LEGAL PROCEDURE BOT

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Abstract. In a rapidly increasing technological era the chat bots are getting much more attention from last few years. The changes in laws and the procedures often lead to confusion among individuals and professionals. This growing problem of manual systems and legal procedures and document requirements lands us to an idea of one stop solution that is legal procedure chat bot. Our objectives include comprehensive guidance which will help people legally, sophisticated list of required documents and the better user interaction using various tools and technologies. One of the best features of chat bot is that it not only provides the legal procedure but also gives the list of necessary documents which will ease the task of people and avoid the confusion. The manual systems are time consuming and labor-intensive process. Individual who needs information about any legal procedure, needs to go through the hectic procedure of checking and regulations, and needs to move from one desk to another to verify and get the list of required documents. This manual process often leads to mistakes and misinterpretation. Chat bot overcomes these drawbacks by providing detailed legal procedure and list of required documents on a single platform. It simplifies the complex procedures and provides easy user interaction which helps in accessing the information anywhere and anytime. All-inclusive generative AI chat bot is one stop solution for legal procedures and required documents which is less error prone and avoids the human mistakes.

Keywords: Chat bot, Generative Deep Learning, Natural Language Understanding, Artificial Intelligence.

1 Introduction

The advancement in technology has encourage the companies, institutions as well as government systems to involve the automation in their manual systems [5]. One of such systems is the Government's legal system. Though there are technological advancements in getting the e-aadhar card, e-pan card, online application for driving license etc. but the detailed procedure to get those legal documents and solve the legal matters there is no such system available. To overcome the challenges in manual system [2] and time consuming processes we are building an AI based solution that is **The Legal Procedure Bot**. One of the objectives of chat bot is to give the complete procedure of legal queries and list of required documents. An individual will get benefited by chat bot as it will provide the solution for the legal matters. The government procedures are complex and often the information accessibility is an issue. The chat bot aims to simplify the user interaction with system with the help of well-defined and simple user interface and ensure the accessibility of the information [6]. The chat bot will also provide the all necessary documents required in procedure from the start to end.

This will save the time of an individual.The advanced technologies stack and tools will help the legal procedure bot to enhance the performance of chat bot and streamline the process of legal matters.

The artificial intelligence and machine learning are the emerging technologies that empower the chat bots to perform better. The normal language used by the user might not be understandable by the chat bot to solve this issue we will be using the natural language processing and its' subsets natural language understanding and natural language generation. The chat bot aims to provide the functionalities such as detailed procedure of any legal matter, the documents required for that procedure, estimated fees, the direct links of official websites for any application forms, and the location of nearby centres or courts or lawyers.In manual system, user need to visit each and ever centre physically to ask the detailed procedure and required documents, if they don't know the address of centres then they need to search for it and this system often leads to misinterpretations and human errors. The chat bot is the modernised one stop solution over the manual system which will provide the results on one click.In conclusion, The Legal Procedure Bot is an AI based chat bot which has an advanced functionalities to overcome the drawbacks of manual system and solve the complexity issues in legal matters. It will clarify the whole process and provide the guidance related to user specific legal query. This AI based system will be time efficient and less prone to human errors.

2 Algorithms

- **Natural language processing (NLP) :-**

  Natural Language Processing consists of two parts: Natural Language Understanding(NLU) and Natural Language Generation(NLG) [4]. The speech to text architecture utilises both the technology to first convert speech to text, understand the intent and convert the text back to speech. The NLU takes unstructured data : speech, and converts into structured data : text so that the machine can understand and act upon it. The NLU focuses on extracting the intent from the user query [4]. Using Natural language processing, the chat bot can answer users legal queries and answer the queries in the most efficient way. Natural language processing gives machines the ability to toeing the given input, break it down, extract its meaning, determining appropriate action and answering the user in their natural language.

- **Pattern Matching Algorithm:-**

  The pattern matching Algorithm is used to perform vector similarity search to fetch legal queries from the vector database [4]. The vector embedding of the query and the embeddings stored in the database are compared using popular Algorithm cosine similarity. The vectors which have the highest score of similarity are returned and given to the LLM to answer the query to the user.

