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AI Chatbot Application Development Assisting Legal Case Prediction

Chinmoy Jyoti Hazarika[1], Agrawal Jay[2], Rahul M.[3], Rahil Antony George[4], Dr. Venkatesh S.[5]

[1,2,3.4] Students,and [5] Faculty
Dept. of Database and Business Systems,
SRM Institute of Science and Technology
Chennai, India

***Abstract:** Law and society are the indispensable achievements of mankind in different legalities. With the upcoming ages of human civilization the formulation of the judicial system was initiated. The legal system, along with jurisprudence, holds great significance in the growth of any society. Law Enforcements plays a pivotal role in regulating the proliferating communities. Due to the elongated expansion and modernization within the society, thesis and philosophies of law also undergo many curtailing and advancements. Numerous communities and societies tend to overlook judiciary as a fundamental part of their primary education, leading to a significant number of civilians remaining unaware of legal proceedings. Lawsuits could pose a remarkable challenge, especially for individuals unfamiliar with the legal processes, circumscribing major tasks such as meeting potential lawyers, hiring the right one, deciding the suitable court for filing a lawsuit, and contemplating the applicable emolument and time frame for suing. An unenlightened civilian might easily fall prey to any false claims, incurring considerable expenses in terms of time and funds. Hence, the suggested system offers an effective solution for predicting legal case types more efficiently.*

In the development of this project, an AI chatbot application has been curated to assist new lawyers in discerning legal case types. Datasets are brought together from various resources, and pre-processing techniques are utilized to pre-process the text datasets. Machine Learning (ML) algorithms like BERT are applied to train the datasets, and the AI chatbot application poses certain questions to assist in predicting legal case types accurately. By furnishing the necessary answers for the prediction process, it can efficiently determine the type of legal case, providing an effective tool for lawyers.

Keywords—Artificial Intelligence (AI), Machine Learning (ML).

1. INTRODUCTION:

Predicting legal judgments has long been a keen topic in the kingdom of law theory and practice to enhance judicial consistency, accessibility to justice, and administrative effectiveness. Various methodologies and techniques have emerged over time, ranging from simple compute models to highly sophisticated analytical algorithms to forecast legal judgments. There have been a wide amassing of approaches attempted, particularly through artificial intelligence (AI)-based methodologies gaining adhesion with the recent emergence of AI.

Legal decision-making systems, rooted in AI, have been conceived to automatically predict verdicts to aid lawyers. An AI-powered legal automation system introduced as AI lawyer in May 2016 in the United States epitomizes this trend, with ongoing efforts to enhance its accuracy. This system sifts through abundant judgment documents, analysing their contents through a definitive algorithm to automatically render case verdicts. With a efflux in the number of lawsuits in recent years, it is progressively challenging and time-consuming for human lawyers to furnish accurate verdicts in legal judgments. Hence, there is a pressing demand to forge systems for precise prediction of legal judgments, drawing upon a wealth of legal precedents, anchor aging AI lawyers and automated legal systems founded on extensive data. Nonetheless, there remains minimal research on big data analytics in the

legal domain.

Privacy contravention legal cases stem from the interplay of societal and technological factors, encircling violations of laws, human errors, and the perception of personal information owners. Recent privacy legal cases exhibit definitive characteristics from other legal scenarios. For instance, stealing someone's possessions is worldly deemed illegal regardless of circumstances. In contrast, privacy transgression scenarios pose a challenge in pinpointing censurable parties, with cases involving misuse of spyware to breach an individual's privacy serving as prime examples showcasing how legal judgments can be influenced by technological and social factors.

Law and society are entwined accomplishments of humanity, dating back to the inception of human civilization where the constructs of the judicial system originated. The legal system coupled with jurisprudence plays a cardinal role in societal development. Law enforcement stands as a castigatory element in shaping budding communities. Owing to the prolonged expansion and modernization of societies, the theories and philosophies of law have undergone multitude refinements and advancements. Various communities and societies neglect to embody jurisprudence in their core educational curriculum, leaving a sizeable number of civilians oblivious to legal procedures. The intricacies of a lawsuit can prove intimidating for individuals unacquainted with legal processes, entailing major actions like tying up with potential lawyers, selecting the appropriate legal representation, determining the suitable court for litigation, evaluating the applicable emolument and suing timelines. An uninformed citizen may easily fall prey to patently false claims, emanating extensive costs in terms of time and finances.

