Lawbot

A CHATBOT WHICH ASSIST PEOPLE WITH THEIR LEGAL ISSUES

Project ID: 18-010

Software Requirements Specification

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Abstract

Majority of the people today has a very limited knowledge in the existing laws and legal system in the country. When people encounter a situation in life where they need legal advice, they have no idea of the prevailing laws related to that situation. People go through lot of hardships to get the necessary, accurate legal advice. In such situations, what people mostly do is go to a place where they think they can get the service done or they hire a lawyer. This way involves lot of time, cost and of course it's inefficient. Maybe they have come to the wrong place seeking for information. And what often happens is people assume things and jump into conclusions. "This might be right. Let's do it" is the approach taken by most people in situations like this. This way they may end up with false and misleading information.

Or there are legal information providing websites and legal assistant apps where people needs to login first, search for the necessary information, filter out what they actually need and then logout. This way is again time consuming and not to mention how inefficient they are. Most of them are not free information providing sources.

What if there's that one source which is available all 24/7, provides you with the legal information you need instantly and free of charge. How easy and efficient that is?
To address this requirement, 'Lawbot', a legal assistant chatbot will be developed. It will be developed using Natural Language Processing (NLP), which is an artificial intelligence field concerned with interactions between human languages and computers. Simply what happens here is text or audio provided by the user is analysed and processed by the bot and responds appropriately.

Even though you are actually talking to a machine, chatbot will be developed in a way that gives you a feeling that you are talking to another human. Unlike messaging apps, response for your question will come instantly making a more natural, human conversation.

So far, there are no any legal assistant chatbots in Sri Lanka which have been made specifically for Sri Lankan laws. Lawbot will be the first Sri-Lankan legal assistant chatbot.

Declaration

I declare that this is my own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Bhanuka Hingalagoda

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Figure 4.2.4 Survey results

Figure 4.2.4 Survey results

1. Introduction

1.1 Purpose

This SRS document provides a detailed overview of the Lawbot, the legal assistant chatbot and a comprehensive description on my component and how it interacts with other components. In addition to that, this document provides details regarding all the functional and non-functional requirements of this system and GUI, system interfaces, hardware interfaces and communication interfaces which are used in the system. Also, user interaction with the system and how those operations are carried out are explained.

This document is intended primarily for any customer who uses our system. This will also be of interest to software engineers, quality engineers, maintainers and all the other stakeholders involved in developing the application. The requirements that specified in this document are intended to be met in the product at the end of the project.

1.2 Scope

This document mainly focuses on the 'NLP handling' component of Lawbot. It is an artificial intelligence field concerned with interactions between human languages and computers. User input and output will be handled in a way a machine can understand. In addition to that, this document covers main requirements for release 1.0 of Lawbot, the legal assistant chatbot and will guide developers in selecting a design that will be able to accommodate the full-scale application.

1.2.1 Product description

Lawbot is a legal assistant chatbot, which assists people in their legal issues related to 3 specific areas. They are,

i) Road accidents - pedestrian and vehicle accidents
ii) Citizen's Registrations - obtaining new NIC, obtaining certified copy of marriage, birth, death certificate, voter registrations
iii) Employment Information - about pensions, EPF, ETF

Lawbot will be implemented as a web application. It will answer peoples' questions in the following manner.

First user can enter his question as text/voice. Then Lawbot tries to analyse and understand, if the question is within the areas Lawbot supports. If the question is out of the areas Lawbot supports, user will be informed about the areas it supports. If the question is valid, Lawbot checks if it can answer the user's question directly, it will provide the most appropriate answer to the user's question. If the question cannot be answered directly which means question contains some missing information to provide the exact answer (question is not clear enough), Lawbot will ask questions from the user till it gets all the missing information to get the question clarified from the user.

Finally, when the question is clear enough to give an exact answer, Lawbot will provide the answer. And also, if there are any documents involved in, related to a user's question, Lawbot will direct the user to those documents as well, if the user requests. If user requests for the directions to a certain legal place related to his question (ex: nearest police station to the user), after user provide the Lawbot with his location, Lawbot will provide the user in return with the directions to the nearby places. Lawbot will try to understand the different patterns and ways of asking the same question and to have a conversation which is more similar to a normal human conversation.

Lawbot has the following constraints at the moment.

Lawbot will not support any other languages than English. This is intended for the use of only Sri Lankan citizens and tourists who would like to get an idea about the current laws in Sri Lanka pertaining to a legal scenario. All the solutions and answers that provided by the Lawbot are in the context of Sri Lankan laws and might be different to a law which is applied in a different country pertaining to the same legal scenario. And Lawbot will assist you only in the legal areas that is it currently supporting and with the user requirement, developers of the Lawbot will decide of the new areas to be supported by the Lawbot.

1.2.2 Benefits of Lawbot

Lawbot is primarily intended for the use of all the Sri Lankan citizens who seek legal assistance in the areas of road accidents, citizen's registrations and employment information. Tourists who face a legal issue in Sri Lanka can seek assistance from Lawbot. With the Lawbot, it reduces so much of the hardships people need it go through when they need legal assistance.

Lawbot gives people an idea about the existing Sri Lankan laws related to different legal scenarios.

Lawbot is more like booking a human lawyer since it's like you are having a normal conversation with a person. You won't feel like you are talking to a machine.

And Lawbot is even better than just a lawyer since it is available all 24/7 and will give you the answers you are looking for just free of charge.

Lawbot will provide you with the answers for your legal issue at the very instant you asked the question. You don't have to wait for the response. It is much faster.