- **Large Language Model:-**

  Large Language Model: The legal procedure chat bot makes use of the LLM(Large Language Model) to construct answers to user queries. The LLM works by predicting the next best possible word to complete the sentence so as the sentence makes complete sense. The LLM model is fed with the legal queries from the database that matches the user's queries. The LLM then constructs the answer in a prescribed format, adhering to legal compliance's. The LLM that will be used in The Legal Procedure Bot is Mistral-7B-Instruct-v0.2.

3 Methodology

The Legal Procedure bot will be based on the Generative Deep learning architecture. Rather than a rule-based architecture, which checks for an exact match between the query and keywords stored in the database [3], a generative deep learning-based architecture fetches the results based on a semantic similarity between the query and information stored in the database. The chat bot is built on the following flow:

1. *Step 1:* The legal data is stored in a CSV file, which includes legal procedures, acts, regulations, and case law.

2. *Step 2:* The data stored in the CSV file is preprocessed. The data is divided into 'n' different chunks and these chunks are converted into text embeddings. These embeddings are vector representations of text and are stored in a vector database. The embeddings are created through different methods like Word2Vec and Doc2Vec.

3. *Step 3:* A semantic index is prepared using these vector embeddings, like an index prepared for real world information. This semantic index allows for efficient and meaningful retrieval of information.

4. *Step 4:* The user queries a legal procedure to the chat bot. This query is converted to embeddings

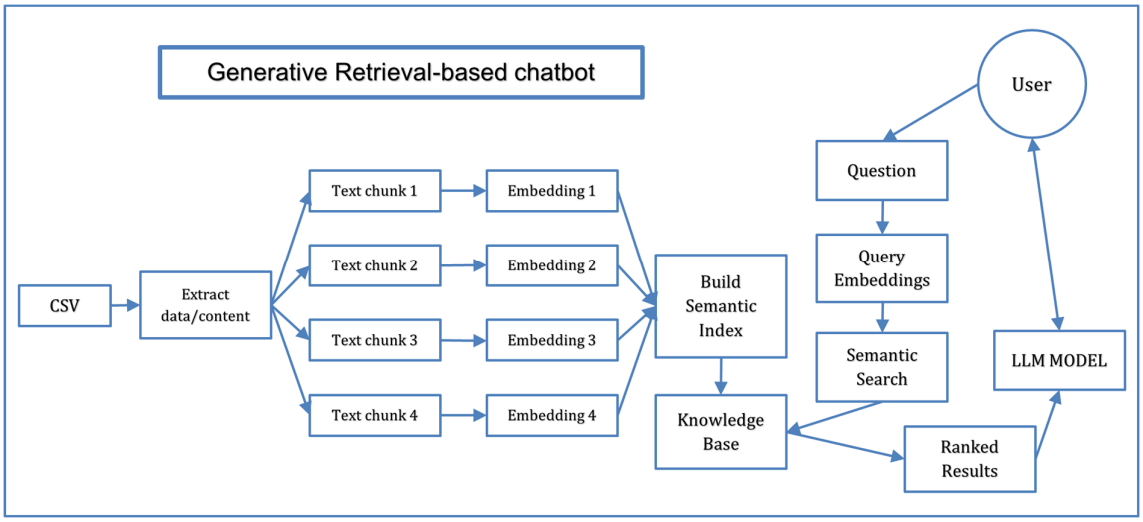

Figure 1: RAG based Architecture

using the same embedding model employed during the data preprocessing stage. The query embedding is utilized for a semantic search - the embedding is searched with the embeddings already stored in the vector database. A ranked list of embeddings is returned in decreasing order of similarity between the query embedding and embeddings stored in the vector database.

5. *Step 5:* The LLM (Large Language Model) processes the embeddings and returns the most relevant legal procedure or information to the user. The LLM's response may include thorough explanations, suggestions to relevant legal documents, or step-by-step instructions to guide the user through the desired legal process.

This methodology, built on generative deep learning and semantic indexing, improves the user's understanding by providing accurate, context-aware legal information and procedures in response to their queries. It utilizes natural language understanding and semantic indexing to make legal information more accessible and understandable to users.

