VITAL: Virtual Interactive Telegram Assisted Law Clinic

Preetila Seeam[1] and Amar Seeam[2(✉)]

[1] University of Mauritius, Moka, Mauritius
p.seeam@uom.ac.mu
[2] Middlesex University Mauritius, Flic En Flac, Mauritius
a.seeam@mdx.ac.mu

Abstract. This paper introduces VITAL: Virtual Interactive Telegram Assisted Law clinic, an innovative approach to legal education facilitated by the integration of Artificial Intelligence (AI). The manuscript deliberates on the potential advantages, obstacles, and applications of incorporating AI into legal education. VITAL aims to harness the power of AI to enrich the legal learning experience, providing tangible, experiential education through a virtual clinic utilizing chatbots via the widely-adopted Telegram messaging platform. This initiative brings a revolution in legal education, ensuring accessibility, flexibility, and continual evolution of knowledge imparted to students.

Keywords: Artificial Intelligence · Legal Education · Virtual Learning · Law Clinic

1 Introduction

Legal education has traditionally been centered around case law, statutory interpretation, and Socratic dialogue. However, with the advancements in technology, particularly AI, there is a potential to reshape the learning experience in legal education. AI can be integrated into virtual learning environments to simulate real-life legal scenarios, provide adaptive learning experiences, and enhance students' analytical and critical thinking skills. This paper introduces VITAL (Virtual Interactive Telegram Assisted Law clinic), an innovative project that aims to integrate AI into a virtual clinic for legal education using chatbots.

Chatbots, powered by AI and natural language processing (NLP) technologies, have increasingly become a prevalent tool in various industries. This research investigates the development and implementation of a Chatbot Law Clinic, which aims to provide accessible legal assistance to those in need. The primary aim of this research is to develop an a virtual Interactive Law clinic specifically tailored for Mauritius and hosted on the Telegram platform, ensuring its accessibility to the entire Mauritian population. VITAL will serve as a valuable resource for employees, trade unions, human resource professionals, and employers alike, providing a platform for them to ask questions and obtain legal advice without the need for consulting an actual lawyer.

A. Seeam et al. (Eds.): InterSol 2023, LNICST 541, pp. 290–310, 2024.
https://doi.org/10.1007/978-3-031-51849-2_20

The proposed platform combines the features of an expert system and a chatbot, simulating human conversation to enable users to interact with the system and receive reliable answers to their legal inquiries. By leveraging the widely adopted and user-friendly Telegram platform, VITAL ensures ease of access and continuous availability, which is particularly crucial in the event of future lockdowns due to public health concerns.

At its core, VITAL is a learning-centric system that continually expands its knowledge base through ongoing interactions with users. As the system engages with users, it can identify and track the most common issues faced by different sectors of society, allowing it to provide more targeted assistance. Additionally, VITAL is designed to communicate complex legal concepts in a manner that is easily understandable to the general public.

This research aims to provide an accessible, convenient, and effective legal resource for the people of Mauritius, while simultaneously contributing to the broader understanding of how artificial intelligence can be applied to improve access to legal services.

In underserved areas, access to legal education and resources is often limited due to various factors such as geographical constraints, lack of financial means, and scarcity of educational institutions. The proposed platform addresses these issues by offering a virtual platform where students and legal practitioners can engage in interactive learning experiences without the need for physical presence.

Furthermore, the AI component in VITAL can be programmed to understand and analyze various legal frameworks and jurisdictions. This is especially beneficial for underserved areas that may have distinct legal systems, as the AI can be customized to provide relevant and localized legal content.

Moreover, the system can serve as a bridge between legal experts and the community in underserved areas. Through the platform, legal professionals can offer pro bono services, conduct webinars, and provide mentorship to aspiring legal practitioners in remote areas.

1.1 Beneficiaries

Although VITAL is designed to benefit everyone in Mauritius, it specifically targets individuals who face difficulties in accessing legal aid. A vast amount of knowledge and information is embedded within the laws and acts of Mauritius. However, retrieving relevant information on a specific issue requires not only an understanding of the law but also a deep appreciation for what to look for.

Considering these factors, the primary objective of this proposal is to digitalize these laws and acts, transforming them into an easily accessible, interactive chatbot. This chatbot will incorporate elements of artificial intelligence to assist and guide users towards finding solutions to their legal concerns, both during the COVID-19 crisis and beyond. Our concept makes use of the Telegram Instant Messaging platform (Fig. 1), an alternative to the popular WhatsApp messaging system, that usefully has free to use APIs for conversational agents. A similar concept was successfully implemented through Telegram for a Tourism chatbot, by the authors in [1].

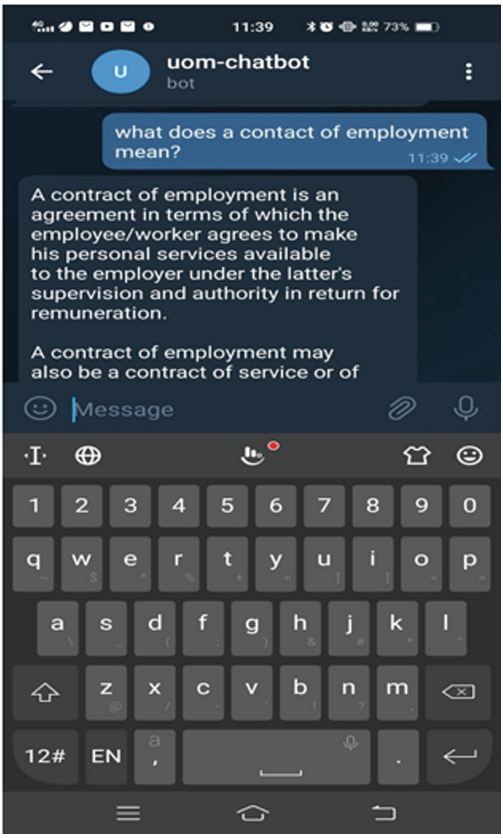

Fig. 1. Telegram bot

1.2 Target Groups

VITAL aims to address the needs of the following target groups, who may experience greater challenges in obtaining legal assistance:

- Low-income individuals who cannot afford traditional legal services
- People living in remote or underserved areas with limited access to legal professionals
- Individuals with disabilities or language barriers that make it difficult for them to navigate the legal system
- Non-profit organizations and community groups that require legal guidance but lack the resources to hire legal counsel

The paper is divided as follows. The subsequent section, Sect. 2, presents a literature review focusing on the use of Artificial Intelligence in education, and specifically its innovative application in legal education. Section 3 delves into the methodology used in the development of VITAL, explaining the AI

technologies and strategies employed. Section 4 discusses implementation and testing processes of VITAL Finally, Sect. 5 and 6 concludes the paper with discussion and offers recommendations for future research and development in the field of AI-enhanced legal education.

2 Literature Review

Chatbots are becoming increasingly popular in the educational domain as they have the potential to provide personalized learning experiences to students. The research shows that chatbots can improve educational outcomes by offering timely and constructive feedback to students, guiding them through complex tasks, and encouraging them to engage in active learning.

One of the benefits of chatbots is their ability to personalize the learning experience for students. By using data analytics and machine learning algorithms, chatbots can analyze students' learning patterns and preferences to provide tailored feedback and guidance. This personalization can help to improve students' motivation and engagement with the learning process, leading to better learning outcomes.

Another advantage of chatbots is their ability to scaffold learning. Chatbots can provide step-by-step guidance and support to students as they work through a task, helping them to break down complex problems into smaller, more manageable parts. This scaffolding can help students to build their confidence and competence in the subject matter, ultimately leading to improved learning outcomes.

Chatbots can also engage students in conversation, creating a more interactive and dynamic learning experience. By simulating natural language conversations, chatbots can encourage students to ask questions, explore ideas, and engage in critical thinking. This engagement can help students to develop their communication and collaboration skills, which are essential for success in today's workforce.

However, challenges remain in terms of chatbot design, deployment, and evaluation. Chatbots must be carefully designed to ensure that they are effective and user-friendly. They must also be integrated seamlessly into the educational environment, and their impact on learning outcomes must be evaluated rigorously. Furthermore, chatbots must be continually updated and improved to reflect changing student needs and preferences.

2.1 AI in Education

The integration of AI into educational systems has been gaining momentum and has the potential to reshape the learning experience in various ways. For example, chatbots hold great potential to revolutionize the field of education. For example, [2] demonstrates that they can improve educational outcomes, although research is still nascent. The use of chatbots extends beyond education to healthcare, offering 24/7 access to information and assistance, automating

routine tasks, and reducing costs [3]. Concerns persist, however, regarding data privacy, security, and lack of standardization. AI-chatbots have shown promise in enhancing student learning, offering immediate feedback and engaging students [4]. The advent of AI, particularly chatbots like ChatGPT, in the educational sphere does not come without its set of disruptions and challenges. While chatbots offer immediate feedback and active engagement, thus enhancing student learning as suggested by [4], they also introduce new dynamics that educators and administrators must navigate. One such issue is the potential for overuse or misuse by students, which can divert attention away from structured learning experiences and potentially dilute the educational content. An intriguing finding from this multifaceted study is the promise and challenges of using ChatGPT in educational settings. While the tool shows potential, early adopters express safety concerns and highlight the need for specific guidelines. The study, titled 'What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education,' contributes to both theoretical and practical discussions surrounding the role of chatbots in educational settings. It offers key insights into curriculum development and ethical considerations specific to chatbot use, while also acknowledging limitations such as its emphasis on early adopters and the absence of quantitative data [5].

In another systematic literature review on chatbots in education, the researchers identified three main pedagogical roles of chatbots—supporting learning, assisting, and mentoring—along with four main objectives for their implementation. However, they highlighted challenges in aligning evaluations with these objectives, exploring chatbots' mentoring potential, and leveraging their adaptive capabilities. The study concludes that while chatbots hold promise in education, more research is needed to align technological advancements with educational needs [6]. In [7] a systematic review on the development of emotionally intelligent chatbots is explored, highlighting techniques for emotional response generation and popular datasets like Weibo and Twitter. The review uses both automatic and human evaluations for performance metrics but acknowledges limitations due to time constraints and the nascent state of the field. The work by [8] examines the growing role of AI chatbots in education, made possible by advancements in natural language processing and understanding. The paper reviews methodologies and tools for chatbot design, focusing on language-related challenges, especially in implementing English and Arabic interfaces. A use case involving the Hubert.ai chatbot, used for gathering student feedback on a machine learning course, is also presented to illustrate the educational benefits of chatbots. In the paper by [9] a further systematic literature review using a multi-perspective framework is conducted, to examine the role of chatbots in education, especially in large-scale learning scenarios. Despite the increasing presence of chatbots in various sectors, their systematic study in educational settings has been lacking. Drawing from 1405 articles across different fields, the study narrows down to 80 relevant papers for in-depth analysis. The findings indicate that chatbots are still in the early stages of adoption in education, and their effectiveness varies depending on several factors. The work by [10]

investigates the burgeoning role of chatbots in the educational process. Despite the long-standing recognition of conversation as a key element in learning and teaching, the paper argues that chatbots are still in the early phases of their educational utility. However, they do offer substantial benefits. For example, voice chatbots enable more direct and focused interaction with the learning material, enhancing the user experience by eliminating the need for traditional computer navigation. Chatbots also foster a sense of engagement and self-expression among students, and are capable of collecting emotional data to respond to specific situations like elevated student anxiety. This is especially useful in large-scale educational settings such as universities or MOOCs, where chatbots can provide personalized support at a fraction of the cost of human resources. In a comprehensive study by [11], the authors sought to fill a research gap by investigating the use of artificial intelligence (AI) chatbots in educational settings from an educational technology perspective. Utilizing bibliometric and citation network analyses, the study identified emerging trends and applications post-COVID-19. The research revealed that chatbots are increasingly applied in language education, educational services like information counseling and automated grading, as well as in healthcare education and medical training. Despite these advances, the study highlighted several limitations, including a focus on English-language publications and limitations in the authors' technological expertise. Nevertheless, the study offers an extended framework for future applications of AI chatbots in education, emphasizing the need for a holistic approach that considers technological integration.

