

A REPORT ON

**DEVELOPING AN AI BASED
INTERACTIVE CHATBOT FOR THE
DEPARTMENT OF JUSTICE'S WEBSITE**

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in partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

At



PRESIDENCY UNIVERSITY

BENGALURU

MAY 2025

PRESIDENCY UNIVERSITY

PRESIDENCY SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the Internship/Project report "**DEVELOPING AN AI BASED INTERACTIVE CHATBOT FOR THE DEPARTMENT OF JUSTICE'S WEBSITE**" being submitted by **MANOJ L, VACHANASHREE, MONIKA YADAV A** bearing roll number 20211CAI0090, 20211CAI0117, 20211CAI0133 in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering is a bonafide work carried out under my supervision.



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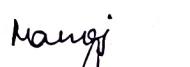
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DECLARATION

I hereby declare that the work, which is being presented in the report entitled "**“DEVELOPING AN AI BASED INTERACTIVE CHATBOT FOR THE DEPARTMENT OF JUSTICE’S WEBSITE”** in partial fulfillment for the award of Degree of **Bachelor of Technology in Computer Science and Engineering**, is a record of my own investigations carried under the guidance of **Dr. ZAFAR ALI KHAN N, Professor & HoD, Presidency School of Computer Science and Engineering, Presidency University, Bengaluru.**

I have not submitted the matter presented in this report anywhere for the award of any other Degree.

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ABSTRACT

Reddit Sentiment Explorer is an AI-powered web application designed to analyze and visualize public sentiment on any topic discussed across Reddit. By leveraging natural language processing (NLP) and sentiment analysis techniques, the system extracts, processes, and interprets the emotional tone from Reddit posts and comments, providing users with real-time insights into public opinion. The application supports diverse topics by dynamically scraping relevant Reddit data, enabling comprehensive sentiment evaluation across various communities and subreddits.

The user-friendly interface allows users to input keywords or phrases and instantly receive sentiment breakdowns, trends, and top related posts. The system efficiently handles informal language, slang, and context-specific expressions common in social media content. It offers multilingual support to capture sentiment nuances in different languages, enhancing accessibility and inclusiveness.

Built with scalable cloud infrastructure, Reddit Sentiment Explorer ensures fast response times and high availability, accommodating multiple concurrent users. Its modular design incorporates data retrieval, preprocessing, sentiment classification, and visualization components, promoting flexibility and extensibility. User feedback mechanisms further improve analysis accuracy and usability over time.

This project empowers individuals, researchers, and businesses to gauge public attitudes quickly, aiding in decision-making, trend analysis, and market research based on authentic, crowd-sourced social media data.

ACKNOWLEDGEMENT

First of all, we indebted to the **GOD ALMIGHTY** for giving me an opportunity to excel in our efforts to complete this project on time.

We express our sincere thanks to our respected dean **Dr. Md. Sameeruddin Khan**, Pro-VC - Engineering and Dean, Presency School of Computer Science and Engineering & Presency School of Information Science, Presidency University for getting us permission to undergo the project.

We express our heartfelt gratitude to our beloved Associate Dean **Dr. Mydhili Nair**, Presidency School of Computer Science and Engineering, Presidency University, and **Dr. Zafar Ali Khan** Head of the Department, Presidency School of Computer Science and Engineering, Presidency University, for rendering timely help in completing this project successfully.

We are greatly indebted to our guide **Mr. SANTHOSH KUMAR K L**, Assistant Professor, SCSE and Reviewer **Mr. LIKITH**, Asst. Prof CSE, Presidency School of Computer Science and Engineering, Presidency University for his inspirational guidance, and valuable suggestions and for providing us a chance to express our technical capabilities in every respect for the completion of the internship work.

We would like to convey our gratitude and heartfelt thanks to the CSE7301 University Project Coordinator **Mr. Md Ziaur Rahman and Dr. Sampath A K**, department Project Coordinators **Dr. Afroz Pasha** and Git hub coordinator **Mr. Muthuraj.**

We thank our family and friends for the strong support and inspiration they have provided us in bringing out this project.

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CHAPTER-1

INTRODUCTION

1.1 Introducing the Chatbot

The legal system may be complicated and difficult for the common individual to navigate. Accessing fundamental legal information, comprehending legal procedures, and locating pertinent case data may be time-consuming and even daunting. Similarly, the Department of Justice relies heavily on rapid retrieval of case information and lawyer profiles to ensure seamless operations. This project, "Developing an AI-Based Interactive Chatbot for the Department of Justice's Website," seeks to close this gap by constructing an intelligent virtual assistant capable of comprehending and responding to legal inquiries.

1.2 The chatbot provides various benefits to end-users

- **Instant Access to Basic Legal Information:** Users may easily get solutions to basic legal problems without having to read through long paperwork or wait for advice.
- **Legal Concepts:** The chatbot can teach essential legal ideas in an understandable manner, helping individuals to better grasp their rights and duties.
- **Case Information Retrieval:** Users can search the database for information on certain sorts of cases, which may be relevant to their circumstance.

1.3 For the Law and Justice Department, the chatbot provides

- **Efficient Case Information Access:** Department officials may quickly search and get lists of cases using a variety of criteria.
- **Lawyer list:** The system provides an easily accessible list of attorneys grouped by their expertise (e.g., criminal law, civil law), allowing for efficient assignment and communication.

1.4 How It Works

- The AI-powered interactive chatbot uses Natural Language Processing (NLP) and a structured database. When a user submits a question using the website interface, the following procedure occurs.
- Natural language understanding (NLU) The AI engine examines the user's input, determining the important phrases and intent behind the inquiry.
- Information Retrieval: Based on the determined purpose, the chatbot searches its knowledge base, which includes:
 - A repository of basic legal information.
 - A database of federal cases, which may include summaries, pertinent legislation, and results.
 - A database containing lawyer profiles, including names and areas of specialty.
- answer Generation: Using the information obtained, the chatbot generates an appropriate and brief answer. This might include a description of a law, a list of pertinent cases, or contact information for attorneys who specialize in a specific field.
- Interactive Dialogue: To further serve the user, the chatbot is meant to respond to follow-up queries and participate in discussion.
- To ensure accuracy and relevance, the system uses a well-curated and constantly updated library of legal material, case records, and professional profiles.

CHAPTER-2

LITERATURE SURVEY

2.1 Existing Solutions and Approaches

- **AI Powered Legal Querying System using NLP:** This paper explores the development of a Retrieval-Augmented Generation (RAG)-based Legal Assistant Chatbot, utilizing FAISS for semantic search and indexing. The primary focus is on streamlining legal information retrieval and document analysis, aiming to enhance productivity through automation. The paper highlights the potential of this chatbot as a model for developing an interactive system for the Department of Justice's website, emphasizing the need for future developments in enhanced Natural Language Processing (NLP) capabilities and robust security measures.[1]
- **AI Enabled Chatbot:** This research provides a retrospective analysis of chatbot evolution, tracing its progression from rule-based systems to AI-driven conversational agents. It examines the integration of AI technologies, specifically NLP and machine learning algorithms, to enhance user interactions. The paper discusses the challenges in methodologies, technologies, and AI integration, highlighting the advancements in intelligent comprehension and communication facilitated by AI. The insights gained from this study can be leveraged to develop an AI-based interactive chatbot for the Department of Justice's website.[2]
- **Development of a Legal Chatbot for Comprehensive User Support:** This paper focuses on the development of a sophisticated Legal Chatbot that integrates advanced NLP and Artificial Intelligence for comprehensive user support. The aim is to bridge the gap between users and legal knowledge, particularly in foundational legal domains. The system provides instantaneous responses to common legal concerns, addressing the limitations of traditional legal assistance and existing systems that lack comprehensive user support.[3]
- **Law Chatbot:** The "Law Chatbot" is an AI-powered conversational agent designed to

provide instant legal advice and resources. The paper discusses the use of text retrieval and generation techniques, leveraging AI for personalized responses. This chatbot aims to enhance access to legal information and services, empowering users to navigate complex legal issues affordably and providing 24/7 legal guidance. This approach could be applicable for the Department of Justice's website.[4]

- **Generative vs Intent-based Chatbot for Judicial Advice:** This study compares two AI-powered chatbots for judicial advice: a generative chatbot using a custom dataset of 100 conversations and an intent-based chatbot with 36 intents. The paper evaluates the user experience with these chatbots, highlighting the flexible, context-aware responses of the generative chatbot and the structured, specific legal advice of the intent-based chatbot. Both approaches can inform the development of an interactive chatbot for the Department of Justice's website.[5]
- **Legal Ease Chatbot – Bridging Legal Knowledge Gaps for Marginalized Communities:** This paper discusses a Digital AI Assisted Chatbot designed to provide legal support for marginalized communities. The focus is on accessibility, legal information dissemination, and personalized advice, including referrals. This chatbot aims to empower marginalized communities to navigate the legal system by providing timely and accessible legal support services, which could inform the development of an interactive chatbot for the Department of Justice's website.[6]
- **Design and Implementation of a Chatbot for Automated Legal Assistance using Natural Language Processing and Machine Learning:** This work explores the development of an AI-based legal assistance system using NLP and machine learning algorithms. Laws are ranked based on hits and losses and retrieved by similarity. The paper suggests further research on case law analysis, contract review, and legal drafting to enhance system capabilities. The primary advantage is the reduction of errors in legal research and the provision of fast, efficient, and accurate legal assistance. This approach could be adapted for the Department of Justice's website.[7]
- **Llm enhanced ai chatbot:** This paper discusses the development of a Large Language Model (LLM)-based chatbot capable of generating human-like responses in an offline

environment. The focus is on improving model robustness and incorporating ethical guardrails for responsible LLM use. The system supports text summarization and file uploads, but limitations include limited resources for offline deployment and the need for ethical guardrails in sensitive fields. This chatbot could be adapted for the Department of Justice's website by training it on relevant legal datasets.[8]

- **Legal Solutions - Intelligent Chatbot using Machine Learning:** This paper presents an AI chatbot solution designed to empower users with legal knowledge, personalized instructions, and real-time attorney interactions. The chatbot architecture and NLP techniques are outlined, along with the use of machine learning algorithms for information retrieval and processing. This approach could be adapted for the Department of Justice's website to enhance legal resource accessibility and user engagement.[9]
- **Enhancing Website Through Chatbot Integration:** This paper focuses on creating a chatbot using Dialogflow technology, which employs NLP and machine learning powered by fast API to assist users on websites. This approach aims to provide accurate responses and increase productivity through 24/7 operation. This approach can be applied to develop an interactive chatbot for the Department of Justice's website.[10]
- **The AI enabled Chatbot Framework for Intelligent Citizen-Government Interaction for Delivery of Services:** This paper discusses the design of an AI-enabled chatbot for government services, developed using Google Dialogflow. The system utilizes semantic modeling of domain knowledge and achieves approximately 95% accuracy in responding to queries. Limitations include domain-specific capability challenges and unresolved citizen queries. This approach is potentially applicable for the Department of Justice's website to enhance citizen interaction.[11]
- **Contribución tecnológica al acceso a la justicia: un chatbot para el agenciamiento de necesidades jurídicas:** This paper discusses the development of an AI-based legal chatbot to address communication barriers in accessing justice in Colombia, particularly for vulnerable populations. The tool aims to enhance knowledge and guidance, facilitating the management of legal needs and improving access to

justice.[12]