1.3 Definitions, acronyms and abbreviations

Term	Definition
SRS	Software Requirement Specification
GUI	Graphical User Interface
Chatbot	It's a computer program or an artificial intelligence which conducts a conversation via auditory or textual methods.
NLP	Natural Language Processing
ML	Machine Learning
Text Clustering	The task of grouping a set of texts in such a way that texts in the same group (called a cluster) are more similar to each other than to those in other clusters.
Ontology	A branch of metaphysics concerned with the nature and relations of being Ontology deals with abstract entities
API	(Application program interface) A set of functions and procedures that allow the creation of applications which access the features or data of an operating system, application, or other service.

Table 1.3.1: Definitions, Acronyms, and Abbreviations

1.4 Overview

Lawbot is a legal assistant chatbot which is a web application and assists people in their legal issues related to road accidents, Citizen's registrations and employment information and gives an idea about the current existing Sri Lankan laws.

1.4.1 Main goals of Lawbot

Main goal of Lawbot is to provide the people with an easy way to get to know about current governing rules and laws in Sri Lanka and to assist people if they encounter a legal issue related to road accidents, Citizen's registrations and employment information. We hope to improve the Lawbot by supporting other different legal areas which are frequently asked by people other than the areas we are currently supporting. And also, we hope to add a social platform to the Lawbot where people can share and discuss their ideas, incidents related to different legal areas.

1.4.2 Users of Lawbot

Main category of users of Lawbot is Sri Lankan citizens and tourists who would like to get to know about current Sri Lankan laws and need assistance in legal issues.

Developers, Maintainers, Quality assurers and testers can use to improve Lawbot by identifying and resolving bugs and adding new features.

Remaining three sections of this document give a detailed description of Lawbot mainly focusing on 'NLP Handling' component. Section 2 provides the details about the overall system such as product perspective, product functions and user characteristics which presents information oriented to the end user highlighting the 'NLP Handling' component. Moreover, this section explains constraints, assumptions and dependencies related to the Lawbot. Section 3 provides the specific requirements of the Lawbot. This will provide more detailed descriptions on external interface requirements, classes and system attributes. Finally, section 4 guides to the references that this SRS referred.

2. Overall Description

Lawbot is designed as a web application. It can be used from desktop, laptop or smartphone. Internet connection should be mandatory since this is a web application. User's questions are directed to the server. Within the server user's state is maintained. Question is analysed within the server using NLP techniques like sentimental analysis, tokenization, named entity recognition and normalization.

To get the answers for user's questions, information source is needed. For that a knowledge base had been created using ontology with all the laws and necessary legal information. Querying the knowledge base is done to get the answer for the user's question.

To map the unambiguous words in the user's question, they are mapped using text clustering in machine learning. This is done for effective querying of the knowledge base. So that those unambiguous words can be mapped to the words already defined in the knowledge base.

Finally, the question which is analysed using NLP and mapped using ML is directed to the knowledge base to query and find the appropriate answer. Answer is again converted to human understandable format using NLP.

If there are documents involved with that user's specific legal issue, user is asked if he needs the documents and if the user gave the approval, he is directed to the necessary documents.

If user requests for directions of the locations related to his legal issue, Lawbot provides the directions using google map API.

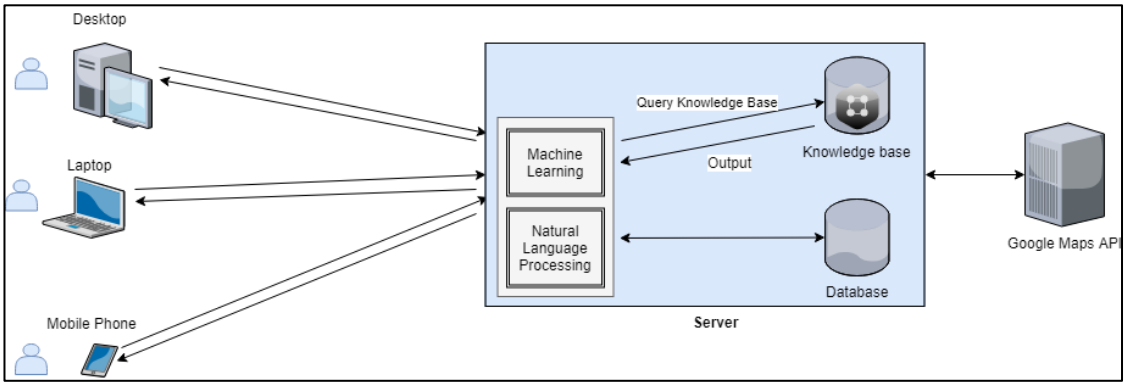

Figure 2.1: System overview

2.1 Product perspective

There are some chatbots available giving you legal assistance which has several downsides. One of the biggest downside is they don't allow user to ask any kind of legal related question as they wish. They restrict user's natural way of conversation by commanding user to select an option out of the pre-defined options. This is more like navigating through a normal app with some radio buttons and dropdowns. They always expect the user to follow their predefined procedure. This is totally contrasting to the way a chatbot should actually work. To address these kind of problems, we are providing a new legal assistant chatbot which allows for a more user friendly, natural two- way communication. Ex: Ailira, PaperStreet.

If you have ever used Ailira and PaperStreet what they actually do is instead of providing the necessary information, they direct us to a attorney working on that area of concern and leave us a with a message saying that attorney will contact you in future. This is more similar to booking a lawyer. Our chatbot will guide you through legal solutions step by step with providing the links to download the necessary documents and nearby locations.