TECHNOLOGIES USED:

1.1) Machine Learning

Machine Learning (ML) is a field that furnishes computers with the ability to learn without obvious programming instructions. ML emerges as one of the most riveting technologies in contemporary times, furnishing computers with human-like learning capabilities. Oft interlinked with computational statistics, ML focuses on prophesying using computers, though not all ML involves statistical learning. Mathematical optimization studies provide methodologies, theories, and application domains to the monastery of ML. Data mining, a related field, gives prominence to exploratory data analysis through unsupervised learning. In the business sphere, ML is synonymous with predictive analytics.

ML paragons computers acquiring skills to execute tasks devoid of explicit programming directives. By learning from enhanced data, computers grasp how to execute specific tasks. While simple tasks are straightforward to program, challenging tasks necessitate algorithms that overshadow manual human intervention. In application, facilitating machine algorithm development proves more effective than diligent human programming.

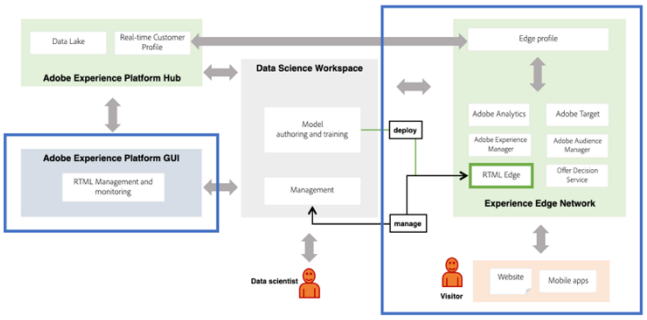

Figure 1.1 ML architecture

Machine Learning approaches

ML methodologies traditionally fall into three broad categories contingent on the lines of "signal" or "feedback" accessible to the learning system:

1.1.1) **Supervised learning:**

Supervised learning implies a tutor or supervisor for machine training. Essentially, supervised learning requires instructing or guiding the machine with labeled data, where certain information is already glued to the correct answers. After acquainting the machine with a fresh dataset, the supervised learning

algorithm combs through the training data (comprising training examples) to generate accurate outputs from labeled information. This aligns with scenarios where input variables (x) and output variables (Y) entail mapping function from input to output, aiming to approximate this function skillfully for seamless prediction of output variables for novel data inputs.

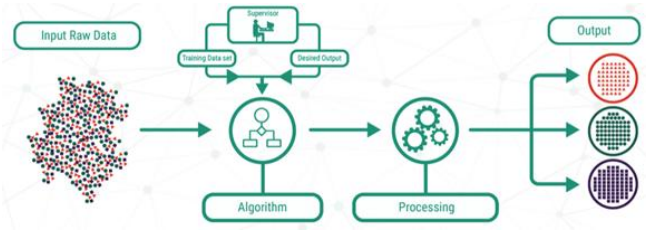

Figure 1.2 Supervised learning flowchart

1.1.2) Unsupervised learning:

Unsupervised learning entails machine training sans classified or labeled information, permitting the algorithm to categorize unsorted data based on similarities, patterns, and discrepancies without predefined data training. In this scenario, the machine must autonomously distinguish hidden structures within unlabeled data without external training.

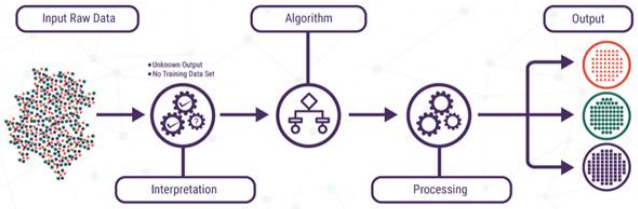

Figure 1.3 Unsupervised learning flowchart

1.1.3) **Reinforcement learning:**

An interactive computational program steers a dynamic setting, endeavouring to achieve specific objectives while receiving feedback akin to rewards, prompting it to maximize performance within its functional scope.

Figure 1.4 Reinforcement learning flowchart

1.2) OBJECTIVES OF THE PROJECT:

- To anticipate legal case types using advanced techniques for lawyers
- To contrive and fabricate ML algorithms for identifying legal cases for aspiring lawyers.
- Chatbot App Development for New Lawyers, Legal Brand Assistance.

SCOPE OF THE PROJECT:

- Open to lawyers about to join.
- There are six new lawyers to bring legal documents.
- It is available to the judiciary.
- Document analysis.

2. LITERATURE SURVEY

INTRODUCTION:

A complete analysis of the legal case is shown below. The most popular technologies are discussed below

LITERATURE SURVEY:

[1] Because it only addresses the music recommendation domain, the study on critiquing-based recommendation chatbots highlights limits in the validation scope. Although the results illuminate efficient criticizing processes, the absence of verification in more extensive suggestion scenarios may impede the use of the suggested methods.