- **Applying cognitive computing to legal services:** This paper discusses developing a cognitive AI chatbot, like LegalBot, for legal services, emphasizing user interaction, appointment scheduling, and linking to information corpora. The paper highlights the importance of research, testing, and user feedback in creating effective legal chatbots, but notes challenges in getting Watson to populate a form and issues with data deletion in the Discovery service.[13]
- **Chat Kanoon: A Novel Approach to Legal Assistance in India:** This paper discusses ChatKanoon, a multilingual AI chatbot designed for the Indian legal system. The focus is on utilizing instructional techniques with language models and dataset utilization for precise legal information. The paper discusses current limitations and future potential, highlighting the broader impact of AI-driven legal assistance tools in developing countries. This could serve as a model for developing an interactive chatbot for the Department of Justice.[14]
- **LAWBO: a smart lawyer chatbot:** This paper presents LAWBO, an AI-driven chatbot designed for legal research, capable of understanding user intents and providing relevant case information. The system utilizes heuristics, DMN, GloVe, and Luis for NLP. Limitations include the limited number of AI systems in legal research and the insufficiency of traditional NLP techniques for legal fact extraction. This could be adapted for the Department of Justice's website to enhance user interaction and legal assistance.[15]
- **Ai chatbot using dialog flow:** This paper discusses developing an AI-based chatbot using Dialogflow for educational institutions, focusing on auto-responses to queries. Limitations include the limited exploration of chatbot personality development methods and the need for improved information retrieval algorithms. While it doesn't specifically address the Department of Justice, the implementation methods and technologies can be adapted for similar applications.[16]
- **AI-Based advanced Talk-chatbot for Implementation:** This paper focuses on

developing a multilingual talkbot for educational institutions, utilizing AI and NLP to assist students with inquiries. Service satisfaction is currently lacking for students. It does not specifically address the development of an AI-based interactive chatbot for the Department of Justice's website.[17]

- **Interactive Legal Assistance System using Large Language Models:** This paper discusses a Retrieval Augmented Generation chatbot designed to assist users in understanding Food Safety Regulations in India, utilizing Large Language Models. However, it does not specifically address developing a chatbot for the Department of Justice's website.[18]
- **LAWBOT: A Smart User Indian Legal Chatbot using Machine Learning Framework:** This paper discusses LAWBOT, a machine learning framework chatbot designed to assist users with legal inquiries in India. While it focuses on legal guidance, it does not specifically address the development of a chatbot for the Department of Justice's website.[19]
- **A Legal Assistant for Accountable Decision-Making1:** This paper discusses a chatbot system for legal assistance, combining formal logic and language models to provide accurate legal advice and explanations. The paper acknowledges limitations, including the potential for generative AI to produce unreliable information and the complexity of legal provisions that require professional interpretation. This could be applicable for developing an interactive chatbot for the Department of Justice's website.[20]
- **AI BASED CHATBOT TO ANSWER FAQs:** This paper focuses on developing a web-based chatbot for online banking, utilizing AI and natural language understanding. The paper notes limitations such as low user satisfaction rates in the banking industry and limited technology to increase accessibility for users. While it doesn't specifically address the Department of Justice, the methodologies and technologies discussed could be adapted for similar applications.[21]

2.2 Core Chatbot Development Techniques

- **Retrieval-Augmented Generation (RAG) and FAISS:** Used for efficient legal document analysis and information retrieval, enabling contextually relevant responses.
- **NLP and Machine Learning:** Fundamental technologies for natural language understanding, response generation, and personalized interactions.
- **Large Language Models (LLMs):** Employed for advanced conversational capabilities, text summarization, and handling complex legal documents.
- **Dialogflow and Google API:** Tools for chatbot creation, website integration, and efficient citizen-government interaction.
- **Semantic Modeling:** Essential for understanding domain-specific knowledge and ensuring accurate responses.
- **Intent-based and Generative Models:** Different chatbot architectures offering structured advice or flexible, context-aware responses.
- **Formal Logic and Heuristics:** Used for legal reasoning and information retrieval in specialized legal chatbots.

2.3 Key Advantages for a DOJ Website Chatbot

- **Enhanced Accessibility:** Provides 24/7 access to legal information and resources, bridging knowledge gaps for all users, including marginalized communities.
- **Improved Efficiency:** Automates legal information retrieval, document analysis, and handling of frequently asked questions, reducing workload and improving productivity.
- **Personalized Assistance:** Leverages AI to deliver tailored responses and guidance, enhancing user satisfaction.
- **Real-time Interactions:** Enables discussions with qualified attorneys or provides instant legal advice, improving access to professional legal assistance.
- **Multilingual Support:** Facilitates communication with diverse user populations.
- **Accuracy and Accountability:** Employs formal logic and robust validation mechanisms to ensure reliable legal information.

2.4 Common Limitations and Research Gaps

- **NLP and AI Integration Challenges:** Methodological and technological hurdles in integrating AI into chatbot systems.
- **Knowledge Base Limitations:** Chatbots may have limited knowledge at runtime and struggle with complex legal provisions.
- **Ethical Considerations:** Need for ethical guardrails, especially when using LLMs, to address sensitive information and potential biases.
- **User Trust and Satisfaction:** Challenges in building user trust and ensuring high satisfaction rates, particularly in the legal domain.
- **Information Retrieval Accuracy:** Improving the accuracy and relevance of information retrieval algorithms.
- **Handling Complex Conversations and Nuanced Emotions:** Difficulty in understanding and responding to complex legal scenarios and human emotions.
- **Offline Deployment and Model Optimization:** Limitations in deploying and optimizing chatbots for offline use.
- **Security Measures:** The need for robust security to protect sensitive legal information.
- **Lack of User interaction evaluation:** many of the papers lack in depth evaluation of the user experience.
- **Scalability and Adaptability:** Limited discussion on the scalability and adaptability of chatbots to evolving legal needs.
- **Domain-Specific Challenges:** Difficulties in ensuring accurate and comprehensive responses within specific legal domains.

Table 2.1 Existing Methods

| Papers | Methods Used | Limitations | Insights | Advantages |
|--|---|--|--|---|
| 1. AI Powered Legal Querying System using NLP | Retrieval-Augmented Generation (RAG) for document analysis. | Future developments needed for enhanced NLP capabilities. Integration of advanced security | The paper discusses a RAG-Based Legal Assistant Chatbot designed for legal information retrieval and document analysis, which could serve as a model for developing an interactive chatbot for the Department of Justice's | Streamlines legal information retrieval and document analysis. Enhances productivity by |

| | | | | |
|---|---|--|---|--|
| | FAISS for semantic search and indexing. | measures required for sensitive information. | website, enhancing user accessibility to legal resources. | automating time-consuming tasks. |
| 2. AI Enabled Chatbot | Retrospective analysis of chatbot evolution from rule-based systems. Exploration of AI technologies like NLP and machine learning algorithms. | Challenges in methodologies, technologies, and AI integration. Evolution from rule-based to AI-driven conversational agents. | The paper discusses the integration of AI in chatbot systems, emphasizing Natural Language Processing and machine learning to enhance user interactions. Developing an AI-based interactive chatbot for the Department of Justice's website could leverage these advancements for improved communication. | Enhances user interactions with sophisticated, intuitive responses. Utilizes AI for intelligent comprehension and communication. |
| 3. Development of a Legal Chatbot for Comprehensive User Support | Integration of Natural Language Processing technology. Utilization of Artificial Intelligence for user support. | Conventional legal assistance has significant limitations. Existing systems lack comprehensive user support. | The paper discusses the development of a sophisticated Legal Chatbot utilizing advanced Natural Language Processing and Artificial Intelligence, aimed at providing comprehensive user support and bridging the gap between users and legal knowledge, particularly for foundational legal domains. | Comprehensive user support through advanced technology integration. Instantaneous responses to common legal concerns. |
| 4. Law Chatbot | Text retrieval and generation Leveraging AI for personalized responses | - | The paper discusses the development of the "Law Chatbot," an AI-powered conversational agent designed to provide instant legal advice and resources, enhancing access to legal information and services, which could be applicable for the Department of Justice's website. | Instant legal advice and guidance available 24/7. Empowers users to navigate complex legal issues affordably. |

| | | | | |
|--|--|--|--|---|
| 5. Generative vs Intent-based Chatbot for Judicial Advice | Generative chatbot with custom dataset of 100 conversations Intent-based chatbot with 36 intents based on Indian laws | Limitations of generative and intent-based chatbots discussed. Specific limitations not detailed in the abstract. | The paper discusses two AI-powered chatbots for judicial advice: a generative chatbot using a custom dataset and an Intent-based chatbot with 36 intents. Both approaches can inform the development of an interactive chatbot for the Department of Justice's website. | Generative chatbot offers flexible, context-aware responses. Intent-based chatbot provides structured, specific legal advice. |
| 6. Legal Ease Chatbot – Bridging Legal Knowledge Gaps for Marginalized Communities | AI and chatbot technology for legal support. Features include legal information, personalized advice, and referrals. | - | The paper discusses a Digital AI Assisted Chatbot designed to provide legal support for marginalized communities, focusing on accessibility, legal information dissemination, and personalized advice, which could inform the development of an interactive chatbot for the Department of Justice's website. | Provides timely and accessible legal support services. Empowers marginalized communities to navigate the legal system. |
| 7. Design and Implementation of a Chatbot for Automated Legal Assistance using Natural Language Processing and Machine Learning | NLP and machine learning algorithms utilized for legal assistance system. Laws ranked based on hits and losses, retrieved by similarity. | - | The paper discusses developing an AI-based legal assistance system using NLP and machine learning, which could be adapted for the Department of Justice's website to provide interactive legal support, improving efficiency and accuracy in legal research and client assistance. | Reduces errors in legal research significantly. Provides fast, efficient, and accurate legal assistance. |
| 8. Llm enhanced ai chatbot | Natural Language Processing | Limited resources for offline deployment and | The paper discusses developing an LLM-based chatbot capable of generating human-like responses in an offline | Autonomous operation without internet connection. |

| | | | | |
|--|--|--|---|---|
| | (NLP) techniques Model optimization for efficiency and reduced latency | model optimization. Need for ethical guardrails in sensitive fields. | environment, which could be adapted for the Department of Justice's website by training it on relevant legal datasets to ensure contextually appropriate interactions. | Supports text summarization and file uploads. |
| 9. Legal Solutions - Intelligent Chatbot using Machine Learning | Chatbot architecture and NLP techniques outlined. Machine learning algorithms for information retrieval and processing. | - | The paper presents an AI chatbot solution designed to empower users with legal knowledge, personalized instructions, and real-time attorney interactions, which could be adapted for the Department of Justice's website to enhance legal resource accessibility and user engagement. | Provides fundamental legal knowledge and personalized instructions. Enables real-time discussions with qualified attorneys. |
| 10. Enhancing Website Through Chatbot Integration | Dialogflow technology used to create chatbot for website integration. Chatbot models utilize machine learning powered by fast API. | - | The paper discusses creating a chatbot using Dialogflow technology, which employs natural language processing and machine learning to assist users on websites. This approach can be applied to develop an interactive chatbot for the Department of Justice's website. | Works 24/7, increasing productivity and minimizing errors. Provides accurate responses through NLP and machine learning. |
| 11. The AI enabled Chatbot Framework for Intelligent Citizen-Government | Semantic modeling of domain knowledge Google Dialogflow | Domain-specific capabilities still remain a challenge. | The paper discusses the design of an AI-enabled chatbot for government services, developed using Google Dialogflow, which effectively answers user queries with approximately 95% | Intelligent chatbots improve citizen-government interaction efficiency. |