	PaperStreet	Our solution
1) Conversation Based	✗ - Structure Based	✓ - like talk to another human
2) Answers user's questions	✗ - Need to go through a lawyer.	✓
3) Social platform for user interaction	✗	✓
4) Voice support	✗	✓

Table 2.1.1: Comparison with Paperstreet

	Ailira	Our Solution
1) Conversation Based	✗ - Structure Based	✓ - like talk to another human
2) Social platform for user interaction	✗	✓
3) Voice support	✗	✓

Table 2.1.2: Comparison with Ailira

2.1.1 System interfaces

Google Maps API - to give directions to a user

2.1.2 User interfaces

Home page interface
Chatbot page interface
About page interface

2.1.3 Hardware interfaces

Laptop or desktop computer or mobile phone
Microphone - if voice input
Network Connection (Router, Modems, Dongles)

2.1.4 Software interfaces

Web Browser - Google Chrome / Firefox / Internet Explorer

2.1.5 Communication interfaces

Modem/Router/Dongle will provide access to internet when it needs and HTTP protocol will be used.

2.1.6 Memory constraints

No special Memory requirement for client side. In order to load webpage 200MB of free memory space is required in client.

For server there should be at least 16GB of memory.

2.1.7 Operations

User needs to go to the website by typing the URL.

User doesn’t need to sign up or log in to talk to chatbot.

User needs to enter the question as text/voice.

User needs to answer the questions asked by chatbot.

2.1.8 Site adaptation requirements

User Interface is only in English.
User inputs are supported as both text and voice.

2.2 Product Functions

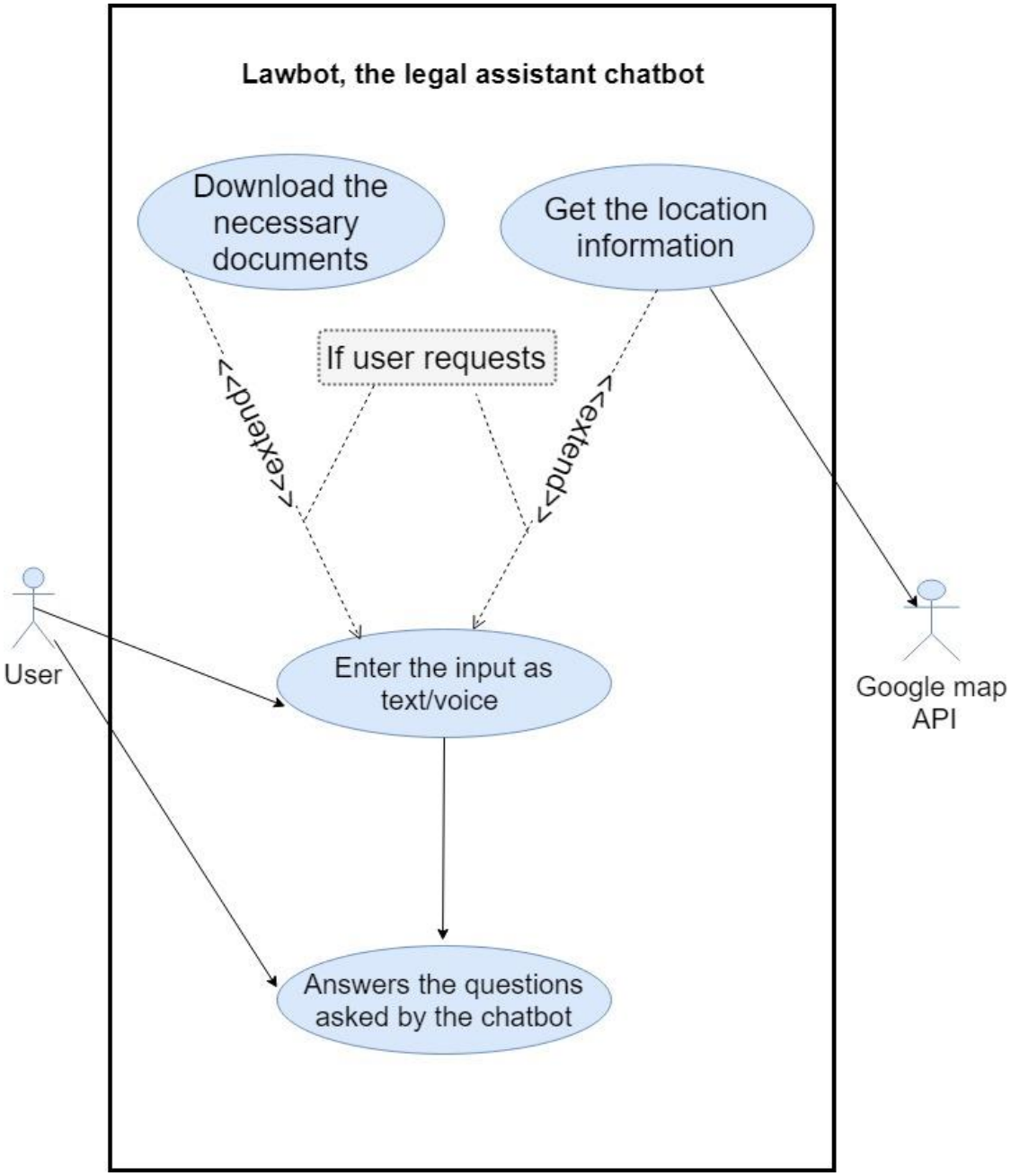

Figure 2.2.1: Use Case Diagram

Use case Id	UCS 1
Use case name	Get legal assistance for an issue

Pre-condition	User is connected to internet
Primary actor	User (person with a legal issue)
Main success scenario steps	1. User have to enter the question as text /voice. 2. System checks if the question can be answered (question is within valid legal areas). 3. If question is within supported areas, chatbot will check if question is clear enough to answer or if it has missing information. 4. After question is identified as clear to provide an exact answer, chatbot will provide the answer.
Exception Conditions	2.1 If the question is out of supported areas that the chatbot can be answered, chatbot will say 'question is out of the supported areas'. 3.1 If there are missing information in the question asked by the chatbot, user will be prompted with questions asking for the missing information.