Notably, AI chatbots have proven effective in teaching foreign languages, particularly in enhancing conversational skills [12]. Furthermore, the use of chatbots as AI conversational partners in language learning tasks shows promising results. They provided scaffolding and support for learners, while engaging them in conversation [13]. Yet, it is critical to address the accessibility of chatbots and students' privacy concerns [9]. Their effectiveness in providing educational advice and supporting students' studies is supported by [14].

Teachers have demonstrated generally positive attitudes towards chatbots in education, acknowledging their utility in providing content, fostering student engagement, and aiding administrative tasks. However, concerns about students' over-reliance on them and their inability to replace human interaction persist [15]. Additionally, while chatbots have the potential to improve communication in education, the risk of disseminating misinformation or interfering with research processes necessitates caution [16]. Chatbots have been increasingly recognized for their potential role in formal education as they offer the ability to deliver educational content, assess student understanding, and provide feedback [17]. Their role as a digital learning tool can increase student engagement in online learning by providing a personalized experience and reducing feelings of isolation [18]. They have been effectively utilized in various higher education tasks, such as delivering information, helping with administrative tasks, offering personalized academic advising, and improving student engagement and retention [19].

Despite their potential, the use of AI chatbots in higher education does come with its challenges. While they can provide personalized support, they are not

a panacea and must be used in conjunction with other tools and resources [20]. In flipped learning environments, chatbots can effectively aid in learning content, assessment, and feedback, thus creating a more engaging environment [21]. Exploring the possibilities further, a framework for implementing AI-integrated chatbots in educational settings has been proposed, offering personalized and adaptive learning experiences [22].

In terms of content and language integrated learning (CLIL), chatbots have been proven effective for teaching new vocabulary and concepts [23]. Their application as virtual teaching assistants has also shown improvement in student performance and engagement [24]. Students generally perceive chatbots positively, appreciating their potential as learning tools, but they also point out certain design issues, including the need for natural language understanding and the ability to learn from user interactions [25]. Lastly, [26] found that in Higher Education Institutions, the adoption of chatbots for administrative inquiries is significantly influenced by their design, interactivity, and ethical considerations. These factors collectively build trust among students, thereby increasing the likelihood of chatbot adoption.

2.2 AI in Legal Services and Education

In legal education, AI can be used to create simulations of court proceedings, facilitate legal research through natural language processing, provide instant feedback on legal arguments, and much more. It can also be used to simulate client interactions, which are crucial in training future lawyers. However, research on the integration of AI in legal education is still in nascent stages and there is a need for more empirical studies and practical applications. In the AI and legal field, the authors previously worked on an expert system designed to assist the Mauritian population with inquiries related to labor and employment law. The expert system made use of Machine Learning, Speech Recognition/Synthesis and Natural Language Processing techniques to converse with users through a web interface, and was an early version of a similar chatbot demonstrated in this paper, with a custom interface, minus the learning capabilities and management abilities. [27]

Whilst these directions are promising, the integration of artificial intelligence (AI) into legal services, especially through the use of chatbots, has raised important legal and ethical questions. Legal chatbots have been identified as potentially capable of improving access to justice, offering services faster and cheaper than traditional lawyers, and being particularly beneficial to those who cannot afford legal representation [28]. However, it has also been pointed out that the current lack of regulatory frameworks for chatbots may result in potential issues related to fraud, privacy, and discrimination [29].

Concerning the broader legal status of AI, there seems to be a global lack of specific AI-related legislation. Different countries show varied approaches towards AI regulation, some taking a more proactive stance while others are more hands-off [30]. Interestingly, there is a trend to perceive AI as a tool rather than a legal entity, leading to laws primarily focused on its applications and not on AI itself [30].

The transition from automation to autonomous technology, like self-driving cars, has sparked discussions about legal and ethical responsibility [31]. This raises issues such as who should bear responsibility in case of an accident. Intellectual property rights in disrupted digital learning environments have also been brought to the forefront, emphasizing the need to consider issues around the ownership, licensing, unauthorized use, and protection of digital content [32].

Meanwhile, the advent of "ethical chatbots" based on principles of beneficence, non-maleficence, autonomy, and justice has been proposed as a viable solution to socio-legal issues [33]. AI's ability to model human behavior accurately, as demonstrated with Siri, reinforces the potential of AI as a valuable tool in understanding human behavior [34].

Chatbots also hold promise in disseminating legal information to specific demographic groups. For example, a chatbot framework was successful in simplifying legal rights for children, leading to positive user feedback [35]. Concerning criminal justice, AI systems have the potential to enhance the accuracy of risk assessments, potentially leading to more just outcomes [36]. However, it's important to ensure that these systems don't inadvertently target marginalized groups, highlighting the need for greater transparency and accountability in AI development and use [36].

The conversation around the ethical and legal implications of AI extends into healthcare, where AI-assisted suicide has been a topic of complex debate, weighing its potential benefits and risks. Furthermore, the development of "robot lawyers," AI-based programs capable of understanding natural language to provide legal information and advice, represents an exciting frontier in AI's role within legal services [37].