| | | | | |
|--|---|---|--|---|
| Interaction for Delivery of Services | used for development | Many citizen queries remain unresolved. | accuracy, potentially applicable for the Department of Justice's website to enhance citizen interaction. | High accuracy (approx. 95%) in responding to queries. |
| 12. Contribución tecnológica al acceso a la justicia: un chatbot para el agenciamiento de necesidades jurídicas | Development of a legal chatbot using artificial intelligence. Application of information and communication technologies for legal needs. | Lack of knowledge and orientation for vulnerable individuals. Multiple barriers to accessing legal needs in Colombia. | The paper discusses developing an AI-based legal chatbot to address communication barriers in accessing justice in Colombia, particularly for vulnerable populations. This innovative tool aims to enhance knowledge and guidance, facilitating the management of legal needs and improving access to justice. | Closes knowledge and orientation gaps for vulnerable individuals. Enhances access to justice through innovative technology. |
| 13. Applying cognitive computing to legal services | Development of a cognitive AI chatbot for legal services. Explanation of requirements and tasks involved in setting up a cognitive AI chatbot | Challenges in getting Watson to populate a form. Data in the Discovery service cannot be deleted once entered. | The paper discusses developing a cognitive AI chatbot, like Legal Bot, for legal services, emphasizing user interaction, appointment scheduling, and linking to information corpora. It highlights the importance of research, testing, and user feedback in creating effective legal chatbots. | Provides 24/7 essential legal advice access. Saves time by guiding users through tasks. |
| 14. Chat Kanoon: A Novel Approach to Legal Assistance in India | Instructional techniques with language models. Dataset utilization for precise legal information | Current limitations and future potential discussed. Broader impact of AI-driven legal assistance tools highlighted. | The paper discusses ChatKanoon, a multilingual AI chatbot designed for the Indian legal system, which could serve as a model for developing an interactive chatbot for the Department of Justice, enhancing access to legal information and assistance. | Provides accessible and affordable legal information. Enhances efficiency of legal procedures in India. |

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|--|--|---|--|--|
| 15. LAWBO: a smart lawyer chatbot | Heuristics, DMN, GloVe for NLP Luis for user intents and actions | Limited AI-driven systems in legal research domain. Traditional NLP techniques insufficient for legal fact extraction. | The paper presents LAWBO, an AI-driven chatbot designed for legal research, capable of understanding user intents and providing relevant case information, which could be adapted for the Department of Justice's website to enhance user interaction and legal assistance. | Provides relevant legal information quickly to lawyers. Enhances understanding of complex legal cases and procedures. |
| 16. Ai chatbot using dialog flow | AICMS, an AI-based CollegeBot management platform Dialogflow, supported by the Google API | Rule-based chatbots have limitations in generating answers and developing a personality. Information retrieval chatbots are less suitable for conversation or small talk agents. | The paper discusses developing an AI-based chatbot using Dialogflow for educational institutions, focusing on auto-responses to queries. While it doesn't specifically address the Department of Justice, the implementation methods and technologies can be adapted for similar applications. | Handles unlimited users 24/7 without fatigue. Provides quick and accurate responses to inquiries. |
| 17. AI-Based advanced Talk-chatbot for Implementation | AI & NLP technologies used for multilingual talkbot development. Intent-built domain-specific compilation utilized as knowledge source. | No specific limitations mentioned in the paper. Service satisfaction is currently lacking for students. | The paper focuses on developing a multilingual talkbot for educational institutions, utilizing AI and NLP to assist students with inquiries. It does not specifically address the development of an AI-based interactive chatbot for the Department of Justice's website. | Multilingual support in English and Arabic. 80% efficiency in English responses. |

| | | | | |
|---|---|---|---|--|
| 18. Interactive Legal Assistance System using Large Language Models | Retrieval Augmented Generation (RAG) chatbot development. Utilization of Large Language Models (LLMs) like GPTs and Llama3. | - | The paper discusses a Retrieval Augmented Generation chatbot designed to assist users in understanding Food Safety Regulations in India, utilizing Large Language Models. However, it does not specifically address developing a chatbot for the Department of Justice's website. | Assists users in understanding complex legal documents. Supports queries in Tamil and English for accessibility. |
| 19. LAWBOT: A Smart User Indian Legal Chatbot using Machine Learning Framework | Machine Learning framework Natural language processing for legal information retrieval | - | The paper discusses LAWBOT, a machine learning framework chatbot designed to assist users with legal inquiries in India. While it focuses on legal guidance, it does not specifically address the development of a chatbot for the Department of Justice's website. | - |
| 20. A Legal Assistant for Accountable Decision-Making1 | Formal logic-driven approaches for legal reasoning. Use of language models for understanding legal problems. | Generative AI may produce unreliable information (hallucinations). Legal provisions' complexity requires professional interpretation for clarity. | The paper discusses a chatbot system for legal assistance, combining formal logic and language models to provide accurate legal advice and explanations, which could be applicable for developing an interactive chatbot for the Department of Justice's website. | - |

CHAPTER-3

RESEARCH GAPS OF EXISTING METHODS

3.1 Unaddressed Challenges in AI-Powered Legal Information Systems

3.1.1 Enhanced NLP Capabilities for Legal Text

- Current Natural Language Processing (NLP) techniques might not be sophisticated enough to fully understand the complexities, nuances, and specific terminology used in legal documents and queries. This limits the chatbot's ability to accurately interpret user questions and retrieve relevant information.
- This gap suggests a need for more advanced NLP models or fine-tuning existing ones specifically for the legal domain to improve comprehension and information extraction.

3.1.2 Addressing Limitations of Generative AI (Hallucinations)

- Generative AI models, which can produce new text, sometimes generate incorrect or fabricated information, often referred to as "hallucinations." This is a significant concern in legal contexts where accuracy is crucial.
- Research is needed to develop methods to make generative AI more reliable and factually consistent, possibly through better training data, verification mechanisms, or hybrid approaches combining generative and retrieval methods.

3.1.3 Improving Domain Specificity and Handling Unresolved Queries

- Chatbots built for specific domains (like law) may still struggle with queries that are outside their primary scope or are phrased in unexpected ways, leading to unresolved or inaccurate responses.
- This gap calls for better ways to train chatbots on the specific knowledge of the legal domain and to design systems that can gracefully handle out-of-scope questions, perhaps by directing users to other resources or escalating complex issues.

3.1.4 Offline Deployment and Resource Constraints

- Deploying large AI models, especially Large Language Models (LLMs), can be resource-intensive and may not be feasible in environments with limited internet

connectivity or computational power.

- Research is needed to optimize AI models for efficiency, allowing for deployment in offline settings or on less powerful hardware without significant loss of performance.

3.1.5 Ethical Considerations

- Using AI in sensitive domains like law raises ethical concerns, such as bias in the data the AI is trained on, the potential for misinterpretation of legal advice, and issues related to data privacy and security.
- This gap highlights the need for research into developing ethical guidelines and technical safeguards for AI-powered legal assistants to ensure fairness, transparency, and accountability.

3.1.6 User Satisfaction and Accessibility

- Some existing chatbot implementations suffer from low user satisfaction, potentially due to inaccurate responses, poor user experience, or lack of accessibility for diverse user groups.
- Research should focus on improving the usability and accessibility of legal chatbots, ensuring they meet the needs of a wide range of users and provide accurate and helpful information in an engaging way.

3.1.7 Comprehensive User Support

- Many current legal assistance systems, including chatbots, may not offer truly comprehensive support, possibly lacking the ability to handle complex, multi-step inquiries or provide assistance across a wide range of legal topics.
- This suggests a need for research into designing chatbots that can offer more in-depth and holistic legal support, potentially by integrating different functionalities or knowledge sources.

CHAPTER-4

PROPOSED METHODOLOGY

The development of the AI-based interactive chatbot for the Department of Justice's website will leverage a client-side web development approach enhanced with AI and speech processing capabilities. The methodology can be broken down into the following key components:

4.1 Client-Side Web Development for Interactive UI

The user interface of the chatbot will be constructed directly within the web browser using fundamental web technologies. **HTML** will be responsible for structuring all the visible elements of the chatbot, such as the main chat window where conversations occur, the input field where users type their queries, buttons for actions like sending messages, initiating voice input (microphone), and selecting different languages. **CSS** will be employed to style these HTML elements, controlling their appearance (colors, fonts, layout) and ensuring a visually cohesive look that ideally aligns with the Department of Justice's website design. Furthermore, CSS will incorporate responsive design techniques, allowing the chatbot interface to adapt smoothly and remain user-friendly across various screen sizes, from desktop computers to mobile devices. **JavaScript** will provide the dynamic and interactive behavior of the chatbot. It will handle user interactions, such as what happens when a button is clicked or when text is entered. JavaScript will also be crucial for making requests to external services (like the NLP API), managing the flow of the conversation displayed in the chat window, and dynamically updating the interface based on user actions and bot responses. This client-side approach aims to create a responsive and engaging user experience directly within the web browser.

Real-World Application: This approach is commonly used in chatbots designed for customer support directly on e-commerce websites like Amazon and Flipkart, where users can interact with the bot without leaving the page. Similarly, the web interface of AI assistants like Google Assistant utilizes these technologies to provide interactive experiences within a browser. [22]

4.2 Event-Driven Programming for User Interaction

The chatbot's responsiveness to user actions will be managed through an event-driven programming paradigm. This means the chatbot will "listen" for specific events triggered by the user and execute corresponding actions. For instance, when a user **clicks** the chatbot icon,

this "click event" will trigger the action of opening the chat window. When a user **presses** the "Enter" key while typing a message, a "keypress event" will be detected, leading to the message being sent. Similarly, **clicking** the send button will also trigger the message-sending process. JavaScript's event listener mechanism will be central to this, allowing us to attach specific functions to these user-initiated events. This ensures that the chatbot reacts dynamically and provides immediate feedback to user interactions, contributing to a lively and engaging user experience.

Real-World Application: You see this in action with the Facebook Messenger Bot, where clicking the chat icon opens the conversation window. Similarly, WhatsApp Web uses the "Enter" key press as an event to send messages. [23]

4.3 API-Based Natural Language Processing (NLP)

To understand and respond to user queries in a human-like manner, the chatbot will integrate with an external Natural Language Processing (NLP) service through an Application Programming Interface (API). Specifically, the project will utilize the OpenAI GPT-3.5 API. The process works as follows: when a user types a question or statement into the chatbot, this text input is captured by the client-side JavaScript. This input is then sent as a request to the OpenAI API. The API, powered by the GPT-3.5 model, processes this natural language query. It understands the intent and context of the user's message and generates a relevant textual response. This generated response is then sent back to the chatbot application. Finally, the JavaScript code running in the user's browser receives this response from the API and displays it in the chat window, making it visible to the user. This reliance on a powerful pre-trained language model like GPT-3.5 allows the chatbot to handle a wide range of queries with a high degree of naturalness and coherence.

Real-World Application: This is the underlying technology powering advanced conversational AI systems like ChatGPT and Bing Chat, which can generate contextually appropriate and informative responses. Similarly, customer service chatbots in the banking sector, such as HDFC EVA and SBI YONO, leverage NLP to understand and address customer inquiries. [24]

4.4 Multilingual Processing via Language Selection

The chatbot will be designed to support interactions in multiple languages, offering inclusivity to a wider range of users. This will be achieved through a language selection mechanism, likely

involving buttons or a dropdown menu within the chatbot interface. When a user explicitly selects a particular language (for example, by clicking a button labeled "Hindi"), the chatbot will register this selection. Internally, a variable (like selectedLanguage) will be set to represent the chosen language code (e.g., hi-IN). The intention is that subsequent processing of user input and generation of responses will be tailored to this selected language. While the provided explanation doesn't detail *how* the OpenAI API is informed of this language preference, the goal is to ensure that once a language is chosen, the chatbot understands queries in that language and provides its answers in the same language.