Table 2.2.1: Use case scenario

2.3 User Characteristics

Any person who needs to get an idea about current Sri Lankan laws related to road accidents, citizen's registrations and employment information and find the solution for their legal issue can use Lawbot. Since Lawbot is all about having a normal conversation with a person and UI is very simple, even a novice can use it without needing any prior IT knowledge. But anyone using Lawbot must have a general English knowledge to talk to the Lawbot.

2.4 Constraints

In order to use Lawbot end user must have a web browser and need a proper internet connection.

Web browser should be a JavaScript enabled browser. ex: chrome, Firefox

Database we are using, has the ability to map ontologies. So, ontology enabled database is needed.

Lawbot will be developed using open source technologies.

2.5 Assumptions and dependencies

Lawbot is created with the laws and legal solutions that were available during the time information were gathered. Update of current laws will not be reflected in the Lawbot at the same time the laws were amended until an admin manually update the knowledge base.

Users are not expected to use slang/ idioms when a question is asked. Users are not expected to ask questions out of the supported legal context and general questions which aren't related to legal context.

2.6 Apportioning of requirements

The requirements described in sections 1 and 2 of this document are referred to as primary specifications; those in section 3 are referred to as requirements specifications. The two levels of requirements are intended to be consistent. In the event that a requirement is stated within both primary and functional specifications, the application will be built from functional specification since it is more detailed.

Ontology is created at the beginning. NLP and ML handling parts are handled parallelly. Halfway through the implementation of the server, building the front end will be started. Support of the documents and directions will be implemented afterwards.
As the user requirement, we hope to support different legal areas other than the currently supporting ones in the future.
And also, we hope to integrate Lawbot to existing messaging platforms in future. ex: Facebook, Messenger, Viber.

3. Specific Requirements

3.1 External interface Requirements

3.1.1 User interfaces

Home Interface

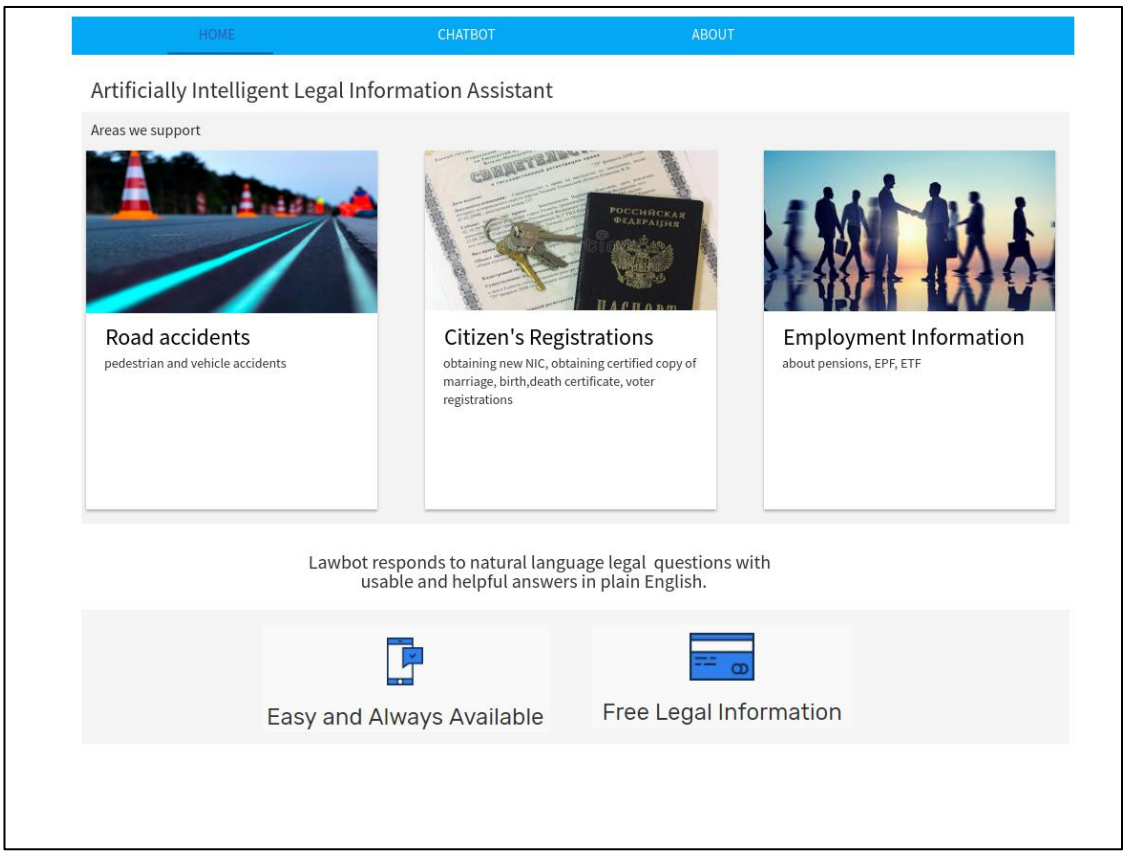

Figure 3.1.1.1: Home user interface

Name of item	Home
Description of purpose	Gives user a brief idea about the Lawbot and its supporting areas.
Source of input or destination of output	N/A
Valid range, accuracy and/or tolerance	N/A
Units of measure	N/A