[2] The FX Core system case study highlights the difficulties associated with the close coupling of services and the use of various communication paradigms in the context of microservices migration. Further optimization attempts are hampered by this complexity, which may restrict the scalability and efficiency improvements that microservices design may provide.

[3] The research using deep networks emphasizes how difficult it is to learn the rules in Nine Men's Morris. Teaching sub-symbolic systems to recognize valid moves is intrinsically challenging without prior knowledge of the game's rules, illustrating the difficulty of learning intricate rule-based systems from scratch.

[4] There are challenges in maintaining the integrity of Legal Professional Privilege (LPP) material in digital settings, especially when it comes to copying all digital data—including erased LPP documents—into storage media pictures. This difficulty emphasizes the necessity for strong solutions to successfully protect sensitive legal data.

[5] Although anonymous fingerprinting systems for multimedia transfer have advanced, many of the current methods have practical drawbacks. Although promising, the recombined fingerprint solution involves intricate graph searches for traitor tracing, which means that in P2P distribution scenarios, other purchasers and honest proxies must be involved.

[6] Assuring safety, non-blockingness, and maximally permissive control are difficult tasks when creating maximally permissive supervisors for partially seen discrete event systems. Although new algorithms provide promising answers, it is still computationally challenging to discover subsystems inside the whole controller due to its complexity.

CONCLUSION:

The conclusion drawn from the referenced papers collectively underscores the need for further research and development to address the identified challenges in various domains. These challenges include limitations in validation scope, system optimization complexities, the difficulty of teaching sub-symbolic systems complex rule-based tasks, and hurdles in preserving data integrity, particularly in legal contexts. Additionally, practical limitations in existing approaches for multimedia distribution and the computational challenges of synthesizing maximally permissive supervisors emphasize the necessity for interdisciplinary approaches and scalable, generalizable solutions.

Therefore, future research efforts should prioritize the development of robust and scalable solutions that can effectively address the complexities inherent in these domains. Interdisciplinary collaboration, incorporating insights from machine learning, system architecture, legal frameworks, cryptography, and other relevant fields, is crucial for advancing research and overcoming these challenges. By doing so, researchers can contribute to the creation of more efficient, reliable, and secure systems across various domains, ultimately driving innovation and progress in the respective fields.

3. PROPOSED SYSTEM

3.1) EXISTING SYSTEM

A recent development in recommender systems (RSs) is dialogue-based conversational recommender systems (DCRSs), which enable users to communicate with the system in natural language thereby speeding up the process of providing feedback and exploring products. Nevertheless, there hasn't been much research done to objectively examine how users interact and perceive these systems—and, especially, how to let users give feedback on the recommendations they receive. In order to enhance DCRS's feedback elicitation process, we want to create efficient critiquing methods in this article (i.e., allowing users to evaluate the current recommendation during the discussion). Our work involves the implementation of three prototype systems each of which propose a different method of critique: user-initiated, progressive system-suggested, and cascade system-suggested. Next, in order to assess the three prototypes, we carried out two task-oriented user tests with a total of 292 participants. Specifically, we examine two common user jobs in recommendation systems (RSs): the basic recommendation task (BRT, which involves finding items based on the user's preferences) and the exploration-oriented task (EOT, which involves investigating various item kinds). The findings indicate that while BRT increases user satisfaction, EOT encourages more user participation. Furthermore, the kinds of criticizing approaches that users utilize during EOT are likely to affect their perception and alter the associations between specific interaction metrics and users' perceived serendipity. The results point to useful methods for providing feedback to improve user-chatbot interaction when the chatbot is making recommendations for various uses.

3.2) DISADVANTAGES OF EXISTING SYSTEM:

- Users' personalized recommendations are heavily dependent on their specific tastes, which might ultimately end up in a more constrained exploring environment.
- They only utilized the music recommendation domain to validate their findings. Additional validation of the results in additional domains is required.

3.3) PROPOSED SYSTEM:

The proposed techniques provide effective solutions for more efficient estimation of legal information. In this project, we developed a smart chatbot application that will help new lawyers on various legal issues. Data will be collected from different sources and data files will be processed using previous methods. ML algorithms like BERT are used to train the dataset and some questions will be asked by the smart chatbot application can easily identify legal documents when all the answers to the estimation process are given. Therefore, this project will help predict the type of law in lawyers' use of chatbot applications and machine learning.

3.4) ADVANTAGE OF PROPOSED SYSTEM:

- Provide good solutions on legal documents for incoming lawyers.
- Use chatbot applications and machine learning algorithms for easy prediction.
- User friendly for new lawyers.