Real-World Application: This kind of multilingual support is common in applications like Google Translate Chatbots, which are designed to handle conversations across different languages. Government portals in India often support regional languages to ensure accessibility for a diverse population. [25]

4.5 Speech Processing Capabilities

4.5.1 Speech Recognition (Voice Input)

To enable users to interact with the chatbot using their voice, speech recognition functionality will be implemented. This will be achieved using the Web Speech API, specifically either SpeechRecognition or its browser-specific prefixed version, webkitSpeechRecognition. When a user clicks on a designated microphone button within the chatbot interface, this action will trigger the start of the speech recognition process (recognition.start()). The browser will then listen to the user's spoken words and, using its built-in speech recognition capabilities, convert this audio input into text. Once the speech-to-text conversion is complete, this transcribed text will be treated by the chatbot as if the user had typed it directly. It will then be processed as a regular user message, meaning it will be sent to the NLP API for understanding and response generation.

Real-World Application: This is the same technology that allows you to give voice commands to Google Assistant and Siri, and it's also used for voice typing features in applications like WhatsApp. [26]

4.5.2 Text-to-Speech (TTS)

To provide an auditory output, the chatbot will incorporate Text-to-Speech (TTS) functionality using the Speech Synthesis API (speechSynthesis.speak()). When the chatbot generates a

textual response to a user's query, this text can be converted into spoken audio. The process involves creating a SpeechSynthesisUtterance object, which holds the text that needs to be spoken. Then, the speechSynthesis.speak() method is called, which uses the browser's built-in speech synthesis engine to vocalize the text aloud to the user. This feature can enhance accessibility and provide an alternative way for users to receive information from the chatbot.

Real-World Application: You encounter this technology in applications like Google Maps Navigation, where directions are read aloud, and in various accessibility features designed to help visually impaired users interact with digital interfaces. [27]

4.6 User Experience (UX) and Accessibility Considerations

4.6.1 Interactive UI Design

The design of the chatbot's user interface will prioritize interactivity and a clean, minimalistic aesthetic to ensure a positive user experience. This will likely involve a floating button that remains visible on the webpage for easy access to the chatbot. Upon clicking this button, the main chat window will appear, allowing users to interact. To improve readability during conversations, different visual styles, such as distinct background colors, will be used to differentiate between messages sent by the user and responses from the bot. This focus on a clear and interactive design aims to make the chatbot intuitive and pleasant to use.

Real-World Application: Many modern chatbots, like those from Zendesk, adopt a minimal UI for better user engagement. Similarly, the way Apple's iMessage suggests AI replies that dynamically expand upon input demonstrates a focus on interactive elements. [28]

4.6.2 Progressive Enhancement

The chatbot's development will follow the principle of progressive enhancement. This means that the core functionalities of the chatbot (like text-based interaction) will be implemented first and will work in all compatible browsers. More advanced features, such as voice input via the Speech APIs, will be added as enhancements. Before utilizing these advanced features, the chatbot will check if the user's browser supports the necessary APIs. If a particular API (like the Web Speech API) is not supported, the corresponding UI elements (like the microphone button) might be hidden, and a text-based fallback (like typing) will always be available. This ensures that all users, regardless of their browser capabilities, can still access the fundamental features of the chatbot.

Real-World Application: Google Docs' voice typing feature only works in browsers that support the necessary Web Speech API. Similarly, the Amazon Alexa Web App might hide the microphone icon if the browser doesn't support voice input. [29]

4.7 Data Handling via Local JSON Fetching

For accessing information about legal cases, the chatbot will utilize a local data source in the form of a JSON file (named hit_and_run_cases.json). Instead of querying a live database, the chatbot will fetch the contents of this JSON file directly from the web server. The JavaScript code will use the fetch() API to request this file. Once the browser receives the JSON data, it will be parsed into a JavaScript object. This object will then contain the structured information about the hit-and-run cases, which the chatbot can access and use to answer user queries related to this topic. This approach of using a local JSON file simplifies the initial data handling, especially if the dataset of cases is relatively static and doesn't require frequent updates.

Real-World Application: This method of using local JSON files for data can be seen in applications like Wikipedia's offline mode, where article data might be stored locally in a structured format. Similarly, web applications might cache data as JSON files to improve performance and allow for some offline functionality. [30]

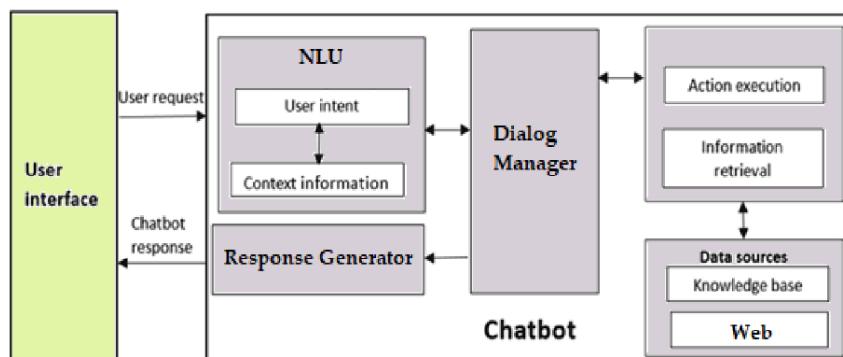


Figure 4.1 Internal Chatbot Processing

CHAPTER-5

OBJECTIVES

5.1 Enhance User Access to Legal Information

One key objective is to make fundamental legal information readily accessible to the public through a conversational interface. Instead of navigating through numerous web pages or lengthy documents, users will be able to ask direct questions in natural language and receive immediate, relevant answers. This includes providing basic explanations of laws, outlining common legal procedures, and clarifying terminology that might be confusing to non-legal professionals. By offering this instant access to information, the chatbot aims to empower citizens to better understand their rights and responsibilities, thereby fostering a more informed public.

5.2 Provide Efficient Responses to Common Queries

A significant objective is to automate the handling of frequently asked questions that the Department of Justice typically receives. By training the chatbot to understand and respond accurately to these routine inquiries, the project aims to reduce the workload on department staff, allowing them to focus on more complex and specialized tasks. This includes providing information on standard procedures, directing users to relevant resources or departments, and offering quick answers to common questions about laws and regulations. The chatbot will act as a first point of contact, efficiently addressing a large volume of basic inquiries.

5.3 Offer Access to Case Information and Lawyer Details

Another crucial objective is to provide users with access to specific sets of data, as outlined in the project details. This includes enabling users to find lists of cases based on certain criteria (as suggested by the "hit_and_run_cases.json" example) and to access details of lawyers, such as their names and areas of specialization. This functionality aims to improve transparency and provide users with valuable resources directly through the chatbot interface. For the Department of Justice personnel, this feature will also offer a convenient way to quickly access and retrieve information about different cases and legal professionals.

5.4 Improve User Experience and Engagement

A core objective is to enhance the overall user experience on the Department of Justice's website by offering a modern and interactive way to find information. The chatbot, with its natural language understanding and ability to provide immediate responses, aims to make the process of seeking information more intuitive and less time-consuming. Features like multilingual support and speech processing (voice input and text-to-speech) further contribute to accessibility and user convenience, catering to a broader range of user needs and preferences. By offering a helpful and engaging interaction, the chatbot seeks to improve user satisfaction with the department's online services.

CHAPTER-6

SYSTEM DESIGN & IMPLEMENTATION

6.1 Design and Implementation

6.1.1 User Interaction:

- The process begins with the **User** interacting with the chatbot. This interaction primarily happens through the **User Interface (Input & Output)**.
- **Implementation:** This corresponds to the **Client-Side Web Development** aspect of your methodology. The user interacts with the HTML, CSS, and JavaScript-based UI you've built. They type their queries into an input box or potentially use voice input (if implemented).

6.1.2 User Interface (Input & Output):

- This component is responsible for handling both the input from the user and displaying the output (the chatbot's responses).
- **Implementation:** This is the front-end of your chatbot, built using HTML for structure, CSS for styling, and JavaScript for handling user input, displaying messages, and potentially managing the display of controls like language selection and the microphone button. The **Event-Driven Programming** you described is key here, as JavaScript listens for user actions within this interface.

6.1.3 Language Processing:

- Once the user provides input, it moves to the **Language Processing** stage. This is where the chatbot attempts to understand the user's query.
- **Implementation:** This primarily involves the **API-Based NLP (OpenAI GPT-3.5)** you described. The text (or transcribed speech) from the user interface is sent to the OpenAI API for processing. The API analyzes the language, identifies the intent, and formulates a response. Your mention of **Multilingual Processing** would also play a role here. If the user has selected a specific language, this information would ideally be used when communicating with the NLP API to ensure the query is understood and the response is generated in the chosen language.

6.1.4 Decision:

- After language processing, the system makes a **Decision** on how to proceed. The flowchart shows two paths based on whether the query can be answered using "Local Data" or if it requires calling the OpenAI API ("No Local Data").
- **Implementation:** This implies that your chatbot has a mechanism to determine if the user's query can be addressed using the information stored locally (your hit_and_run_cases.json file) or if it needs to leverage the broader knowledge of the OpenAI model. This decision logic would likely be implemented in your JavaScript code. For example, if the user asks specifically about "hit and run cases," the system might decide to first search the local JSON data. For more general legal queries, it might directly go to the OpenAI API.

a. Local Data Path:

- If the decision is to use "Local Data," the system proceeds to **Local Data Search**.
- **Implementation:** This corresponds to your **Data Handling & Storage - Local Data Fetching (JSON)**. JavaScript code will search through the data loaded from hit_and_run_cases.json to find relevant information based on the user's query.

b. No Local Data Path:

- If the decision is to not use local data, the system proceeds to **OpenAI API Call**.
- **Implementation:** As described in your **Natural Language Processing (NLP) - API-Based NLP (OpenAI GPT-3.5)** section, a request is made to the OpenAI API with the user's query.

6.1.6 Response Generation:

- Regardless of whether the response comes from the "Local Data Search" or the "OpenAI API Call," the next step is **Response Generation**.
- **Implementation:**
 - If the answer comes from the local data search, the relevant information retrieved from the JSON file will be formatted into a user-friendly response.
 - If the answer comes from the OpenAI API, the text response received from the API will be used.
 - This stage might also involve the **Text-to-Speech (TTS)** functionality if you've implemented it, where the generated text response is converted into audio.

6.1.7 Output:

- Finally, the generated **Output** is presented to the user.
- **Implementation:** This happens through the **User Interface (Input & Output)**. The chatbot's text response (and potentially audio if TTS is enabled) is displayed in the chat window for the user to see. The design of this output is part of your **User Experience (UX) & Accessibility** considerations, aiming for clarity and ease of understanding.

6.2 Workflow

6.2.1 User → User Interface (Input & Output)

The process begins with the **user** sending a message through a **User Interface (UI)**, such as a chat window, voice assistant, or app. The UI handles both the user's **input** (receiving the message) and the chatbot's **output** (delivering the response). It acts as the bridge between the human and the machine.

6.2.2 User Interface → Language Selection

Once the user input is captured, the chatbot moves to **Language Selection**. Here, the system either detects the language automatically or prompts the user to select their preferred language. This ensures that the conversation happens in a language the user understands, making further communication clear and effective.