AI's application is also stretching to law libraries, where it is being harnessed to increase efficiency and accuracy in tasks like legal research, document management, and contract analysis. This usage is projected to grow in the future as demonstrated by [38]. For example, [39] showed that chatbots could be effective in teaching students about complex concepts such as Brooks Law, leading to an improved understanding in comparison to traditional methods.

AI's potential in the legal sector, providing assistance to lawyers and clients alike, is underscored by [40]. A prototype AI system was developed and tested with a group of lawyers, showing significant assistance in legal research and drafting documents. The development of an AI chatbot for Indonesian law on electronic transactions was also examined in [41]. This chatbot was designed to assist users in finding answers to legal questions and provide advice, demonstrating an accurate and effective tool in the legal context. The application of AI-integrated chatbots in e-learning shows promise in creating a more tailored learning experience for students. As indicated by [42], such chatbots can track students' progress, provide feedback, and offer personalized assistance, thus potentially enhancing the e-learning experience.

Perceptions toward the integration of intelligent agents and AI in everyday life are generally positive, though concerns about privacy and security persist, as discussed by [43]. The issue of consumer accessibility to legal services is high-

lighted in [44]. Many consumers reportedly lack awareness about their legal rights and struggle to access legal services, indicating the need for more readily available legal aid options. People's trust in AI increases when it is presented in a human-like manner and is perceived as an expert, according to [45]. This suggests that the effective use of AI in various fields may depend on how it is represented and communicated.

2.3 Comparative Analysis

Table 1 offers a comparative analysis of chatbots in the fields of Education and Legal Services, breaking down each sector's benefits, challenges, research gaps, notable applications, and user perceptions, summarising the state of the art, central to VITAL's direction.

Table 1. Comparative Analysis of Chatbots in Education and Legal Services

Criteria	Chatbots in Education	Chatbots in Legal Services
General Benefits	Personalized learning, Scaffolding, Student engagement, Timely feedback	Access to justice, Legal advice, Cost efficiency, Speed
Challenges	Design, Deployment, Evaluation, NLP Capabilities	Regulatory frameworks, Data privacy, Fraud and discrimination risks
Research Gaps	Specificity in design	Need for empirical studies, Practical applications, Accessibility to consumers
Notable Applications	Teaching foreign languages, Flipped learning environments, Academic advising	Legal research, Simulations of court proceedings, Document management
User Perceptions	Generally positive but concerns about reliance and design issues	Positive if human-like and perceived as an expert

3 Development of VITAL

VITAL is an innovative project designed to provide users with easy access to information about Mauritian Law. The development of this platform involved the exploration and implementation of two distinct versions, each leveraging different technologies and frameworks to achieve their goals.

The first version of the VITAL employed a combination of TensorFlow, Flask, and MariaDB to create a Telegram bot capable of answering questions about Mauritian Law. This version was characterized by a Flask-based website for law faculty members to manage the training data and a TensorFlow AI model to generate appropriate responses based on user input.

While the first version was successfully developed and tested, it faced several challenges in terms of ease of use and maintainability, prompting the exploration of an alternative solution. This led to the development of the second version of VITAL, which utilized the Rasa X framework. Rasa X provided a more streamlined and user-friendly approach to data management, model training, and deployment, simplifying the overall process and allowing for the seamless addition of new features.

This section will provide a detailed account of the implementation and testing processes for both versions of VITAL, highlighting the challenges faced and the solutions applied to overcome them.

3.1 Steps and Technologies for TensorFlow/Flask Version

The development of the VITAL involved several steps and the integration of various technologies, architectures, and programming languages. The key components of the system include a Telegram bot, a Flask-based website, a TensorFlow AI model, and a MariaDB database (Fig. 2).

1. **Telegram Bot:** Implemented using the Python programming language, the Telegram bot is designed to interact with users and respond to their questions about Mauritian Law. It utilizes TensorFlow to determine appropriate responses based on user input.
2. **Flask-based Website:** The website, built with Flask and MariaDB, serves as a platform for law faculty members to add entries that will be used to train and update the AI model. This ensures that the chatbot has accurate and up-to-date information about Mauritian Law.
3. **TensorFlow AI Model:** The AI model, powered by TensorFlow, is responsible for processing user input and generating responses. It is trained using the data provided by law faculty members through the Flask-based website.
4. **MariaDB Database:** A MariaDB database is used to store intents, patterns, responses, and user interaction logs. This database serves as a central repository for the system's data and is accessed by both the Telegram bot and the Flask-based website. A PHPmyAdmin interface allows direct admin access to the database tables and manipulation in SQL if needed.
5. **System Architecture:** The architecture of the system involves several components, including Nginx as a web server, Certbot for SSL certificate management, and Docker containers for running the different services. These components work together to provide a seamless and secure user experience.

6. **Training the AI Model:** The AI model is trained using a gradient descent algorithm, as detailed in the associated research paper. The training process is initiated by the maintainer through the Flask-based website, which triggers the `train.py` script to update the TensorFlow model based on the latest data in the MariaDB database.

By combining these technologies and following the outlined steps, the Chatbot Law Clinic has been successfully developed to provide accurate and efficient responses to users' questions about Mauritian Law.