3.5) SYSTEM ARCHITECTURE:

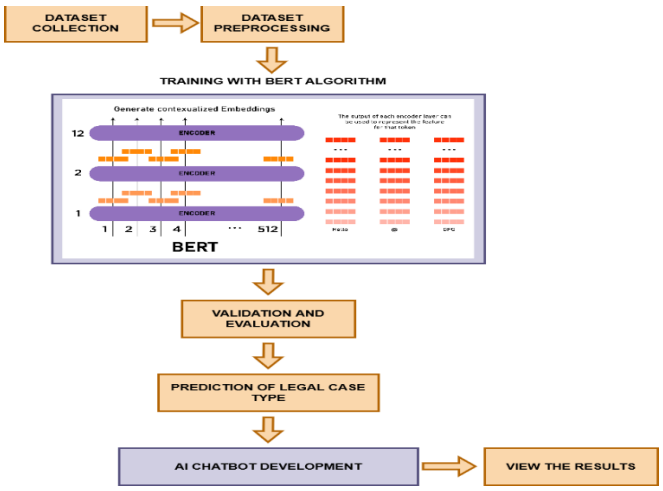

Figure 3.1 Proposed System architecture

3.6) WORKING:

In this project, an Artificial Intelligence Chatbot application has been developed for experts on new laws that will help solve legal problems. Therefore, the first step of the project will be to collect datasets from various sources and then we will separate these data into working files and test data; where test data will remain independent, training data will be used to train the model. Then use the prefix tool to add a prefix to the file. We will get ready for training with the architecture after pre-processing the dataset.

Now we will use advanced ML algorithms (like BERT) to train the model and ask some questions from the AI chatbot application Bidirectional Encoder Representation of Transformers, or BERT for sh/ort, is a deep learning model in which each result is placed in between every input point and connected to every other input point. Weight is calculated based on possible measurement. from your connections. After using the machine learning algorithm, it can use and evaluate the data set. Once all the answers are given to the prediction process, the correct data type can be easily determined. Therefore, this project helps lawyers to effectively predict all types of law using chatbot applications and machine learning.

SYSTEM ANALYSIS

MODULE DESCRIPTION:

- Dataset Collection
- Dataset Pre-processing
- Training using ML Algorithm
- Validation and Evaluation
- Prediction of legal case type

4.1) Dataset Collection

In this project, we will collect data set and use them for training machine learning algorithms. Increasing the number of datasets increases accuracy.

The data set is written data. Machine learning has become the method of choice for solving many of the world's most challenging problems. In terms of prediction work, this is the best performance so far. These efficient machines require a lot of fuel; Oil is information. The more data collected, the better our performance model.

Google also explored the idea that more data means better performance on a large scale of 300 million records. picture! When deploying machine learning models in real-world applications, data needs to be consumed regularly to improve their performance. Moreover, in the age of machine learning, data is arguably the most important resource. There are three steps to data collection.

Distribution Regression occurs when the algorithm answers a binary yes or no question or creates multiple classes (grass, tree, or bush; cat, dog, or bird, etc.). An algorithm used to generate some numerical value. For example, if you spend a lot of time determining the price of your product because it depends on many factors, regression algorithms can help predict that price.

According to some machine learning algorithms classify objects based only on certain characteristics. Sorting is used to recommend videos or shows for streaming video services products that a customer will purchase based on previous searches and purchases.

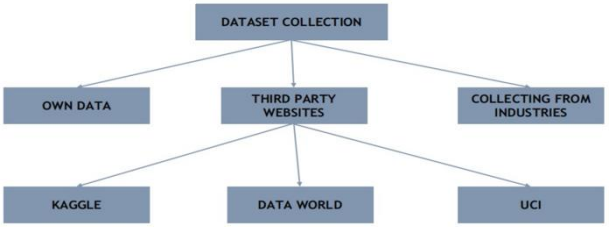

Figure 4.1 Dataset collection

4.2) Dataset Pre-processing

The process of preparing raw data in order to make it compatible with the ML model is termed as data presetting. This is a crucial beginning of building a model in ML. Recently, data prioritization techniques have been adapted to train and infer against machine learning models and artificial intelligence models. Data processing converts data into a format that is easier and more efficient in data mining, machine learning, and other data sciences. This technique is often used in the early stages of machine learning and artificial intelligence processes to ensure accurate results.

Over the past few years, machine learning has become increasingly important. Machine learning uses neural networks with many hidden layers (today's most advanced technology has dozens) and requires a lot of information. When it comes to obtaining comprehending and accuracy similar to that of humans in cognitive activities like speech, language, and vision, these models can be particularly valuable.