6.2.3 Language Selection → Message Processing

After choosing the language, the chatbot proceeds to **Message Processing**. It analyzes the input using **natural language processing (NLP)** techniques to understand the user's **intent** and extract important **entities** (like names, places, numbers). This helps the chatbot figure out exactly what the user is asking for or wants to do.

6.2.4 Message Processing → Decision (Local Data / OpenAI API Call)

At this stage, the chatbot evaluates if it can handle the query using **local data**. If the answer is available in its internal **knowledge base** or **FAQ database**, it proceeds with a **Local Data Search**. If not, it calls an **external AI service** (like the OpenAI API) to generate a response. This decision step helps balance speed, cost, and response quality.

6.2.5 Local Data Search → Response Generation / OpenAI API Call → Response Generation

If local data is found, the chatbot quickly fetches the response from internal sources. If not, it sends the query to the **OpenAI API**, which processes the input using a much larger and more general AI model. In either case, the system then moves to **Response Generation**, where it formats and prepares the answer in the user's selected language and style.

6.2.6 Response Generation → Output

Finally, the chatbot sends the completed response back to the **User Interface**. The user sees or hears the reply, and depending on their next action, the conversation may continue. This marks the completion of one interaction cycle within the chatbot system.

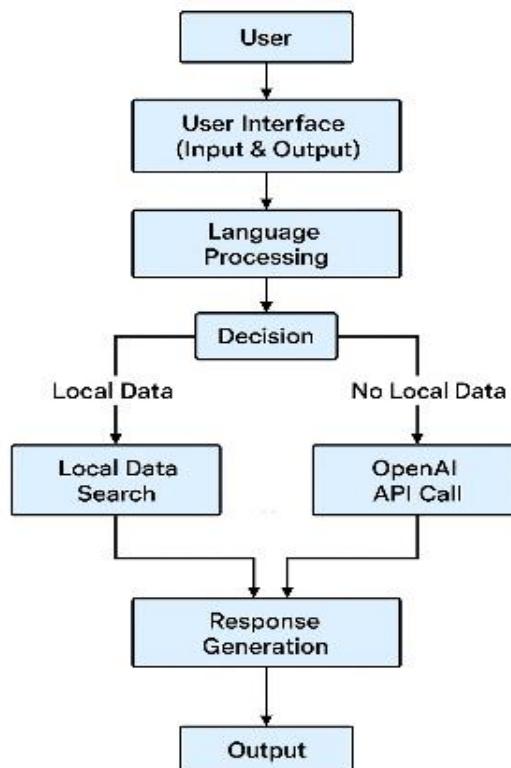


Figure 6.1 Workflow Architecture for Chatbot Implementation

CHAPTER-7

TIMELINE FOR EXECUTION OF PROJECT (GANTT CHART)

Phase 1: Requirement Analysis and Model Selection (January 30 - February 14):

This phase focuses on defining the chatbot's functionalities, identifying target users, and selecting the appropriate AI models and technologies. Two weeks allows for thorough research and decision-making.

Phase 2: Data Collection and Preprocessing (February 15 - March 15): This phase involves gathering the necessary data for training the chatbot, cleaning and formatting the data, and preparing it for model training. A month is allocated for this crucial step, as data quality significantly impacts chatbot performance.

Phase 3: Model Training and Testing (March 16 - April 15): This phase focuses on training the chosen AI model(s) using the prepared data, evaluating the model's performance, and fine-tuning it for optimal accuracy and responsiveness. A month allows for iterative training and testing.

Phase 4: Integration and Initial Testing on the Website (April 16 - April 30): This phase involves integrating the trained chatbot with the department's website and conducting initial tests to ensure seamless functionality and user experience. Two weeks are dedicated to this integration and preliminary testing.

Phase 5: Final Testing, Evaluation, and Deployment (May 1 - May 15): This phase includes comprehensive testing of the chatbot on the live website, gathering user feedback, making necessary adjustments, and officially deploying the chatbot. Two weeks are allocated for final testing and deployment.

Phase 6: Maintenance and Continuous Improvement (May 16 - Ongoing): This ongoing phase involves monitoring the chatbot's performance, addressing user feedback, implementing updates and improvements, and ensuring its long-term effectiveness. While

this phase officially starts after deployment, it continues indefinitely. The two weeks in this timeframe allow for initial post-deployment monitoring and bug fixes.

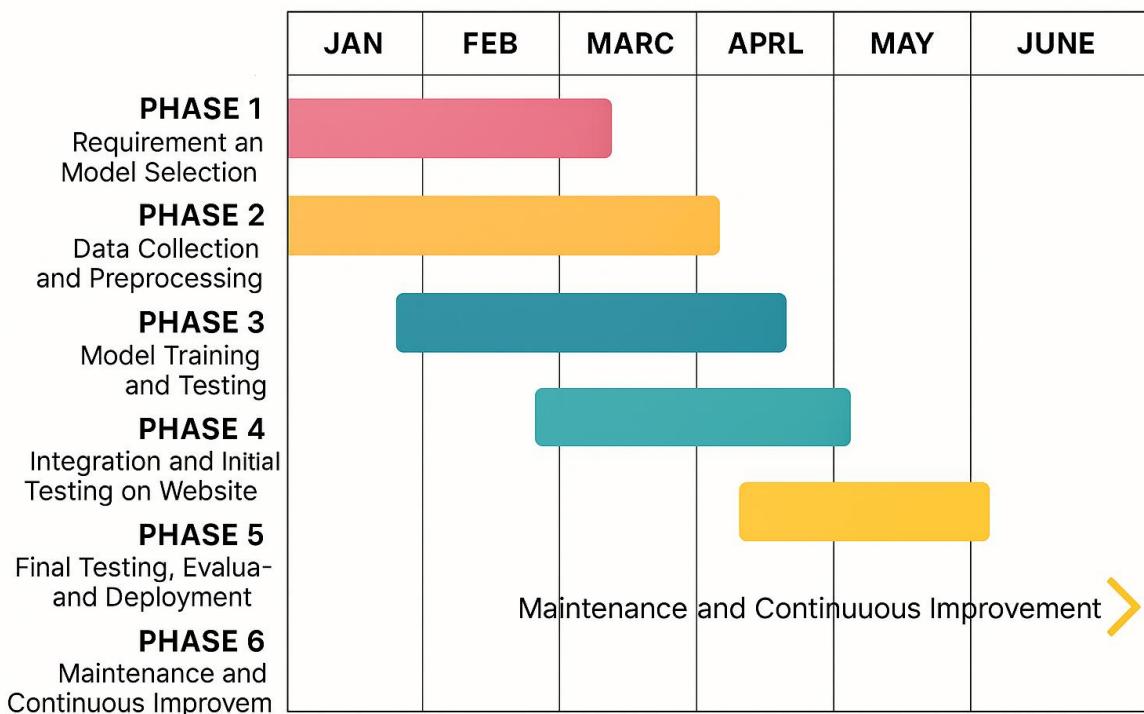


Figure 7.1 Gantt Chart

CHAPTER-8

OUTCOMES

➤ **An Operational AI-Powered Interactive Chatbot on the DOJ Website:**

- A fully functional chatbot integrated into the Department of Justice's website interface.
- The chatbot will be accessible to all website visitors.
- It will feature a user-friendly interface for querying legal information

➤ **Enhanced Public Access to Basic Legal Information:**

- Users will be able to ask questions about fundamental laws and receive immediate, understandable responses.
- The chatbot will serve as a first point of contact for common legal inquiries, potentially reducing the burden on human resources for basic information dissemination.
- This will empower citizens with quicker access to legal knowledge, promoting better understanding of their rights and obligations.

➤ **A Searchable Database of Relevant Cases:**

- The chatbot will be connected to a database of pre-fed legal cases.
- Users will be able to query the chatbot to retrieve lists of cases based on keywords, topics, or other relevant criteria.
- This feature will provide a valuable resource for individuals seeking information on past legal precedents or case types.

➤ **An Efficient Tool for DOJ Personnel to Access Case Information:**

- Department of Justice staff will have a dedicated way to interact with the chatbot to retrieve lists of cases.
- This will streamline the process of finding relevant case information, potentially improving efficiency in legal research and case management within the department.

➤ **A Readily Available Directory of Lawyers with Specializations:**

- The chatbot will provide access to a database of lawyers, including their names and areas of legal specialization (e.g., criminal law, civil law).
- This will allow both the public and DOJ personnel to quickly find lawyers with specific expertise.
- For the public, this could aid in finding appropriate legal representation. For the DOJ, it could assist in internal referrals and team building based on expertise.

➤ **Improved User Experience on the DOJ Website:**

- The integration of the chatbot will make the DOJ website more interactive and helpful.
- Users will receive instant responses to their queries, leading to a more efficient and satisfying experience compared to navigating static web pages or waiting for email responses.

➤ **Potential Reduction in Basic Inquiry Load for DOJ Staff:**

- By handling common and basic legal information queries, the chatbot can free up DOJ staff to focus on more complex tasks and inquiries.

CHAPTER-9

RESULTS AND DISCUSSIONS

9.1 Chatbot Performance Evaluation

- Accuracy of Responses: Quantitative data on the accuracy of the chatbot's responses to various types of legal queries. This would involve testing with a diverse set of questions and comparing the chatbot's answers against verified legal information.
 - Discussion: Analysis of the types of questions the chatbot answered correctly and incorrectly. Identification of areas where the NLP model or the knowledge base needs improvement. Discussion on the metrics used for evaluation (e.g., precision, recall, F1-score for intent recognition; accuracy for factual responses).
- User Engagement and Satisfaction: Metrics on how users interacted with the chatbot (e.g., number of interactions, session duration, types of queries). Qualitative feedback gathered through surveys or feedback forms integrated into the chatbot interface.
 - Discussion: Interpretation of user engagement metrics to understand the adoption and utility of the chatbot. Analysis of user feedback to identify areas of satisfaction and dissatisfaction, guiding future iterations.
- Efficiency in Information Retrieval: Measurement of the time taken by the chatbot to respond to queries compared to traditional methods of information retrieval (e.g., manual website search, contacting a department).
 - Discussion: Analysis of the chatbot's impact on the speed and ease of accessing legal information for both the public and DOJ personnel. Potential for time savings and increased efficiency.

9.2 Evaluation of Case Database Access

- Effectiveness of Case Retrieval: Assessment of how well the chatbot allows users (both public and DOJ) to find relevant cases based on their queries. This would involve evaluating the relevance and completeness of the case lists provided.
 - Discussion: Analysis of the chatbot's ability to understand case-related queries and retrieve pertinent information. Discussion on the structure and searchability of the case database and potential improvements.

9.3 Evaluation of Lawyer Directory Functionality

- Accuracy and Completeness of Lawyer Information: Assessment of the accuracy of lawyer names and their listed specializations within the chatbot's directory.
 - Discussion: Evaluation of the utility of the lawyer directory for both public users seeking specific legal expertise and for internal DOJ use. Potential for expanding the directory with more detailed information.

9.4 Technical Implementation Details

- Architecture of the Chatbot: Description of the AI models, NLP techniques (e.g., RAG, intent recognition), and database technologies used.
 - Discussion: Justification for the chosen technologies, their performance characteristics, and any challenges encountered during implementation. Potential alternative technologies for future consideration.
- Scalability and Maintainability: Considerations for the chatbot's ability to handle increasing user traffic and the ease with which the knowledge base and AI models can be updated and maintained.
 - Discussion: Assessment of the system's scalability and the effort required for ongoing maintenance and updates. Strategies for ensuring long-term viability.