The speech-to-text architecture is used to provide accessibility to users querying legal procedures. The first module in architecture is the speech recognition module. The module uses advanced machine learning models to convert the spoken words into textual form, using acoustic and language models to accurately recognize the spoken content. Once the speech is converted into text, the NLU - Natural Language Understanding module is used to find the intent of the text. The intent manager interprets the user's words and using the legal procedure bot, returns the appropriate procedure [1]. The NLG - Natural Language Generator, converts the text back to speech and conveys the legal procedure to the user.

4 Features

- **Speech-To-Text:-**

  Chat bots are one of the latest technologies which are easy to use for people. With the help of the chat bots, information is available at our fingertips. Developers are continuously working on improving the chat bots and keeping up with the trends.

  Speech-to-text is one of such features which is widely used in various applications. Simply, Speech-To-Text is converting the spoken words into the text format. Speech-to-text conversion begins with a process called Automatic Speech Recognition (ASR) [3]. It reduces the efforts of people to type the whole long queries. It is also helpful if we don't know how to spell the word the speech-to-text will ease the task of asking questions to the bot.

  Steps involved in Speech-To-Text:-

  1. *Step 1:* The user will need to use a microphone to ask a query.
  2. *Step 2:* Once the input is received it will preprocess the text and check for keywords and patterns in audio.

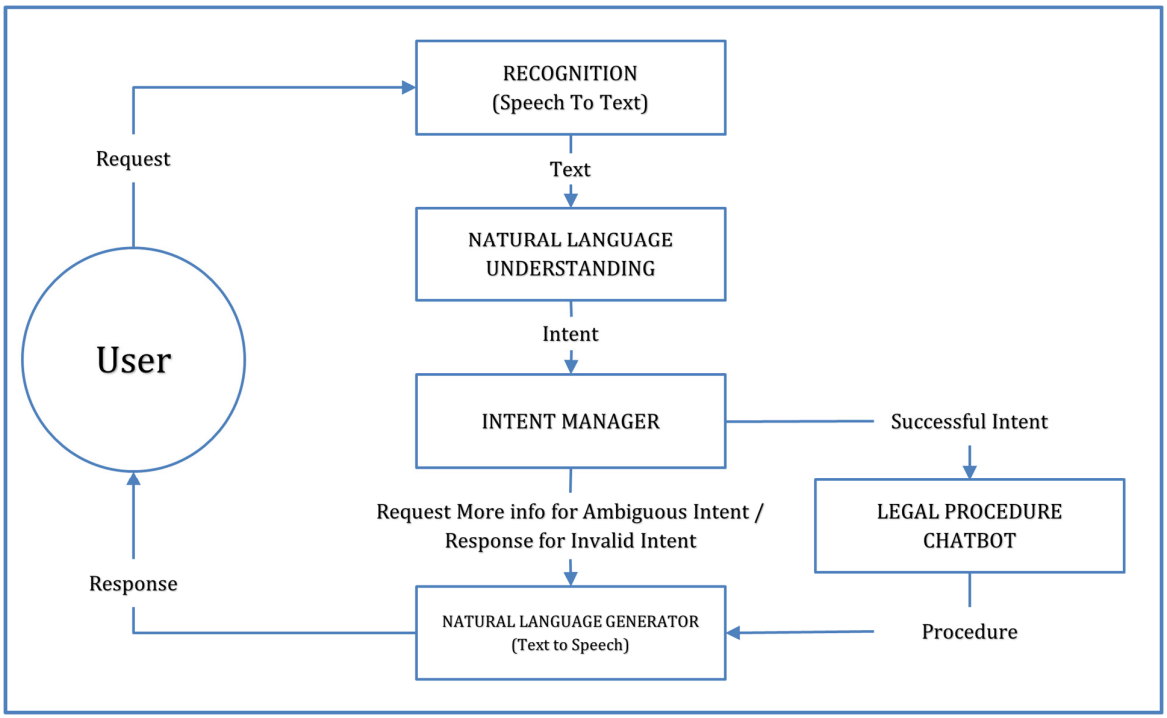

Figure 2: STT and TTS Architecture

3. *Step 3:* The following step is called Natural Language Understanding, and this is where the text's meaning is extracted. Tokenization and part-of-speech tagging, are such techniques used to understand the semantics of the text.
4. *Step 4:* There is one Intent Manager in the architecture of STT which is used to extract the meaning based on user's intent. The response is generated once the intent is detected.
5. *Step 5:* Natural Language Generator is then used to generate the response.