Timing	N/A
Relationships to other inputs/outputs	N/A
Screen formats/organization	N/A
Window formats/organization	Full screen
Data formats	N/A

Table 3.1.1.1: Home user interface

Chat Interface

Figure 3.1.1.2: Chat user interface

Name of item	Chat
Description of purpose	User interaction with chatbot
Source of input or destination of output	Input - user's question Output - answer from the chatbot
Valid range, accuracy and/or tolerance	Valid English language input without using slang/ idioms

Units of measure	N/A
Timing	N/A
Relationships to other inputs/outputs	N/A
Screen formats/organization	N/A
Window formats/organization	Full screen
Data formats	String

Table 3.1.1.2: Chat user interface

About Interface

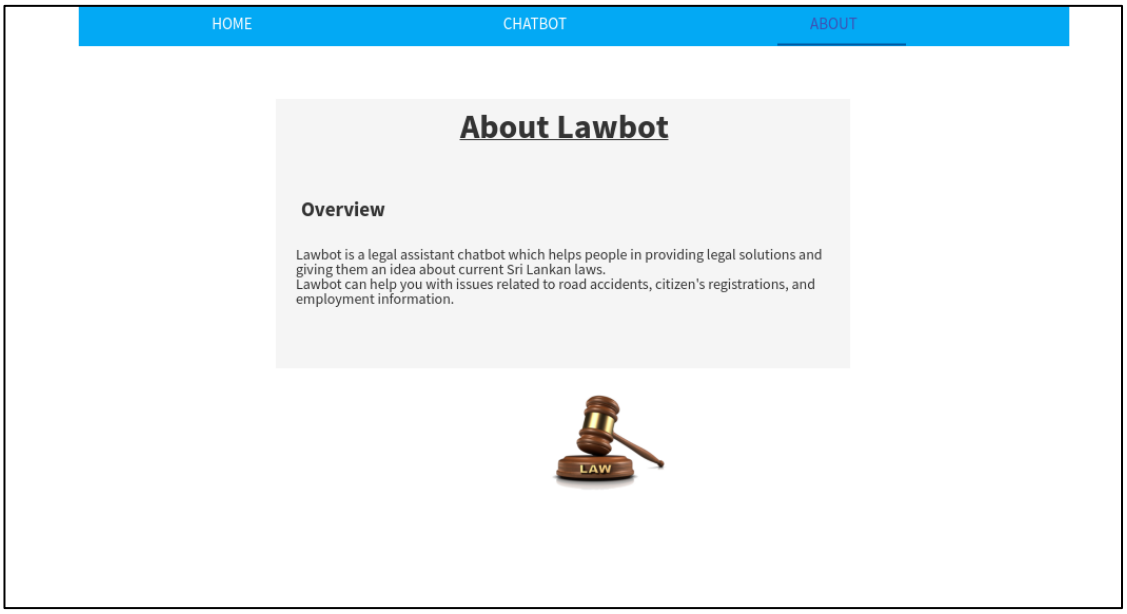

Figure 3.1.1.3: About user interface

Name of item	About
Description of purpose	Gives user a brief idea on the Lawbot project
Source of input or destination of output	N/A
Valid range, accuracy and/or tolerance	N/A

Units of measure	N/A
Timing	N/A
Relationships to other inputs/outputs	N/A
Screen formats/organization	N/A
Window formats/organization	Full screen
Data formats	N/A

Table 3.1.1.3: About user interface

3.1.2Hardware interfaces

Laptop or desktop computer or mobile phone

- For laptops and desktop computers its recommend having Pentium 4 or newer processor in order to run Angular capable browser.

Microphone

- If voice input used
- For mobile devices inbuilt microphone is supported.
- For desktop and laptops, a general-purpose microphone is required.

Network Connection (Router, Modems, Dongles)

3.1.3 Software interfaces

Software interface mainly depend on Angular browser support.

For laptops and desktops

- Web Browser
    - Google Chrome - latest version
    - Firefox - latest version
    - Internet Explorer - version 9 or higher
    - Edge - version 13 or higher
    - Safari - version 7 or higher

For mobile devices -

- Android - version 4.1 or higher
- iOS - version 7 or higher
- Windows - IE mobile version 11

3.1.4 Communication interfaces

Modem/Router/Dongle will provide access to internet when it needs and HTTP protocol will be used.

3.2 Class/Objects

Figure 3.2.1 shows classes relevant to 'Lawbot, the legal assistant chatbot' component and its operations. These classes might be changed in future based on client preference.