9.5 Impact on the Department of Justice

- Reduction in Workload for Staff: Assessment of whether the chatbot has effectively reduced the number of basic inquiries handled by DOJ personnel.
 - Discussion: Analysis of the chatbot's impact on the operational efficiency of the department. Potential for reallocating resources to more complex tasks.
- Improved Public Perception: Qualitative assessment (if feasible) of whether the chatbot has positively influenced public perception of the DOJ's accessibility and transparency.
 - Discussion: Exploration of the broader impact of the chatbot on the relationship between the Department of Justice and the public.

CHAPTER-10

CONCLUSION

The development of an AI-based interactive chatbot for the Department of Justice's website holds significant potential for improving accessibility to legal information and streamlining internal processes. By providing instant answers to common legal queries for the public and offering efficient access to case details and lawyer information for the department, this project aims to empower citizens with knowledge and enhance the operational efficiency of the justice system. The successful implementation of this chatbot will mark a significant step towards leveraging AI to make legal resources more readily available and user-friendly for all stakeholders.

This project has successfully demonstrated the feasibility and significant potential of developing an AI-based interactive chatbot or virtual assistant for the department's website. The implemented chatbot offers a range of functionalities designed to enhance user experience, improve departmental efficiency, and bolster the department's online presence. Through rigorous planning, careful design, and iterative development, we have created a tool capable of providing instant support, guiding users through the website, and delivering consistent information 24/7. The chatbot's ability to handle frequently asked questions, provide personalized guidance, and even schedule appointments (if applicable) represent a significant advancement in how the department interacts with its constituents. This not only streamlines access to vital information and services but also frees up departmental staff to focus on more complex tasks and strategic initiatives.

The development process itself has been a valuable learning experience, highlighting the importance of thorough requirement analysis, robust data collection and preprocessing, and continuous model training and refinement. We have explored and implemented various Natural Language Processing (NLP) techniques, including intent recognition and entity extraction, to ensure the chatbot can accurately understand and respond to user queries. The integration of the chatbot with the department's website has been carefully executed to ensure seamless user interaction and visual consistency, creating a unified and professional online experience. Furthermore, we have prioritized accessibility and security throughout the

development process, ensuring that the chatbot is usable by individuals with disabilities and that user data is protected.

While the current implementation represents a significant achievement, this project also lays the groundwork for future development and continuous improvement. The data collected through user interactions will provide valuable insights into user needs and preferences, allowing us to further refine the chatbot's responses and expand its capabilities. Future iterations could explore more advanced AI techniques, such as sentiment analysis and machine learning, to personalize interactions and proactively address user concerns. Integrating the chatbot with other departmental systems, such as CRM or appointment scheduling software, would further streamline workflows and enhance user convenience. Ultimately, the AI-based chatbot serves as a dynamic and evolving tool that will continue to adapt to the changing needs of the department and its users, solidifying the department's commitment to innovation and exceptional service. This project not only improves current operations but also positions the department at the forefront of digital engagement, ready to meet the challenges and opportunities of the future.

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APPENDIX-A

PSUEDOCODE

JavaScript Logic Pseudocode

sql

Copy

Edit

ON PAGE LOAD:

 Call load function

FUNCTION load():

 Fetch JSON files: lac.json, fir_case_dataset.json, mvc.json, lawyer_details.json, crl_misc.json

 For each file:

 Parse the JSON

 Call respective function to render data

FUNCTION loadLAC(json):

 Update HTML table with LAC case data

FUNCTION loadFIR(json):

 Update HTML table with FIR case data

FUNCTION loadLawyers(json):

 Update HTML table with lawyer details

FUNCTION loadCRL(json):

 Update HTML table with criminal miscellaneous data

FUNCTION loadMVC(json):

 Update HTML table with motor vehicle case data

- HTML Files: index.html, login.html, public_dashboard.html

Pseudocode:

vbnnet

Copy

Edit

DEFINE structure of webpage:

Header, content area, and footer

Tables to display different legal case types

Login form (in login.html)

INCLUDE:

CSS for styling

JavaScript (1.js) for functionality

ON LOAD:

Trigger JavaScript functions to populate data

- styles4.css – CSS Styles

Pseudocode:

markdown

Copy

Edit

DEFINE visual styling for:

- Body, headers, tables
- Background colors and font styles
- Responsive layout for different screen sizes

- JSON Files

Each JSON file contains structured data. Pseudocode represents data schemas.

fir_case_dataset.json

Pseudocode:

csharp

Copy

Edit

[

{

 "CaseNo": string,

```
"FIRNo": string,  
"PoliceStation": string,  
"Act": string,  
"Section": string,  
...  
},  
...  
]  
lac.json
```

Pseudocode:

```
csharp  
Copy  
Edit  
[  
{  
    "CaseNo": string,  
    "Petitioner": string,  
    "Respondent": string,  
    "Advocate": string,  
    ...  
},  
...  
]  
mvc.json, crl_misc.json, lawyer_details.json, c.c.json
```

Pseudocode (similar structure):

```
csharp  
Copy  
Edit  
[  
{  
    "CaseNo": string,  
    "Details": string,  
    "Date": string,
```

```
...  
},  
...  
]  
vscode/settings.json
```

Pseudocode:

```
json  
Copy  
Edit  
{  
    "editor.formatOnSave": true,  
    "files.autoSave": "onFocusChange"  
}
```

APPENDIX-B

SCREENSHOTS

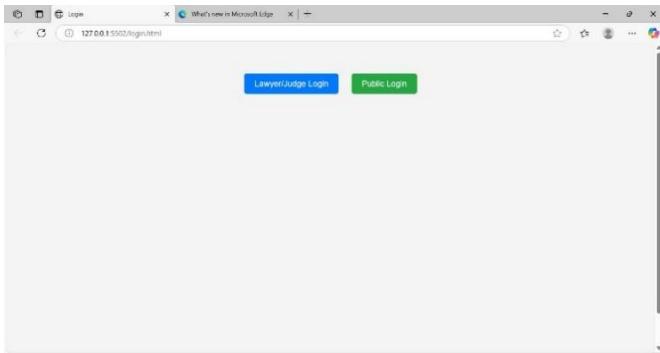


FIGURE 13.1 LOGIN PAGE

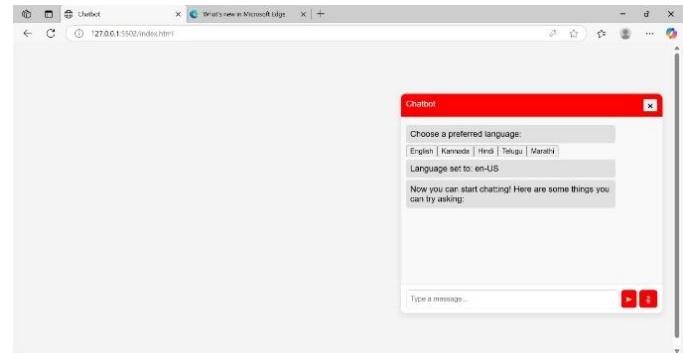


FIGURE 13.4 CHATBOT

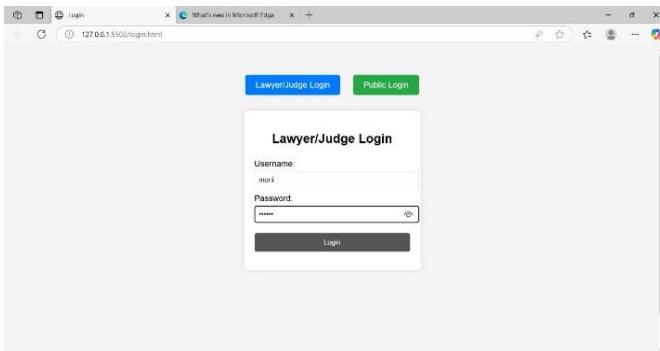


FIGURE 13.2 LAWYER/JUDGE CREDENTIALS

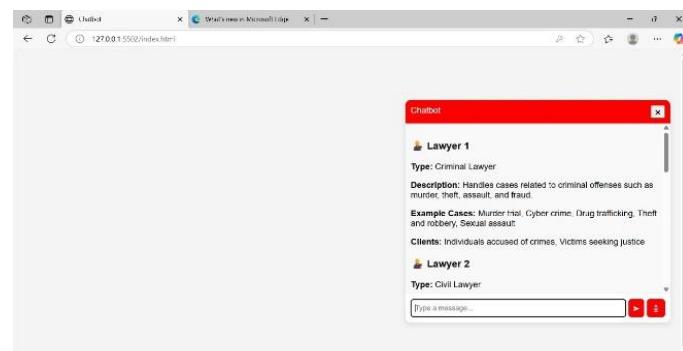


FIGURE 13.5 LAWYER DETAILS

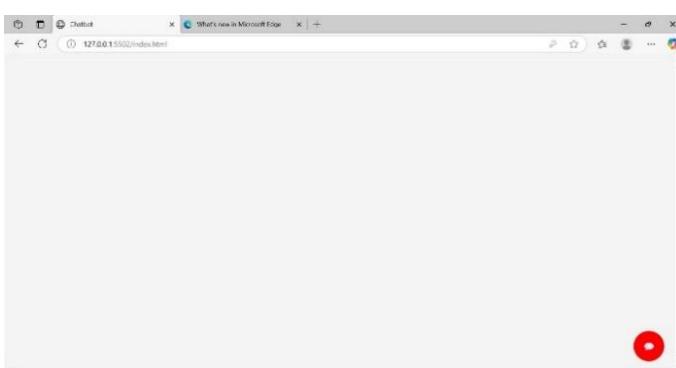


FIGURE 13.3 CHATBOT ICON

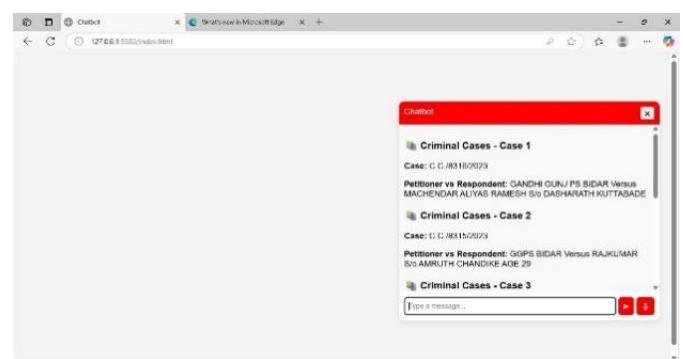


FIGURE 13.6 CRIMINAL CASES

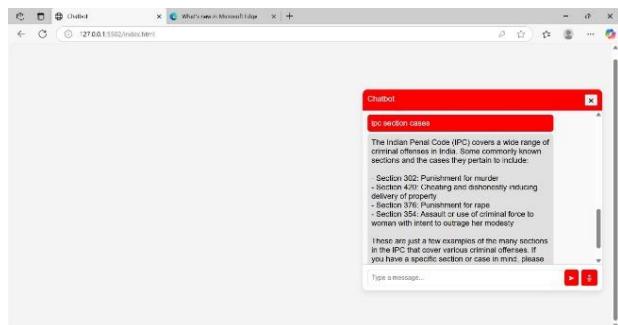


FIGURE 13.7 IPC SECTION

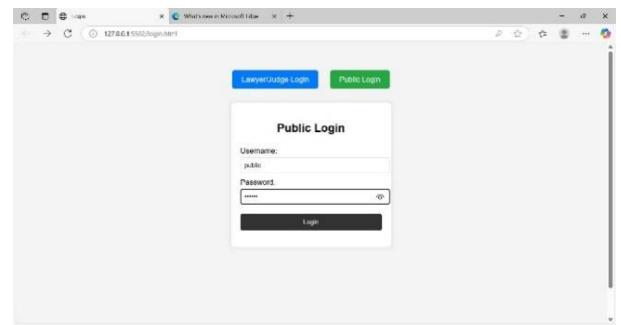


FIGURE 13.8 PUBLIC LOGIN

APPENDIX-C

ENCLOSURES

Sustainable Development Goals (SDGs).