3.2 Steps and Technologies for Rasa X

The creation of VITAL incorporated a range of technologies, architectures, and programming languages. The primary components of the system are a Telegram bot and a Rasa X server. The primary components are shown in Fig. 3

1. **Telegram Bot:** Developed using the Python programming language, the Telegram bot is designed to engage with users and provide answers to their questions about Mauritian Law. It leverages the Rasa X framework to decide on appropriate responses based on user input.
2. **Rasa X Server:** Rasa X is an open-source conversational AI framework that replaces the need for TensorFlow, MariaDB, and the Flask-based website. It serves as a platform for law faculty members to add, edit, and manage the training data used to enhance the AI model. Additionally, Rasa X facilitates model training and deployment, streamlining the entire process.
3. **Rasa AI Model:** The AI model, powered by the Rasa framework, is responsible for processing user input and generating responses. It is trained using the data provided by law faculty members through the Rasa X interface.
   Intents: Intents are the core building blocks of the Rasa AI model. They represent the purpose or goal behind a user's input, such as asking a question, requesting information, or performing an action. The model is trained to recognize and extract intents from user inputs by utilizing natural language understanding (NLU) techniques. By accurately identifying intents, the AI model can respond appropriately to user queries and maintain a smooth conversational flow.
   Stories: Stories in Rasa are sample dialogues that represent real-world conversational sequences between a user and the AI model. These stories are used during the training process to teach the model how to handle various conversational scenarios. Each story consists of a series of alternating user inputs (with associated intents and entities) and chatbot responses (with associated actions). By learning from these stories, the AI model becomes proficient at predicting the most suitable actions to take based on the user's input and conversational context.
   Dialogue Management: Dialogue management is a crucial component of the Rasa AI model that determines how the chatbot should respond to user inputs by selecting the most appropriate action. Rasa's dialogue management system

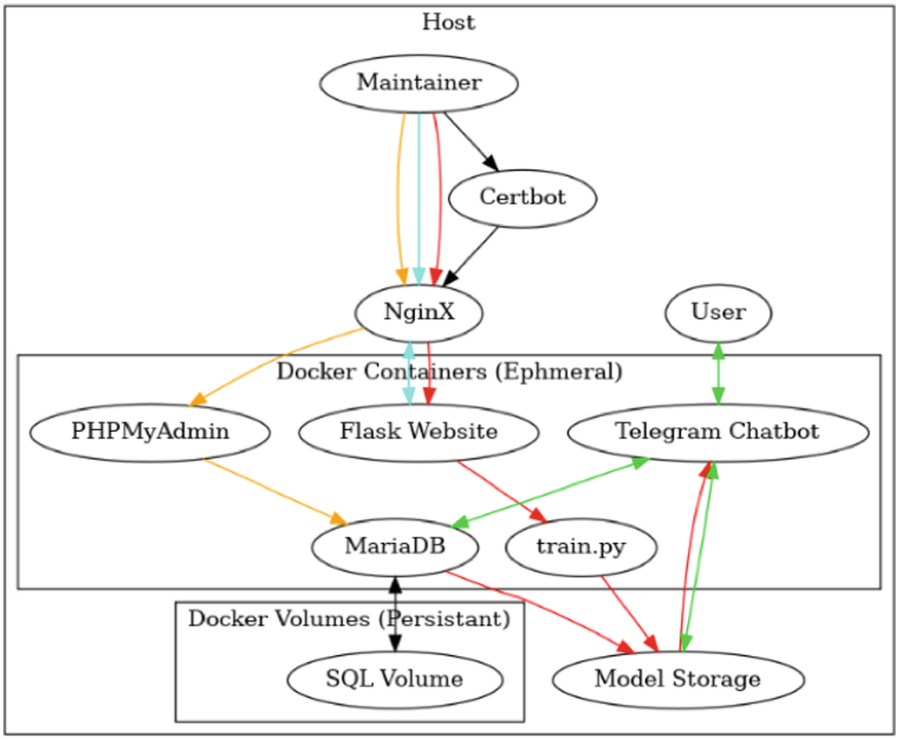

Figure 1: The different processes involved in this project

- Orange lines represent the PHPMyAdmin route to edit the SQL tables
- Cyan lines represent typical maintainer interaction with updating the model via the website
- Green lines represent user interaction with the telegram bot
- Red lines represent triggering the model to train

Fig. 2. Flask based solution (Color figure online)

uses a machine learning-based approach, specifically the Rasa Core, which is responsible for predicting the next action to take based on the conversational history and context. This approach allows the AI model to dynamically adapt to user inputs and maintain a coherent and context-aware conversation, rather than following a static, pre-defined decision tree.

4. **System Architecture:** The architecture of the system includes several components, such as Nginx as a web server, Certbot for SSL certificate management, and Docker containers for running the different services. These components collaborate to offer a secure and seamless user experience.
5. **Training the AI Model:** The AI model is trained using Rasa's built-in machine learning algorithms. The training process is initiated by the maintainer through the Rasa X interface, which triggers the model training and updates it based on the most recent data.

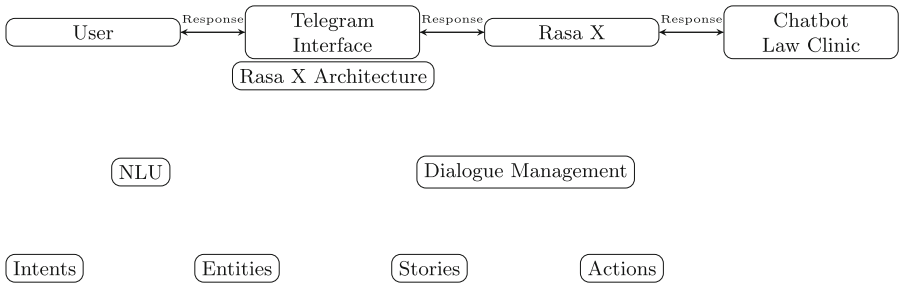

Fig. 3. Components of Rasa X based chatbot

6. **Integration with Telegram:** The Telegram bot communicates with the Rasa X server to provide real-time responses to users' inquiries. This integration ensures that users can access the Chatbot Law Clinic directly through the Telegram platform.

4 Implementation and Testing Processes

4.1 TensorFlow and Flask-Based Version

Implementation. The implementation of the TensorFlow and Flask-based version of VITAL involved several challenges. The first challenge was the development of the Flask-based website, which required constant updates and new functionality to manage and process the data provided by law faculty members. This made the website difficult to use and maintain, as additional features had to be integrated into the system regularly.