Theoretical and mathematical foundations have been put forward for many years. The advancement of machine learning has been driven by two main factors: a) the availability of big data/training examples in many fields; b) Increase in raw energy consumption and similar consumption.

Careful evaluation of the network's architecture and input data is necessary for the design of a good neural network model. The image number, image height, image width, number of lines, and number of pixels are the most often used parameters for picture data. Red, green, and blue (RGB) are the three colors that typically correspond to the three file formats. Usually, a pixel level of [0.255]. Let's choose the following values in this exercise Number of images = 100

- Image width, image height = 100
- 3 channels, pixel level [0-255]

Uniform aspect ratio: The first thing to do is to ensure that the size and aspect ratio of the photos are the same. It is necessary to verify that each image is square and cropped suitably because most neural

network models assume that the input image is square. You can crop an image to choose a certain frame, as demonstrated.

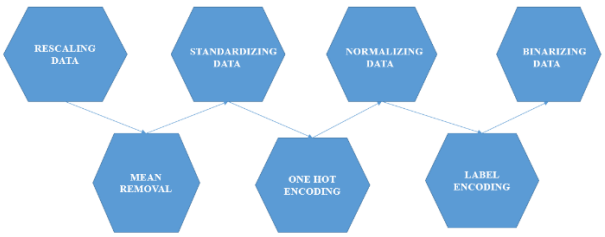

Figure 4.2 Data pre-processing

4.3) Using ML Algorithm Training

After the preliminary data will be fed for training. Machine learning algorithms such as BERT are used to identify legal documents. BERT is a machine learning framework provided as open-source software for natural language processing (NLP). BERT uses the text around an ambiguous word to deduce meaning, which helps with word meaning guessing. Question and answer data can be used to fine-tune the BERT base, which has been pre-trained using Wikipedia articles. The term BERT, or Bidirectional Encoder Represented by Transformers, refers to a deep learning model called Transformers, in which every output and every input are coupled, and the weight between them is determined dynamically. based on the relationships they have. (This procedure is known as tracking in NLP.) Language models were originally just able to comprehend text sequentially, that is, from the left to the right or from the right to the left, but not simultaneously. Because BERT has been designed to read both at once, it is unique. The Transformer's bidirectionality, or direction, provides this function. BERT first underwent training for two different but related NLP tasks: language structure and sentence structure, using this bidirectional ability.

Masked language modeling (MLM) training aims to mask words in a phrase and then train a program to figure out which word is masked depending on the password's content. The purpose of the next learning prediction is to make a prediction about whether two sentences are connected, interconnected, or whether their relationship is random.

Analysing spoken human language is the objective of the NLP (natural language processing) approach. This usually involves thinking on the words in the blank when utilizing BERT. Models tend to be trained using large training data sets for the purpose to achieve this. A substantial amount of real manual knowledge from the instruction set will be required for this.

But BERT only relies on untagged text-only corpora (e.g. the Brown Corpus and the entirety of English Wikipedia). It even understands more from ignored anonymous texts and continues to improve enhanced when used in real-world applications (like Google search). His earlier instruction was intended to be a succession of "experiences" from. From there, BERT can be adjusted to user preferences and magnified to match more search phrases and queries. Transfer learning is the term for this procedure.

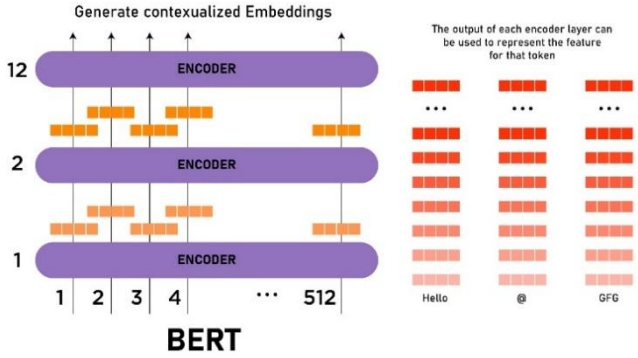

Figure 4.3 BERT architecture

4.4) Validation and Evaluation

Following ML algorithm training, this data set will be validated and evaluated. Validation in ML is akin to approving or verifying the learning model's prediction. Evaluation in ML refers to evaluating or testing the entire ML model and its performance in various situations. It involves evaluating the ML model training process and the accuracy of given predictions in various scenarios.