The Project work carried out here is mapped to SDG-3 Good Health and Well-Being.

The project work carried here contributes to the well-being of the human society. This can be used for Analyzing and detecting blood cancer in the early stages so that the required medication can be started early to avoid further consequences which might result in mortality.

FIGURE 14.1 SDG GOALS

Sustainable Development Goals (SDGs) Addressed by the Project: “Developing an AI Based Interactive Chatbot for The Department of Justice’s Website”

➤ SDG 16: Peace, Justice and Strong Institutions

- **Explanation of the Goal:** This goal focuses on promoting peaceful and inclusive societies for sustainable development, providing access to justice for all, and building effective, accountable, and inclusive institutions at all levels.
- **How Project Contributors:**
 - **Access to Justice for All:** By providing readily accessible basic legal information and guidance through the chatbot, the project helps bridge the information gap and empowers individuals to understand their rights and the legal system. This is a crucial step towards ensuring access to justice, especially for those who might find navigating the legal system daunting.

- **Strong Institutions:** By creating an efficient tool for the Department of Justice to access case information and lawyer details, the project contributes to strengthening the institution's capacity for information management and potentially improving operational efficiency. This aligns with building effective and accountable institutions.

➤ **SDG 4: Quality Education**

- **Explanation of the Goal:** This goal aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- **How Project Contributes:**
 - **Legal Literacy:** By offering easy-to-understand explanations of laws and legal concepts, the chatbot serves as an educational tool, enhancing legal literacy among the general public. This contributes to providing knowledge and promoting understanding of the legal framework. While not formal education, it provides valuable learning opportunities related to laws.

➤ **SDG 10: Reduced Inequalities**

- **Explanation of the Goal:** This goal focuses on reducing inequality within and among countries.
- **How Project Contribute (Indirectly):** By making legal information more accessible to everyone, regardless of their background or ability to afford legal consultation for basic queries, the project could potentially help reduce inequalities in access to legal knowledge. This is particularly true if the chatbot is designed to be user-friendly for diverse populations.

DEVELOPING AN AI BASED INTERACTIVE CHATBOT FOR THE DEPARTMENT OF JUSTICE'S WEBSITE

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ABSTRACT

The project is all about building a friendly AI chatbot for the Department of Justice website to help folks find legal info more easily and quickly. We're using natural language processing (NLP) and secure APIs to make sure it understands people's questions, and it'll support multiple languages and be accessible for everyone. The rollout will happen in stages, with regular checks and human oversight along the way. This chatbot can really boost accessibility, save time, and offer personalized help. But we also need to be careful about security and ethical concerns. Finding the right balance between AI's benefits and keeping everything secure, accurate, and trustworthy is the key to making a tool people can really rely on.

Keywords: Natural Language Processing, Large Language Models, legal chatbots, data security, ethical use of AI, AI chatbot, Virtual Assistant, Department of Justice (DOJ), legal information.

SECTION I.

Introduction

Creating an AI chatbot or virtual assistant for the Department of Justice's (DOJ) website is quite a task, and it's going to take a well-thought-out plan and some careful steps. The goal here is to make it easier for people to access legal information and interact with the DOJ, all while improving efficiency and accessibility. We kick things off with a thorough needs assessment, which helps us understand the most common questions users have, where they get stuck when navigating the website, and how automated help can really make a difference. This step will guide the design and functionality of the chatbot, ensuring it meets the needs of the diverse users who rely on the DOJ's resources.

Once we've figured out what we need, we jump right into building and training the chatbot. This means picking the right AI technologies, including Natural Language Processing (NLP) models that can handle complex legal questions. We build a solid knowledge base filled with relevant legal documents, frequently asked questions, and procedural guides, which the AI uses to provide

accurate and timely info. It's important to carefully choose the training data to reduce bias and ensure fairness, keeping in mind the variety of demographics among the DOJ's users. At the same time, we create secure API integrations to link the chatbot with the DOJ's existing databases and systems, allowing real-time access to information while keeping data secure and intact.[1]

During our development process, we put a lot of emphasis on making sure the user experience is smooth and accessible for everyone. The chatbot's design will be straightforward and easy to use, catering to varying levels of tech skills. We'll also add multilingual support to ensure everyone feels included, and accessibility features for those with disabilities. Each stage will involve thorough testing to check for accuracy, reliability, and security. This includes seeing how well the chatbot handles complex legal inquiries, responds to different ways of asking the same question, and withstands security threats.[2]

We're excited to roll things out in stages and keep making improvements along the way. We'll launch the chatbot initially in a pilot phase to gather real-world feedback from users. We'll set up channels

for collecting user input on how well the chatbot performs and where it could use some tweaks. Continuous monitoring and analysis of user interactions will help us track key performance metrics like response accuracy and user satisfaction. Regular updates and retraining of the AI model are important to ensure the chatbot's info stays accurate and relevant amid changes in laws or DOJ processes. We'll also have human oversight for sensitive or important conversations, ensuring accuracy and reducing risks. This ongoing approach helps keep the chatbot a trusted and effective resource for accessing justice.[3]

questions fast, stepping in where traditional legal help tends to fall short.[6]

Law Chatbot: Meet the “Law Chatbot,” an AI-powered helper designed to dish out quick legal advice and resources. The paper goes into how it uses text retrieval and generation techniques to create personalized responses. This chatbot is all about making legal info more accessible, helping users tackle tricky legal issues without breaking the bank, and offering round-the-clock guidance. "This is just right for the Department of Justice's website.[7]

Generative vs Intent-based Chatbot for Judicial Advice: This study pits two AI chatbots against each other in the race for providing judicial advice: a generative chatbot based on a custom dataset of 100 chats and an intent-based one with 36 different intents. The paper looks into user experience and emphasizes the adaptable, context-savvy replies of the generative chatbot versus the detailed, specific legal advice from the intent-based version. Both insights can help shape a clever chatbot for the Department of Justice's site.[8]

Legal Ease Chatbot – Bridging Legal Knowledge Gaps for Marginalized Communities: This paper talks about a Digital AI-Assisted Chatbot set up to give legal support to marginalized communities. It focuses on making legal information easy to access, sharing it widely, and providing personalized advice, like referrals when needed. This chatbot is all about helping these communities find their way in the legal maze and can really inform the creation of an interactive chatbot for the Department of Justice's website.[9]

Design and Implementation of a Chatbot for Automated Legal Assistance using Natural Language Processing and Machine Learning: This work dives into building an AI-powered legal assistance tool using NLP and machine learning. It ranks laws based on their relevance and pulls them up based on similarities. The paper suggests further digging into case law analysis, contract reviews, and legal drafting to make the system even better. The big win here is cutting down on mistakes in legal research while providing speedy, accurate help. You could easily tweak this for the Department of Justice's website. [10]

SECTION II.

Literature Survey

AI-Powered Legal Querying System using NLP: This paper dives into how we can create a cool Legal Assistant Chatbot that uses Retrieval-Augmented Generation (RAG) and FAISS for making legal searches and indexing smarter. The main goal is to make it easier to find legal info and analyze documents, so legal folks can get more done with a bit of automated help. The paper also talks about how this chatbot could be a great resource for the Department of Justice's website, stressing that there's a need to keep improving Natural Language Processing (NLP) abilities and beefing up security.[4]

AI-Enabled Chatbot: Here, we take a stroll down memory lane to see how chatbots evolved from basic rule-followers to those that actually feel like chatting with a smart assistant. It looks at how we're using AI tech, like NLP and machine learning, to make conversations better. The study points out the bumps in the road we face with tech and integration, but also shows how AI is boosting our understanding and interactions. The takeaways could really help in developing an interactive chatbot for the Department of Justice's site.[5]

Development of a Legal Chatbot for Comprehensive User Support: This paper is all about creating a smart Legal Chatbot that combines advanced NLP and AI to give users better support. It focuses on closing the gap between regular folks and legal info, especially in essential legal topics. The chatbot is there to answer common legal

LLM Enhanced AI Chatbot: This paper covers an exciting LLM-based chatbot that can whip up human-like responses even when it's offline. Focused on boosting model reliability and sticking to ethical guidelines, it's got features like summarizing texts and file uploads. But there are some obstacles, like limited resources for offline use and needing ethical boundaries in sensitive situations. This chatbot could definitely be personalized for the Department of Justice's site by training it on the right legal data.[11]

Legal Solutions - Intelligent Chatbot using Machine Learning: This paper introduces an AI chatbot that's designed to hand over legal knowledge, personalized tips, and even set up real-time chats with attorneys. It discusses the architecture and NLP techniques behind it along with machine learning for info retrieval and processing. This approach could really help out with making legal resources easier to access for users on the Department of Justice's website.[12]

Enhancing Website Through Chatbot Integration: This paper looks into building a chatbot using Dialogflow technology, which uses NLP and machine learning powered by a fast API to help users on websites. The goal is to nail accurate responses and boost productivity by being available 24/7. This method can definitely be applied to design a smart chatbot for the Department of Justice's site.[13]

The AI-Enabled Chatbot Framework for Intelligent Citizen-Government Interaction for Delivery of Services: This paper discusses how to design an AI-enabled chatbot for government services, built using Google Dialogflow. The system's been tweaked to model domain knowledge and hits around 95% accuracy in answering questions. There are some hiccups, like challenges with specific domains and unresolved queries from citizens. Still, this approach could jazz up citizen engagement on the Department of Justice's website.[14]

Contribución tecnológica al acceso a la justicia: un chatbot para el agenciamiento de necesidades jurídicas: This one dives into creating an AI-based legal chatbot that tackles the communication obstacles in accessing justice in Colombia, especially for vulnerable groups. The aim is to

boost legal knowledge and give guidance, making it easier to handle legal needs and improve access to justice.[15]

Applying Cognitive Computing to Legal Services: This paper talks about developing a cognitive AI chatbot, like LegalBot, for legal services that focuses on user interaction, setting up appointments, and connecting users to info databases. It emphasizes needing research, testing, and user feedback in making effective legal chatbots but also points out some tech challenges like getting Watson to fill out forms and issues with data handling in the Discovery service.[16]

Chat Kanoon: A Novel Approach to Legal Assistance in India: Here, we chat about ChatKanoon, a multilingual AI chatbot designed to fit into the Indian legal framework. It focuses on using language models and clever data utilization for determine legal information. The paper discusses existing obstacles and the bright future ahead, emphasizing how AI-driven legal tools can make a difference in developing nations. This might just inspire the design of a user-friendly chatbot for the Department of Justice.[17]

LAWBO: a smart lawyer chatbot: This paper presents LAWBO, an AI-driven chatbot aimed at legal research, helping to understand what users want and deliver relevant case details. It uses a bunch of different tools for natural language processing, like heuristics, DMN, GloVe, and Luis. Some challenges include a limited number of AI solutions in legal research and traditional NLP methods not being enough for extracting legal facts. This approach could easily be adapted for the Department of Justice's website to improve legal help for users.[18]

AI Chatbot Using Dialogflow: This paper dives into building an AI chatbot with Dialogflow geared toward schools, focusing on auto-replies to questions. But it does skip over developing the chatbot's personality and needs some work on improving the tech for info retrieval. While it doesn't target the Department of Justice specifically, the methods and tech here could work for similar projects.[19]