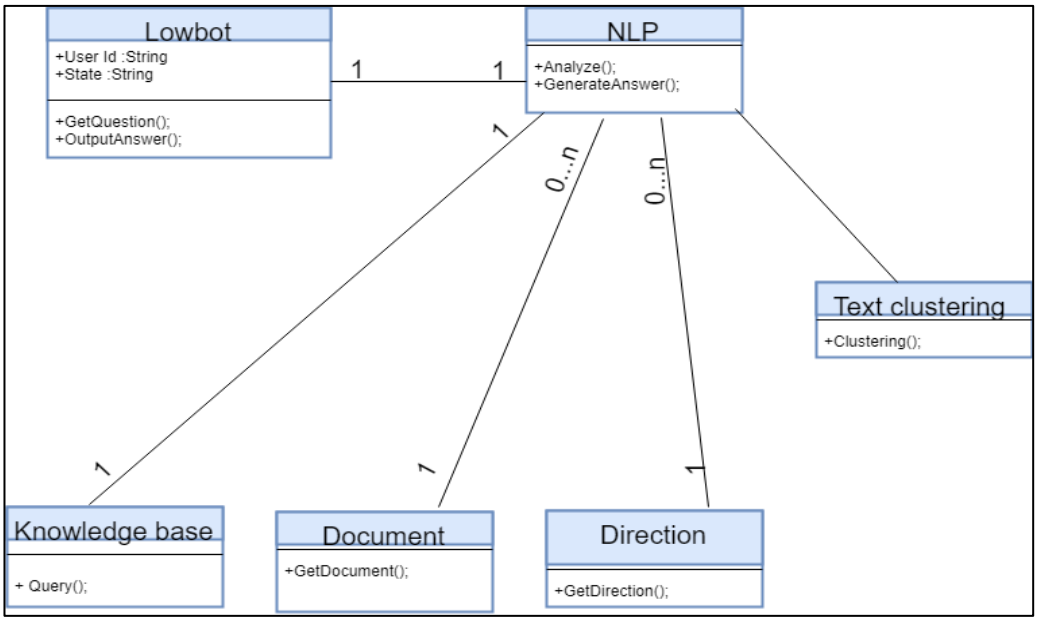

Figure 3.2.1: Class Diagram

3.3 Performance Requirements

Chatbot should reply for a user input within 10 seconds.

3.4 Design Constraints.

Because of the limited time, we do not cater all law categories to limit the scope. Other than that, designers are free to create any (good) design that satisfies the requirements.

3.5 Software System Attributes

3.5.1 Reliability

Reliability is an important attribute in Lawbot since we provide people with the real-world solutions. We provide with a solution only if the solution is reliable and the question is clear enough. If the solution is not definite, we won't provide with a solution.

3.5.2 Availability

Web application should work 24x7. End users can use the chatbot and get answers for their legal issues whenever user needs. Moreover, system should support concurrent user access. In case of a failure down time should be minimum so that system shall maintain high availability.

3.5.3 Security

The system must use HTTPS protocol to the website in order to acquire more secure data transaction.

3.5.4 Maintainability

Knowledge base (ontology) should be expandable and easily updatable since laws can be changed. With the current laws changing, we need to update the ontology.

3.6 Other Requirements

3.6.1 Extensibility

Lawbot should be able to accommodate new features. Lawbot should be flexible to add new functionalities without causing damages to current system functionalities. Knowledge base should be expandable to accommodate new legal areas. Lawbot should be able to integrate to messaging platforms.

3.6.2 Accessibility

The web application should be easily accessible by the users. Users do not need to be bothered to create accounts or login through any existing social platform accounts (ex: Facebook, google) when using Lawbot.

4. Supporting Requirements

4.1 Description of the problem

People face several issues in day today life. For example, misplace of NIC, met with an accident, crops or property damaged by elephants, need to get the passport. In case of such issues, people has no clear idea on is there a legal solution to the issue, if there's a solution what procedure to follow, from where to get the information. So in search of legal assistance what are the options people turn up to? People either go to a legal advice providing place or some might even come to wrong conclusions based on friends', relatives' advice. Or sometimes they might need to waste hours in searching necessary information from the relevant websites or some might have legal assistant apps installed on their phones like Black's Law Dictionary, Fast case etc. If app is the option, then again, they need to login, search for hours and logout. Anyway, people go through several hardships to get the necessary information. All of these methods are very time consuming, cost consuming and needs lot of effort in searching so they are inefficient.

Much has been written about the application of Artificial Intelligence in law. Recently, we've seen a number of products prove themselves in the market, most of them geared towards legal professionals (e-discovery, legal analytics, and legal research). Below diagram shows different legal areas where currently AI has been able to involve with.