Another challenge was the integration of TensorFlow and MariaDB to train the AI model using the data stored in the database. This required careful management of data formats and synchronization between the components to ensure that the AI model was trained correctly and able to provide accurate responses.

Testing. The testing process for the TensorFlow and Flask-based version involved verifying the functionality of the various components and their integration. This included testing the Telegram bot's ability to handle user input, the AI model's capacity to generate appropriate responses, and the Flask-based website's effectiveness in managing the data used to train the model (Fig. 4).

Despite these challenges, the TensorFlow and Flask-based version of VITAL was successfully developed and tested. However, the difficulties faced during implementation and maintenance prompted the exploration of alternative solutions, such as the Rasa X framework.

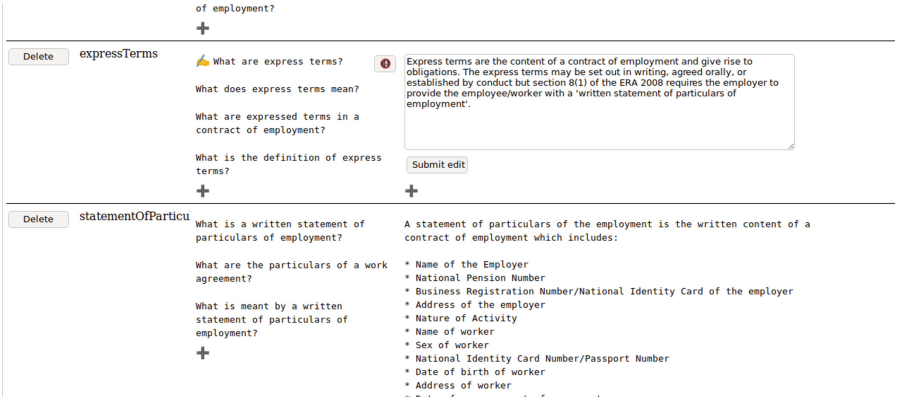

Fig. 4. Flask interface

4.2 Rasa X Version

Implementation. The implementation of VITAL using the Rasa X framework aimed to address the challenges encountered with the TensorFlow and Flask-based version. Rasa X provides a more streamlined approach to data management, allowing the law faculty members to add, edit, and manage the training data directly through the Rasa X interface (Fig. 5).

One of the key benefits of Rasa X is its ease of use, which enabled the team to add new features seamlessly, such as custom scripts for alerting physical operators at the law clinic when new queries required their attention. This resulted in a more efficient and user-friendly system, with improved functionality compared to the previous version (Fig. 6).

Testing. The testing process for the Rasa X version involved verifying the functionality of the Telegram bot and its integration with the Rasa X server. This included testing the bot's ability to handle user input, the AI model's capacity to generate appropriate responses, and the Rasa X server's effectiveness in managing the data used to train the model.

Additionally, the testing process focused on evaluating the new features added through the Rasa X framework, such as custom scripts for alerting physical operators when new queries were received. This helped ensure that VITAL was able to effectively address user inquiries while also providing a seamless experience for the operators managing the system.

In conclusion, the Rasa X version of the Chatbot Law Clinic addressed the challenges faced during the implementation and testing of the TensorFlow and Flask-based version. The Rasa X framework simplified data management and allowed for the seamless addition of new features, resulting in a more efficient and user-friendly system.

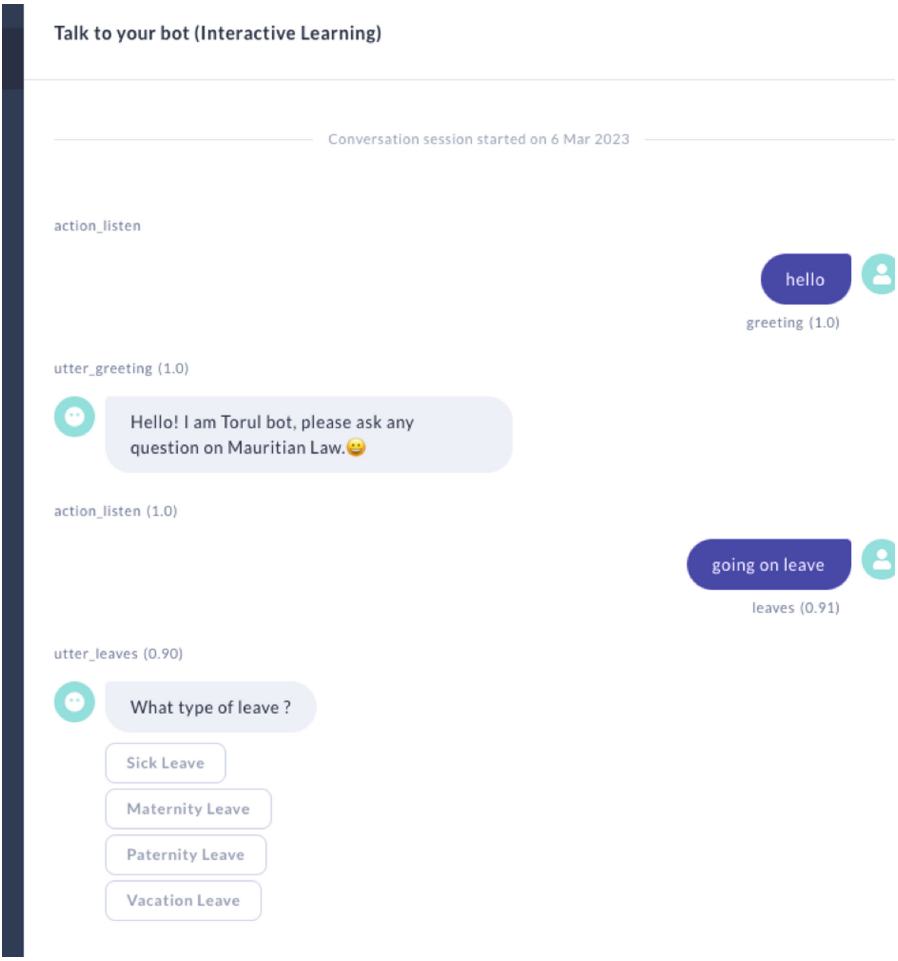

Fig. 5. Rasa X interface allows Telegram to provide the user with options to follow up on query

5 Discussion

The integration of Rasa X and Telegram in the form of the VITAL platform holds the potential to significantly impact the legal profession. This section delves into how this innovation might augment or disrupt conventional legal services, while also considering its benefits and potential challenges beyond education.