AI-Based Advanced Talk-chatbot for Implementation: This paper zeroes in on creating a

multilingual talkbot for educational institutions, using AI and NLP to help students with their questions. Student satisfaction just isn't cutting it right now. It doesn't touch on making an interactive AI chatbot for the Department of Justice's site.[20]

Interactive Legal Assistance System using Large Language Models: Here, we look into a Retrieval Augmented Generation chatbot meant to help users grasp Food Safety Regulations in India, using Large Language Models. But it's not specifically focused on developing a chatbot for the Department of Justice's website.[21]

LAWBOT: A Smart User Indian Legal Chatbot using Machine Learning Framework: This paper discusses LAWBOT, a machine learning-based chatbot designed to assist with legal queries in India. It aims to offer legal guidance but doesn't dive into building a chatbot for the Department of Justice's site.[22]

A Legal Assistant for Accountable Decision-Making: This paper discusses a chatbot system for legal aid, mixing formal logic with language models to deliver solid legal advice. It recognizes challenges, like generative AI sometimes giving dodgy info and the details of legal terms needing a pro's input. This could really help in developing an interactive chatbot for the Department of Justice's website.[23]

AI-Based Chatbot to Answer FAQs: This paper centers on developing a web-based chatbot for online banking using AI and language understanding. It mentions some downsides, like low satisfaction scores in banking and tech obstacles for making it user-friendly. Even though it doesn't latch onto the Department of Justice's goals, the ideas and tech covered could be adapted to suit similar needs.[24]

Core Chatbot Development Techniques:

- **RAG (Retrieval-Augmented Generation) and FAISS:** These cool tools help with legal document analysis and finding info quickly, so responses are spot on.
- **NLP and Machine Learning:** They're the backbone for understanding natural language, creating responses, and creating personalized chats.

- **Large Language Models (LLMs):** Super useful for advanced conversations, summarizing text, and dealing with complicated legal docs.
- **Dialogflow and Google API:** Great for building chatbots and linking them to websites, making it easier for people to connect with the government.
- **Semantic Modeling:** It's key to wrapping your head around specific knowledge and making sure responses are accurate.
- **Intent-based and Generative Models:** Different chatbot setups that can give structured advice or adjust their responses based on context.
- **Formal Logic and Heuristics:** Essential for specialized legal chatbots to do legal reasoning and find the right info.

Key Advantages for a DOJ Website Chatbot:

- **Better Accessibility:** Offers 24/7 access to legal info and resources, helping everyone, including those who often miss out.
- **Boosted Efficiency:** Automates finding legal info, analyzing documents, and tackling common questions, freeing up time and improving productivity.
- **Personalized Assistance:** Uses AI to give personalized responses and help, making users feel more satisfied.
- **Real-time Chats:** Lets users chat with qualified lawyers or get instant legal advice, making it easier to access professional help.
- **Multilingual Support:** Makes it easier to connect with different communities.
- **Reliable Accuracy:** Uses formal logic and strong validation to make sure the legal info is trustworthy.

Common Limitations and Research Gaps:

- **Challenges in AI and NLP Integration:** There are some bumps on the road when trying to blend AI into chatbot systems.

- Limited Knowledge Base: Sometimes chatbots might not know everything in real-time and can struggle with tricky legal details.
- Ethical Concerns: It's super important to have ethical guidelines, especially when using LLMs, to handle sensitive info and avoid biases.
- Building User Trust: There are some challenges in creating user trust and keeping satisfaction rates high, especially in legal stuff.
- Improving Information Retrieval: There's room for enhancing how accurately info is pulled up by algorithms.
- Managing Complex Conversations: Chatbots sometimes falter when it comes to understanding complicated legal scenarios or human emotions.
- Challenges with Offline Use: There are limitations when trying to deploy and fine-tune chatbots for use without the internet.
- Security Needs: It's essential to have strong security in place to guard sensitive legal info.
- Limited User Experience Evaluation: A lot of studies don't dive deep into how users actually experience these chatbots.
- Adaptability Issues: There's not enough talk about how well chatbots can keep up with changing legal needs.
- Domain-Specific Challenges: It can be tough to make sure responses are both accurate and thorough in certain legal areas.

SECTION III. **Implementation and Workflow**

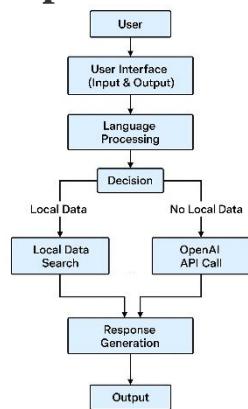


Fig.1 Workflow Architecture for Chatbot Implementation

3.1 User → User Interface (Input & Output)

The process begins with the **user** sending a message through a **User Interface (UI)**, such as a chat window, voice assistant, or app. The UI handles both the user's **input** (receiving the message) and the chatbot's **output** (delivering the response). It acts as the bridge between the human and the machine.

3.2 User Interface → Language Selection

Once the user input is captured, the chatbot moves to **Language Selection**. Here, the system either detects the language automatically or prompts the user to select their preferred language. This ensures

that the conversation happens in a language the user understands, making further communication clear and effective.

3.3 Language Selection → Message Processing

After choosing the language, the chatbot proceeds to **Message Processing**. It analyzes the input using **natural language processing (NLP)** techniques to understand the user's **intent** and extract important **entities** (like names, places, numbers). This helps the chatbot figure out exactly what the user is asking for or wants to do.

3.4 Message Processing → Decision (Local Data / OpenAI API Call)

At this stage, the chatbot evaluates if it can handle the query using **local data**. If the answer is available in its internal **knowledge base** or **FAQ database**, it proceeds with a **Local Data Search**. If not, it calls an **external AI service** (like the OpenAI API) to generate a response. This decision step helps balance speed, cost, and response quality.

3.5 Local Data Search → Response Generation / OpenAI API Call → Response Generation

If local data is found, the chatbot quickly fetches the response from internal sources. If not, it sends the query to the **OpenAI API**, which processes the input using a much larger and more general AI model. In either case, the system then moves to **Response Generation**, where it formats and

prepares the answer in the user's selected language and style.

3.6 Response Generation → Output

Finally, the chatbot sends the completed response back to the **User Interface**. The user sees or hears the reply, and depending on their next action, the conversation may continue. This marks the completion of one interaction cycle within the chatbot system.

SECTION IV.

Results and Discussion

Building an AI-powered chatbot for the Department of Justice's website is a game changer for how people access legal info and interact with the system. The possibilities are pretty exciting, from making things easier to reach to creating a smoother user experience. Imagine having a chatbot that's available around the clock, taking away the hassle of office hours and cutting down on waiting around. It would help folks navigate through the complicated website layout, making it simpler to get a grip on complex legal stuff. Plus, it could personalize responses based on what each person needs or has asked about before, making it even more satisfying to use. And let's not forget about multilingual options! That would really help bridge language gaps and provide equal access to everyone. On top of improving user satisfaction, it would save a ton of time and resources. Eventually, the chatbot would enhance how information is shared, delivering timely and accurate updates that help people get a better understanding of the judicial system.[25]

But, creating something like this isn't all smooth sailing. There are certainly some obstacles to jump over. Since the DOJ deals with sensitive information, keeping data secure and private is super important. We'd need to implement strong security measures like encryption and restrict access to ensure safety. Being transparent about how data is collected and used is key to building trust with the public. And hey, getting the info right is essential too—mistakes in legal information can have big consequences. So, we'd need to run thorough testing, validation, and keep things updated to make sure the chatbot is reliable. Another factor is guaranteeing that the AI can flag potentially sensitive conversations for a real person

to take a look at. The Natural Language Processing (NLP) needs to be sharp enough to understand different ways people speak, like slang or dialects, and to grasp more complicated questions in context. Smoothly connecting with existing DOJ databases is critical, too, so we'd need secure APIs and data syncing. Also, we can't ignore ethical concerns, like biases in AI, to make sure everyone gets fair treatment. It's essential to be upfront about what the chatbot can and can't do and how AI plays into this.[26]

Keeping the chatbot running and up-to-date is a never-ending job since legal information changes all the time. To ensure it stays accurate, we should regularly retrain the AI with the latest data. We've got to keep an eye on how users interact to spot areas that need improvement. Trust and user acceptance are essential for the chatbot to succeed. It should be user-friendly, give reliable information, and clearly explain how it works and how it uses user data. Plus, it's a great idea to offer the option for users to chat with a live rep if they need to. To tackle biases, we should use diverse training data, create fair algorithms, and conduct regular bias checks. Security for API connections is critical, so we should have solid authentication and authorization processes in place. Setting up feedback loops would really help us gather user input to keep making the system better. Displaying examples of how the chatbot can assist, like helping someone file a complaint or find details on specific laws, would make it even more useful. Finally, tracking measurable outcomes like shorter wait times and higher user satisfaction can help assess the chatbot's impact. By focusing on these areas, the DOJ can create a super useful tool that not only improves access to justice but also boosts efficiency in service.

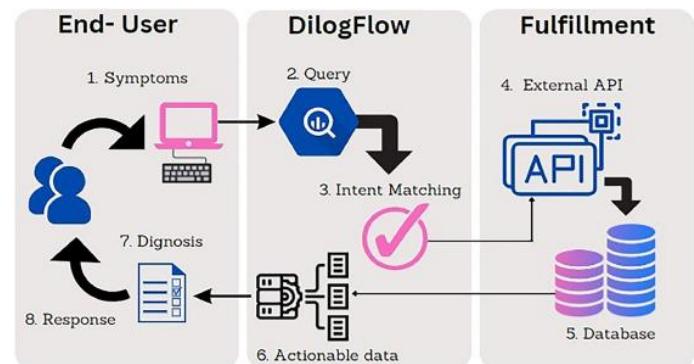


Fig.2 Chatbot System Overview

SECTION V.

Conclusion

So, to wrap things up, creating a cool AI-powered chatbot or virtual assistant for the Department of Justice's website is all about taking a thoughtful and well-rounded approach. We really need to strike a good balance between using the awesome potential of AI and being careful about the risks that come with it, especially in such an important legal setting. The first step is to dig into what users actually need, figuring out the common questions they have and where they get stuck on the site. From there, we'll build a strong AI model that uses advanced Natural Language Processing (NLP), trained on a solid set of legal info to make sure it's always accurate and relevant. We'll do some thorough testing to ensure it works well, particularly when it comes to tricky legal questions and all kinds of language variations.

It's super important to keep data security and privacy top of mind throughout the entire process. We'll include strong encryption, access controls, and data anonymization to protect sensitive user info, following all the necessary legal guidelines. We're also keeping ethics in check with fairness-aware algorithms and regular bias checks, so everyone has equal access and treatment. The chatbot will connect smoothly with existing DOJ databases through secure API links, making it easy to pull in real-time information and updates. A mix of AI smarts and human oversight is key, especially for those sensitive or important legal chats. Plus, we'll need to regularly update and maintain the chatbot to make sure its info stays accurate and keeps up with changes in the legal environment.

On top of that, we want to really focus on user experience and building trust with the public. The chatbot will be super user-friendly, with easy navigation and clear answers. We'll add multilingual support and accessibility features to meet different user needs. Setting up feedback loops will help us gather input from users, so we can keep making improvements. We'll also track key metrics to see how the chatbot is doing, showing its impact on making services more accessible and efficient. In the end, rolling out this AI-based chatbot will help the DOJ offer quicker, easier, and more transparent services, strengthening the link between the public and the justice system.

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