4.5) Prediction of legal case type

The main goal of this research project is to find the best predictive model, for example the best machine learning methods, that will determine new legal documents. layer. Once machine learning algorithms are used, legitimate data types can be easily identified while giving all the answers to the prediction process. Therefore, the program helps lawyers effectively predict what type of legal action will take place using chatbot applications and machine learning.

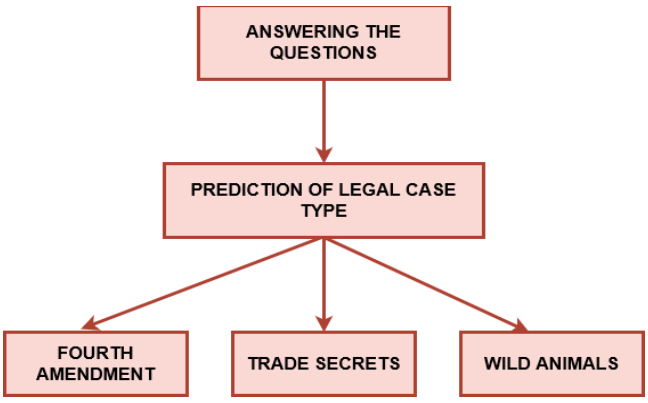

Figure 4.4 Prediction of legal case type

4. SOFTWARE DESCRIPTION

Software requirement specifications serve to set business analysis standards and additional constraints, such comprehensive needs, functionality and behavior efficiency, etc. The main purpose of software specification is to clearly and concisely describe the requirements of a software product.

5.1) GOOGLE COLAB

Google Colab was utilized as an open Interface for this particular endeavor. A free cloud-based online Jupyter book environment called Google Collaboratory enables us to train models using

machine learning and deep learning on CPU, GPU, and TPU.

We obtained a nice GPU for free, which we could use consistently for 12 hours. This meets the majority of data scientists' computational demands.

For our computers, Google Colab provides three various types of runtime:

- CPU,
- GPU and
- TPU

We have 12 hours of constant execution time using Colab. We have to reboot after that because the simulated machine is completely erased. Multiple CPUs, GPUs, and TPUs can be used simultaneously, however in these situations, their resources are shared.

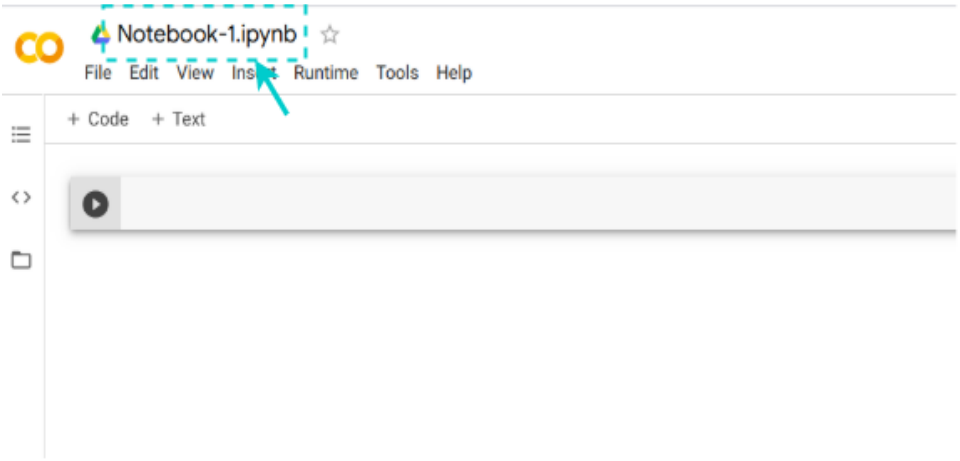

Figure 5.1 Google Colab Notebook

Colab Notebook can handle HTML, LaTeX, and picture formats. thereby it feasible to contain either rich text and code in one page. Our Drive account serves as where we store the Colab notebooks we make ourselves. We may quickly share our Colab books with friends or coworkers and invite them to make edits and comments. For additional details. An overview of Colab. We can use the link below or the menu above to create a new colab book: Make a fresh Colab Book. Notebooks hosted by Colab are Jupyter notebooks. As engineers, Google Colab allows us to:

- Write and run Python code
- Create, post, and share notebooks
- Import and export books from GitHub
- Import external files
- Import books in Google Drive
- TensorFlow, PyTorch, Keras, and OpenCV integration
- Free cloud service with free GPU

5.2) PYTHON

Python has been the programming language utilized in the the building of this project.

In the context of technology, Python is a high-level object-oriented programming language with dynamic semantics built in that is mostly utilized in Web and application development. Its dynamic writing and dynamic linking features offer especially attractive choice for quickly developing applications.

