificial Companions: Key Social Psychological Ethical and Design Issues*, John Benjamins Publishing Co., pp. 143-156, 2010
- [15] <https://docs.djangoproject.com/en/5.0/topics/http/>
- [16] <https://github.com/Data-Sculptor-X/voiceofjustice> codes for Backend Django Application
- [17] <https://github.com/Data-Sculptor-X/VOJ-ReactJS> codes for React Application
- [18] <https://github.com/Data-Sculptor-X/VOJ-React-Native> codes for React Native Application
- [19] T. Bolukbasi, J. Wang, O. Dekel, and V. Saligrama, "Adaptive neural networks for efficient inference," 2017, arXiv:1702.07811. [Online]. Available: <http://arxiv.org/abs/1702.07811>
- [20] M. Elbayad, J. Gu, E. Grave, and M. Auli, "Depth-adaptive transformer," in *Proc. Int. Conf. Learn. Represent. (ICLR)*, 2020.
- [21] N. Houlsby et al., "Parameter-efficient transfer learning for NLP," in *Proc. Int. Conf. Mach. Learn.*, 2019, pp. 2790–2799.
- [22] A. Romero, N. Ballas, S. Ebrahimi Kahou, A. Chassang, C. Gatta, and Y. Bengio, "FitNets: Hints for thin deep nets," 2014, arXiv:1412.6550. [Online]. Available: <http://arxiv.org/abs/1412.6550>
- [23] S. Sun, Y. Cheng, Z. Gan, and J. Liu, "Patient knowledge distillation for BERT model compression," in *Proc. Conf. Empirical Methods Natural Lang. Process. 9th Int. Joint Conf. Natural Lang. Process. (EMNLP IJCNLP)*, 2019.