5.1 Continuous Learning and Adaptation

Rasa X's inherent capabilities, such as continuous learning from user interactions and expert input, allow VITAL to evolve over time. This results in improved

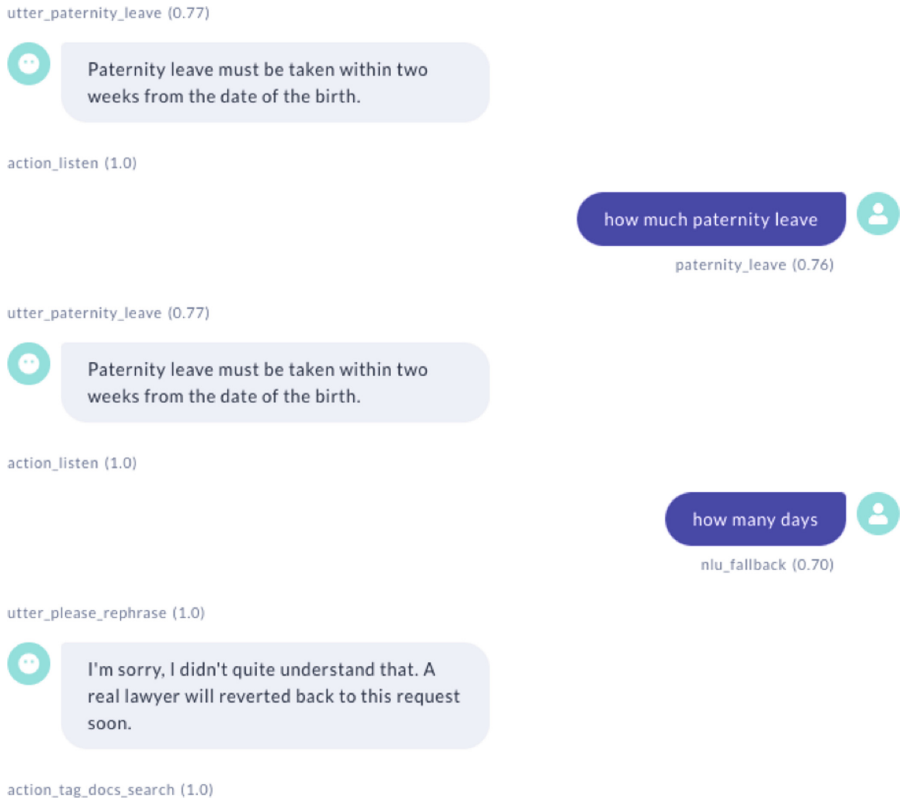

Fig. 6. Rasa X allows follow-up and email notification for queries it cannot comprehend

performance and more precise responses, making it a perpetually developing resource for both individuals seeking legal information and legal professionals who contribute to the system's refinement.

5.2 Accessibility and Affordability

With the user-friendly and widely adopted Telegram as its platform, VITAL can democratize legal consultation, providing easy access to legal information, especially for those who may not have the resources to engage a legal professional.

5.3 Efficiency

By automating routine tasks, such as answering frequently asked questions or providing legal advice, VITAL enhances the efficiency of legal professionals, enabling them to concentrate on more complex cases.

5.4 Client Triage and Case Prioritization

VITAL could assist law firms in triaging client inquiries and prioritizing cases. By handling initial inquiries, it can help identify cases requiring immediate or more in-depth legal assistance, streamlining the process for both clients and legal professionals.

5.5 Potential Disruption to Traditional Legal Services

While VITAL has the potential to augment traditional legal services, it also poses potential disruptions to the legal profession.

5.6 Job Displacement

Automation of routine tasks and the increasing capabilities of VITAL may lead to job displacement for some legal professionals, particularly those in roles focused on providing basic legal information or answering frequently asked questions.

5.7 Ethical Concerns

As VITAL becomes more advanced, ethical concerns may arise regarding its use in providing legal advice. Ensuring that it adheres to professional standards and maintains client confidentiality will be critical in addressing these concerns and maintaining public trust in the legal profession.

5.8 Regulation and Oversight

The rapid advancement of VITAL may outpace the ability of the legal profession to regulate and oversee its use. Establishing appropriate regulations and guidelines to ensure the responsible and ethical use of such platforms in the legal field will be crucial in mitigating potential disruptions.

5.9 Quality Control and Liability

As VITAL increasingly provides legal advice, questions of quality control and liability may arise. Ensuring the accuracy and reliability of advice generated by VITAL will be essential in maintaining the reputation of the legal profession and addressing potential liability issues. Extensions via Rasa X programmability can assist in this.

6 Conclusions

The innovative integration of Rasa X and Telegram serves as a seminal advancement in the development of VITAL, offering particularly valuable features for virtual law clinics. The transition from our initial custom solution to the Rasa X platform has equipped us with advanced capabilities for chatbot development and customization. One notable feature is the human-in-the-loop notifications for unanswered queries, facilitating the chatbot's continuous learning and improvement. In addition, the integration with Telegram, a user-friendly and widely adopted messaging platform, enhances the system's overall accessibility.