Python has a unique syntax which emphasizes readability, which makes it simple and simple to learn. Python code is less difficult for programmers to read and comprehend than code written in other languages. Because it allows the team to collaborate without impediment from linguistic or other problems, this reduces maintenance and development expenses.

Python also facilitates the implementation of packages and modules, which permits the construction of programs from modular structures and the reuse of code across many different projects. Once a user creates a mod or kit, it can continue to be used in other projects, and mods can be easily imported or exported.

The fact that Python provides a free interpreter and common library that both are available in binary and source code forms is one of its biggest features. This is valid across all major platforms, given Python and all required tools are widely available. For developers who do not want to worry about incurring large development expenditures, it is therefore a desirable solution.

5. RESULTS AND DISCUSSIONS

6.1) INTRODUCTION

The real impact of this project's implementations are discussed in this section.

6.2) RESULTS OBTAINED

First, to test the training model, we can split our project dataset collection with the process of collecting the kth dataset. Procedural data collected as shown below

	PSport	PGain	PLiving	DSport	DGain	DLiving	Malice	HotPursuit	NotCaught	LegalOwner	Impolite	Nuisance	Assault	Resident	Convention	NoBlame	outcome
0	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	No	Yes	No	No	No	No	find for the plaintiff
1	Yes	No	No	No	No	No	No	Yes	Yes	No	Yes	No	No	No	No	No	do not find for the plaintiff
2	No	No	Yes	No	No	Yes	No	Yes	Yes	No	Yes	No	No	No	No	No	do not find for the plaintiff
3	No	No	Yes	No	No	Yes	No	No	Yes	No	No	No	No	No	Yes	Yes	find for the plaintiff
4	No	No	No	No	Yes	No	No	Yes	Yes	No	No	No	Yes	No	No	Yes	do not find for the plaintiff

Figure 6.1 Dataset Collected

The figure below shows the search for the values in the data set and represents them with a colour.

Figure 6.2 Checking missing value

The figure below shows the Bert generation after training the model for each period of the wild data.

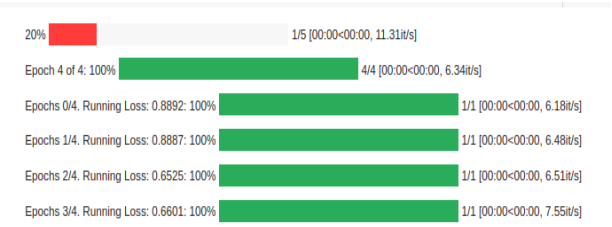

Figure 6.3 Generation of Bert model

The figure below shows the construction of the Bert model learned in each period of the trade secret data set.

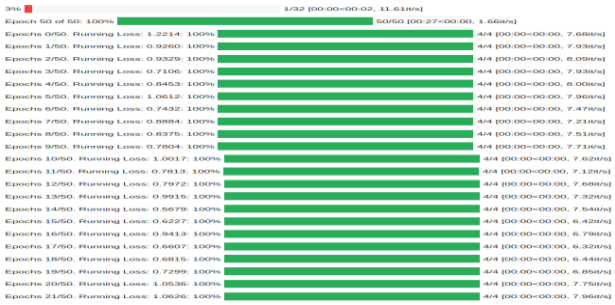

Figure 6.4 Generation of Bert model

The figure below shows the construction of the Bert model examined in each period of the Fourth Amendment data set.

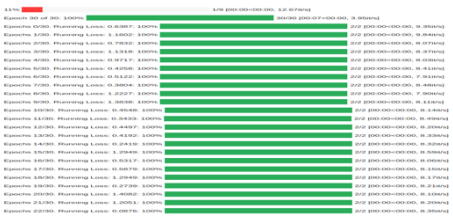

Figure 6.5 Generation of Bert model

The figure below shows the backend and frontend integration Choose to use the Flask framework and ngrok authentication. First, we need to import the necessary packages to create a pipe application and set the name of the instance for the application. Then open the shared resources for the application and install ngrok, which is used to generate secure public

URLs for the application. Then path to the web application "/brain" which can handle GET and POST requests, then call the input function and extract the image URL from the application's JSON payload. After specifying the image file using Base64. Finally, use the learning model to predict different types of legal cases.

Figure 6.6 Backend integrate with front using Flask Framework and Ngrok

The front login screen is shown in the figure below.