- **Text-To-Speech:-**

Text-to-speech is another functionality that we have implemented in our Legal Procedure Chat bot. It can be stated as converting the text to speech or audio. The user will ask the query to the chat bot and the chat bot will generate the response accordingly. Once the response is generated it will convert the text to the audio output.

The main advantage of this technique is it will be helpful to listen to the generated answers rather than reading them. Also useful for people with reading difficulties. Users can also listen to the information while performing other tasks.

Steps involved in Text-To-Speech:-

1. *Step 1:* First we need a text. In our case, the text will be generated in response to a particular query that needs to be converted into speech.
2. *Step 2:* Then the application will select a voice and desired language for output.
3. *Step 3:* The application will request the TTS engine's API to generate audio by selecting the language, voice, and other parameters.
4. *Step 4:* The TTS engine's API processes the text and generates audio. The generated audio output is sent to the application.
5. *Step 5:* The audio playback will respond to the query with the audio output.

- **Geo Location:-**

Chat bot consists of various features such as Speech-To-Text, Text-To-Speech, etc. but another useful feature we are introducing in Legal Procedure Bot is the Geo location service. Geo location

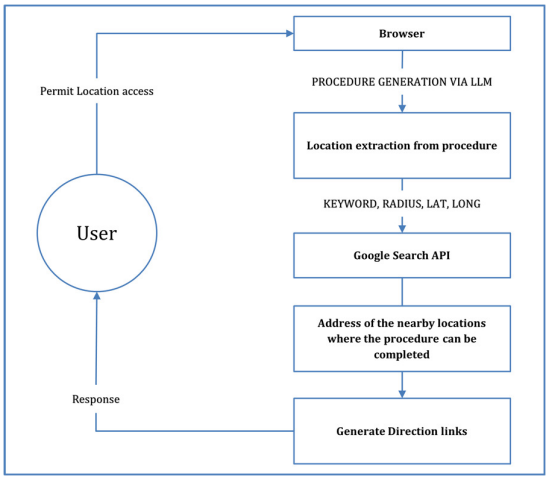

Figure 3: Geo Location flow

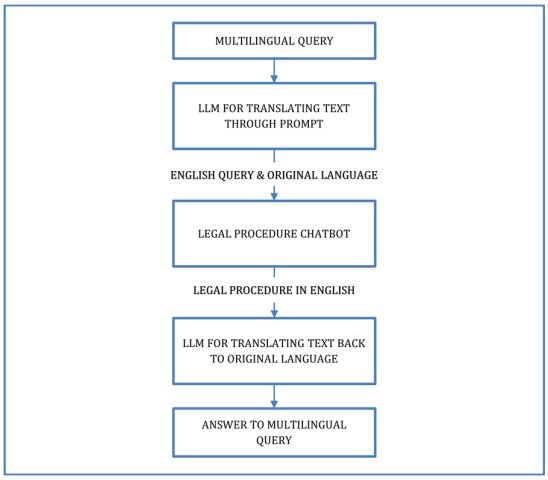

Figure 4: Multilingual Flow

will be helpful to know the nearby location of particular service centers.

For example, I want to know the procedure to apply for an Aadhar card. Then bot will reply with the detailed procedure and required documents along with the nearby Aadhar centers for the bio metric registration.

This feature will save the time of people to search for nearby centers, lawyers, notaries, etc. Google's nearby search API is used for this particular feature. Users just have to give access to the location and the chat bot will give them the nearby locations.

Steps involved in Geo Location:-

1. *Step 1:* Users will need to give access to a location by enabling the location permission on the browser.
2. *Step 2:* A request will be sent to Google's Search API.
3. *Step 3:* The location-related (ex. Address) information will be extracted from the API response.
4. *Step 4:* The address of nearby locations will be displayed in response to the query.