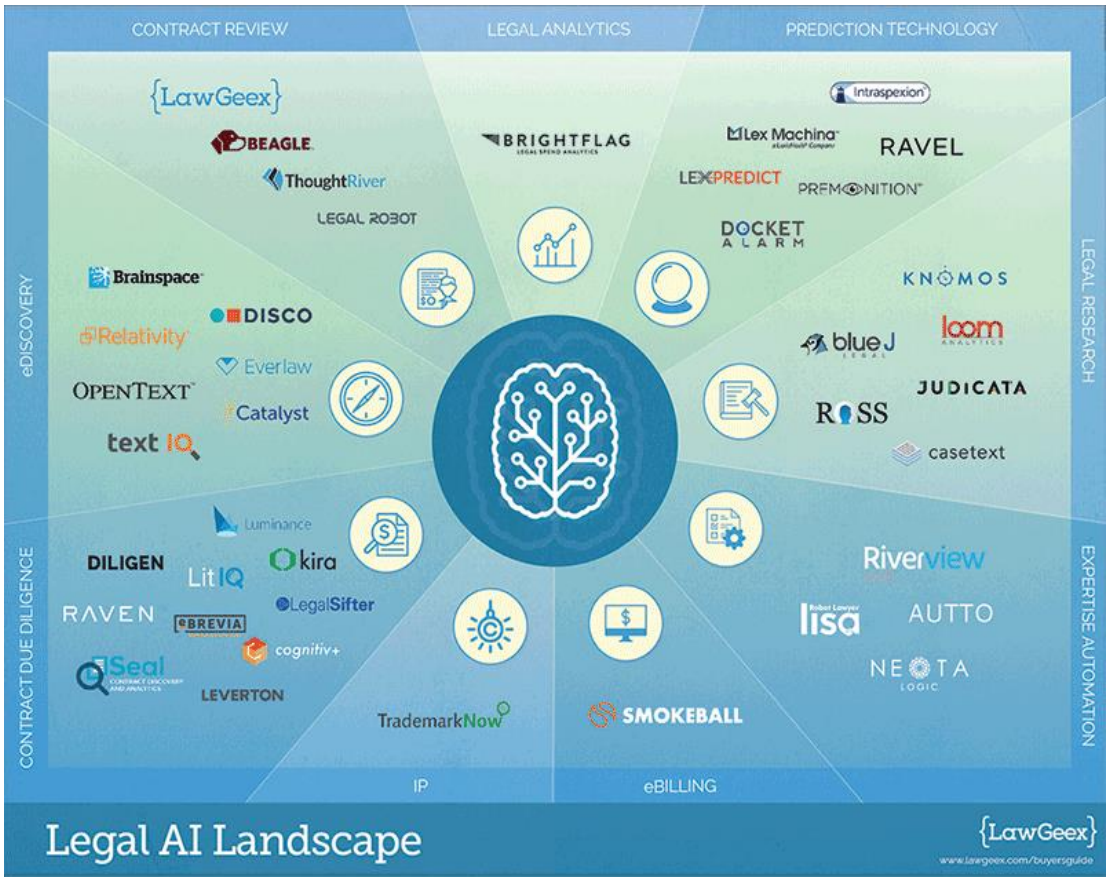

Figure 4.1.1 AI involvement with law areas

But what about AI that directly benefits legal consumers?

This is a question that is still not answered fully and a area still AI has not been able to do much with. Our solution is basically addressing this question.

And most importantly, there's no any single chatbot currently in Sri Lanka which provides legal assistance. So, our chatbot will be the first to provide people with their legal solutions.

4.2 Results of user survey

We wanted to check for the necessity of a legal assistant, since people do not have a right place to get the legal assistance from. And also since legal context spans over a wide range, we wanted to select three legal areas to implement. Therefore, we conducted a survey to find out in which areas nowadays people seek legal assistance mostly. From the results of the survey (given below) we have chosen these three areas.

i) Road accidents - pedestrian and vehicle accidents

ii) Citizen's Registrations - obtaining new NIC, obtaining certified copy of marriage, birth, death certificate, voter registrations

iii) Employment Information - about pensions, EPF, ETF

Results of the survey are given below.