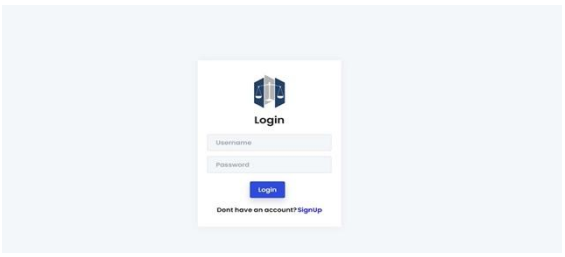

Figure 6.6 Front end login screen

The figure below shows the front-end login screen.

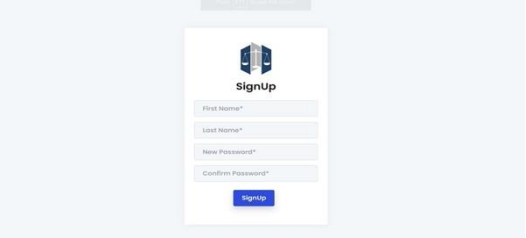

Figure 6.7 Front end Signup screen

The figure below shows different types of legal documents

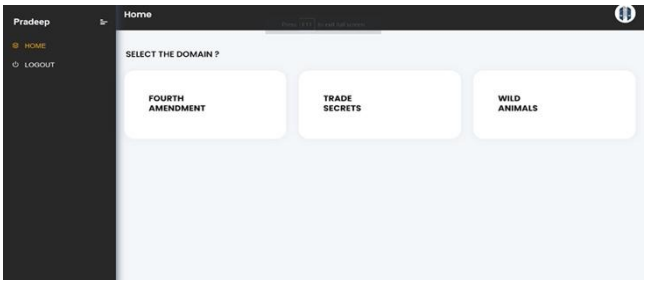

Figure 6.8 Legal case domain

The figure below shows different types of laws Questions and answers.

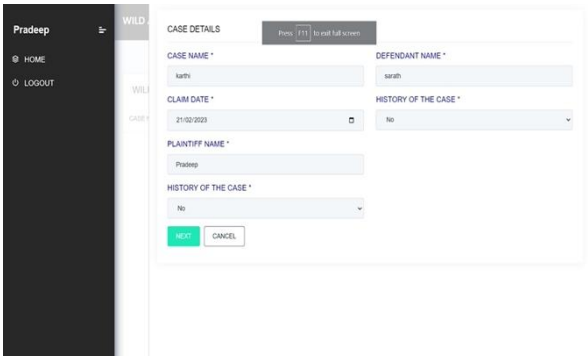

Figure 6. 9 Legal case question and answer

The figure below shows detailed legal information.

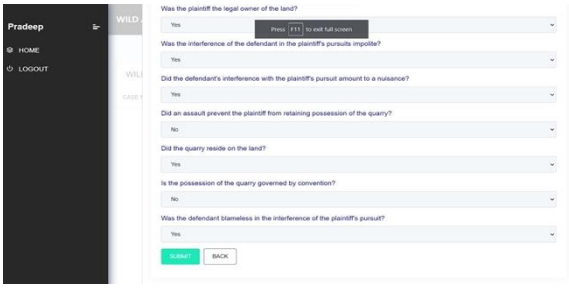

Figure 6. 10 Legal case details screen

The diagram below shows the relevant legal information.

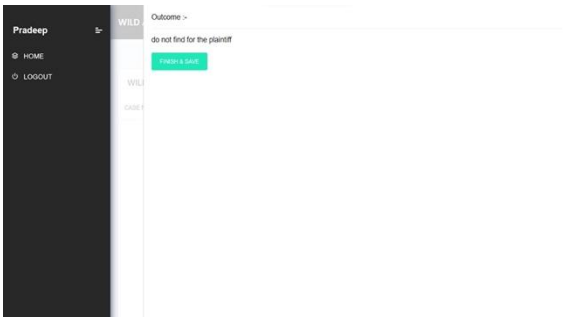

Figure 6.11 Legal case result outcome screen

7. RESULTS AND DISCUSSIONS

7.1) CONCLUSION:

This study was conducted to provide solutions for using machine learning algorithms to predict new processes of legal documents. Use algorithms like BERT to more efficiently identify types of laws like the Fourth Amendment, trade secrets, and wildlife. In addition, a smart chatbot application has been developed for new lawyers to assist the legal profession. Machine learning algorithms are the best techniques that ensure the accuracy of the output and algorithms have the best prediction. There is a lot of room for improvement in technology as there are many ways to predict legal data.

7.2) FUTURE WORK:

In the future, we will study the types of legal information and decision-making technology in the legal bridge that can support more decisions of all kinds of laws. In this area, they have many opportunities to create or modify the project in different ways. So the project has a practical future Manual estimating can be cheaply converted into computerized production.

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