- **Multilingual:-**

There are many chat bots available on the World Wide Web that have various functionalities. But there are no or rarely any chat bots that support multilingual functionality. Multilingual means which supports multiple languages. Mostly the browsers have this functionality but chat bots don't. It will be very helpful for people who don't understand English, so they can search in their language and get the response in their language.

Steps involved in Multilingual query:-

1. *Step 1:* Ask the query in any language you want.
2. *Step 2:* A large Language Model (LLM) will convert the multilingual query to English.
3. *Step 3:* The query will be analyzed and processed by the chat bot and an appropriate response will be generated.
4. *Step 4:* The response will get converted back to the original language in which a query is asked.

5 Results

The login page prompts the user for the credentials of the user: username, email and password. If the user is not registered , he can do so by redirecting to the sign up page. Once logged in successfully, the user will be redirected to the home page.

The home page has a chat window where the user can enter the legal procedure or enter the procedure via his voice. The side navigation holds the Preferences for the user, where the user can activate his location to get nearby locations where he can complete the procedures, can activate having conversation in multilingual languages and can activate text to speech.

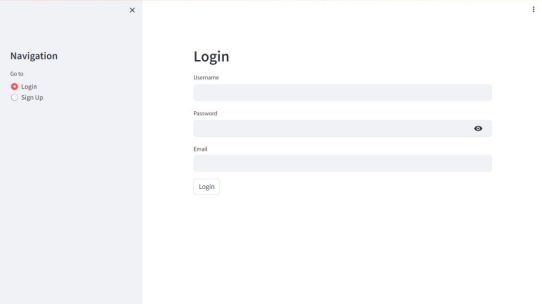

Figure 5: Login Screen GUI

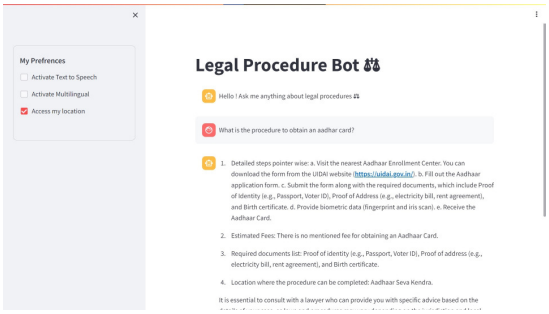

Figure 6: Chat Bot GUI

6 Conclusion

Navigating complex government processes is a major source of confusion and delays for citizens as information is fragmented and diverse. It is important to develop a platform that makes it easier for users to access legal services and avoid errors and time-consuming procedures. Legal process bots provide users with the information they need for legal documents. It uses a generative deep learning architecture that initially saves data in CSV format and extracts chunks of text and metadata. It works with a natural language understanding (NLU) framework and semantic indexing to provide accurate contextual results.

The legal process chat bot's system has a speech-to-text architecture that includes speech recognition that helps convert spoken words into text format. NLU extracts meaning and context from transformed text and identifies entities, intent, and relationships to understand user needs and identify specific legal terms or actions.

Therefore, we provide detailed procedures and charge estimated fees for any government-related legal documents or services. Based on the user's location input, we provide nearby locations where legal proceedings can be completed and provide voice commands to enter the required legal proceedings through speech recognition using natural language processing. Based on advanced natural language processing models and user-centered application design principles, the expected success of our chat bot proves to be an innovative tool for accessing information, despite the need for ethical considerations, scalability and user satisfaction.

7 Future Scope

Future route for legal procedural chat bot ought to involve lowering the limitations via refining algorithms. Continuous updates of legal information and real-time legal updates could help to improve the adaptability of chat bot. User remarks can ensure user-friendliness of the chat bot and help to fulfill consumer expectations. For gaining a person's trust, privacy, and protection enhancements are essential. It should implement privacy elements in such a way that personal data is protected. The addition of multilingual features for query entry and evaluation would assist in achieving chat bot accessibility, attracting a large consumer base, to ease the process. Collaboration with legal experts could make contributions to the chat bot's accuracy and reliability, also partnerships with legal businesses may also lead to customization for special cases.

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