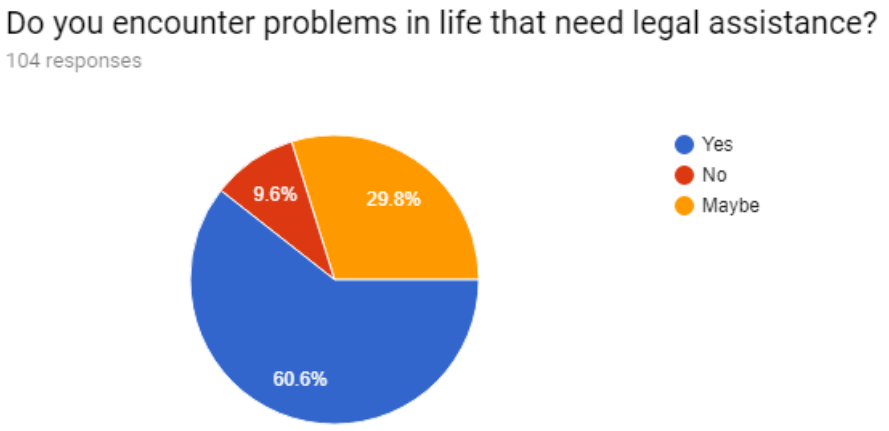

Figure 4.2.1 Survey results

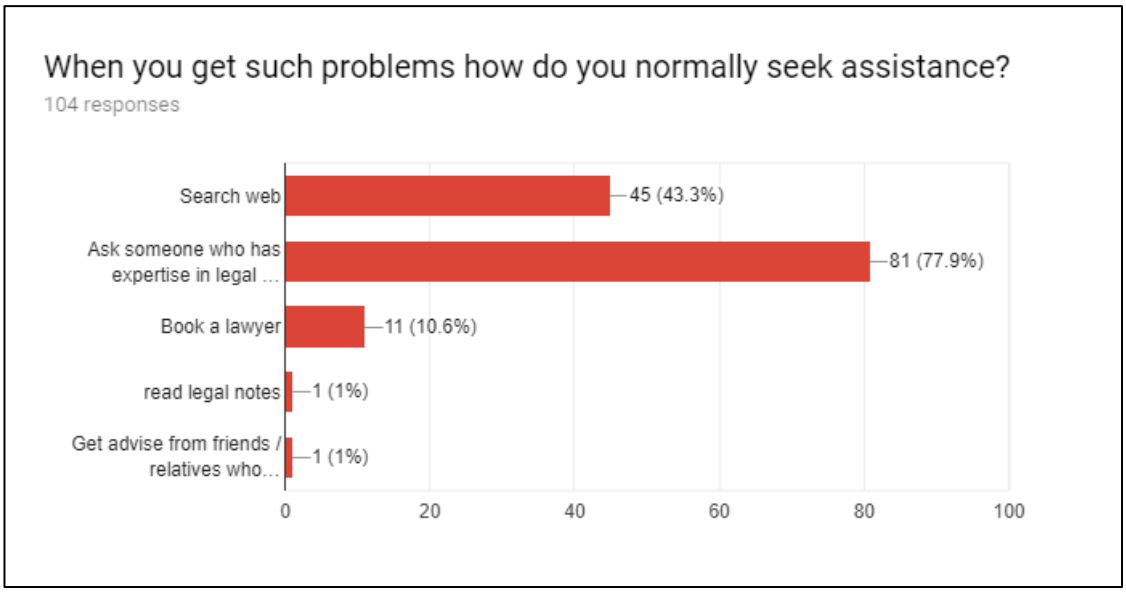

Figure 4.2.2 Survey results

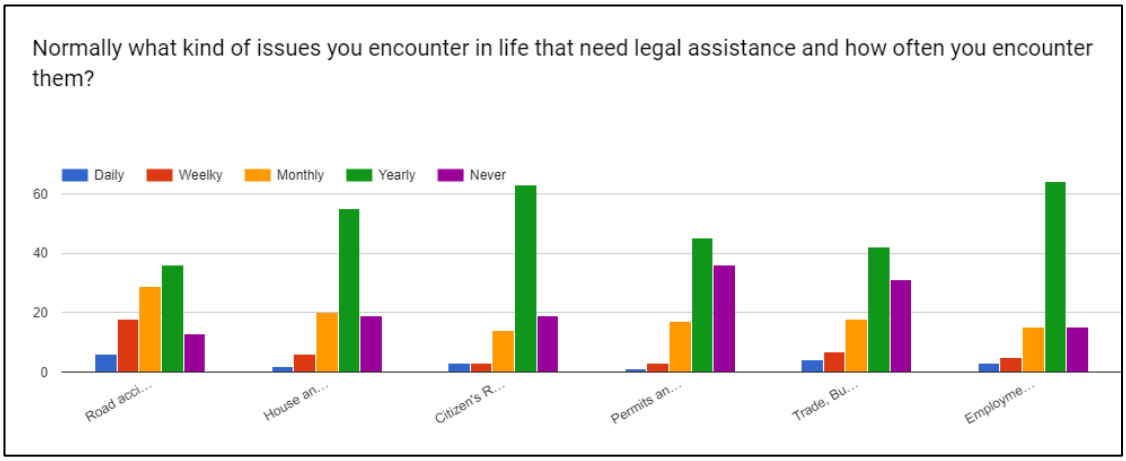

Figure 4.2.3 Survey results

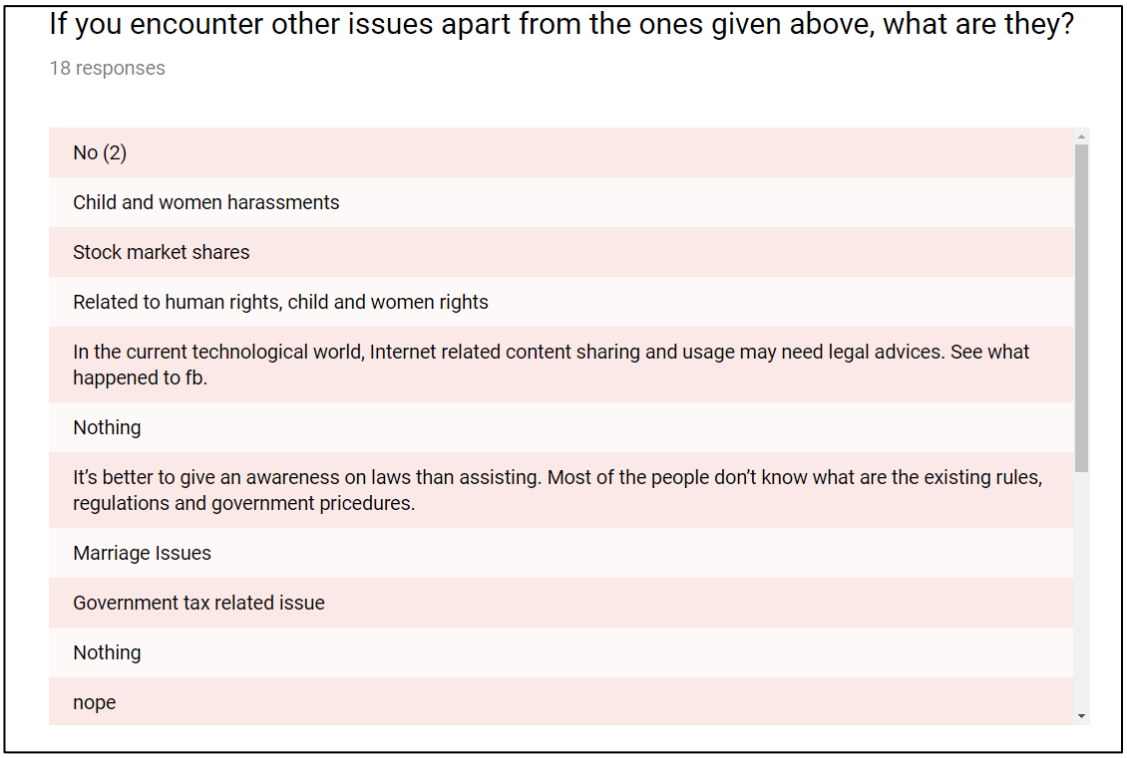

Figure 4.2.4 Survey results

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