6.1 Key Advantages

The integration of Rasa X and Telegram offers several distinct advantages:

- **Open-Source Framework:** Enables unrestricted customization, thereby fostering innovation.
- **Scalability:** Well-suited for accommodating an increasing user base.
- **Advanced NLU (Natural Language Understanding):** Facilitates more accurate and human-like conversational interactions.
- **User Reach:** Telegram's widespread adoption ensures a broader user base.
- **Privacy and Security:** Telegram's robust security measures enhance system reliability.

6.2 Comparison with Existing Solutions

Compared to existing chatbot solutions, the integration of Rasa X and Telegram brings unique benefits that make it a preferred choice for VITAL. These include:

- Extensive customization capabilities
- Cost-effectiveness due to the open-source nature of the platforms
- A greater reach facilitated by integration with the widely-used Telegram platform

6.3 Limitations and Future Research

Although our integration has proven to be a powerful tool for delivering legal services, there are some limitations. It should be noted that at the time of this research, more advanced conversational models like ChatGPT were not utilized. The adoption of such models could be a fruitful avenue for future work, potentially adding further sophistication and naturalness to the conversational interactions.

6.4 Implications for Future Work

As the field of conversational AI continues to evolve, the introduction of more advanced technologies provides an exciting opportunity for the further enhancement of VITAL's capabilities. The integration of Rasa X and Telegram sets a strong foundation upon which future iterations can be built, thereby continuously improving the legal services available to the Mauritian population.

6.5 Future Work

This study has laid the foundation for many promising directions for future research and development. Below, we discuss potential paths to explore:

- **Expanded Language Support:** Currently, the chatbot is designed to communicate primarily in English. As Mauritius is a multilingual country, expanding the chatbot's capabilities to understand and communicate in other local languages such as French and Mauritian Creole could greatly enhance its accessibility and effectiveness.

- **Improved Knowledge Base:** Continuous efforts should be made to expand and update the chatbot's legal knowledge base. This could involve adding more legal categories, integrating new legal regulations, and refining the chatbot's understanding of legal terminologies.
- **Advanced NLP Techniques:** Leveraging more advanced natural language processing techniques could help improve the chatbot's understanding of complex legal questions and provide more accurate and contextually appropriate responses.
- **User Experience Enhancements:** Future work could focus on improving the user interface and making the chatbot more interactive. This could include adding multimedia support, offering predictive text suggestions, or incorporating a voice recognition system.
- **Integration with Other Platforms:** While Telegram offers many advantages, considering integration with other popular messaging platforms like WhatsApp and Facebook Messenger could further expand the chatbot's reach.
- **Evaluation and Feedback Mechanisms:** Implementing an evaluation mechanism for users to rate and provide feedback on the chatbot's responses would help identify areas of improvement and guide future enhancements.

Through these potential avenues of exploration, we hope to continue evolving VITAL, ultimately creating an even more effective, accessible, and comprehensive legal aid resource.

References

1. Chiong, P.S.S.C., Seeam, P., Seeam, A.: Development of a smart tourism information chatbot for Mauritius. In: International Conference on Intelligent and Innovative Computing Applications, pp. 122–130 (2022)
2. Okonkwo, C.W., Ade-Ibijola, A.: Chatbots applications in education: a systematic review. Comput. Educ.: Artifi. Intell. **2**, 100033 (2021)
3. Hammad, R., Bahja, M.: Opportunities and challenges in educational chatbots. In: Trends, Applications, and Challenges of Chatbot Technology, pp. 119–136. IGI Global (2023)
4. Sandu, N., Gide, E.: Adoption of AI-chatbots to enhance student learning experience in higher education in India. In: 2019 18th International Conference on Information Technology Based Higher Education and Training (ITHET). IEEE (2019)
5. Tlili, A., et al.: What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. Smart Learn. Environ. **10**, 15 (2023)
6. Wollny, S., Schneider, J., Di Mitri, D., Weidlich, J., Rittberger, M., Drachsler, H.: Are we there yet? - a systematic literature review on chatbots in education. Front. Artif. Intell. **4**, 654924 (2021)
7. Bilquise, G., Ibrahim, S., Shaalan, K.: Emotionally intelligent chatbots: a systematic literature review. Hum. Behav. Emerg. Technol. **2022**, 1–23 (2022)
8. Aleedy, M., Atwell, E., Meshoul, S.: Using AI chatbots in education: recent advances challenges and use case. In: Pandit, M., Gaur, M.K., Rana, P.S., Tiwari, A. (eds.) Artificial Intelligence and Sustainable Computing. Algorithms for Intelligent Systems, pp. 661–675. Springer, Singapore (2022). https://doi.org/10.1007/978-981-19-1653-3_50

9. Winkler, R., Soellner, M.: Unleashing the potential of chatbots in education: a state-of-the-art analysis. Acad. Manag. Proc. **2018**(1), 15903 (2018)
10. Dimitriadis, G.: Evolution in education: chatbots. Homo Virtualis **3**(1), 47 (2020)
11. Lin, Y., Yu, Z.: A bibliometric analysis of artificial intelligence chatbots in educational contexts. Interact. Technol. Smart Educ. (2023)
12. Azuma, J.: Applying TTS technology to foreign language teaching. In: Handbook of Research on Computer-Enhanced Language Acquisition and Learning, pp. 497–506. IGI Global (2008)
13. Belda-Medina, J., Calvo-Ferrer, J.R.: Using chatbots as AI conversational partners in language learning. Appl. Sci. **12**(17), 8427 (2022)
14. Clarizia, F., Colace, F., Lombardi, M., Pascale, F., Santaniello, D.: Chatbot: an education support system for student. In: Castiglione, A., Pop, F., Ficco, M., Palmieri, F. (eds.) CSS 2018. LNCS, vol. 11161, pp. 291–302. Springer, Cham (2018). https://doi.org/10.1007/978-3-030-01689-0_23
15. Terzieva, V., Todorova, K., Kademova-Katzarova, P., Andreev, R.: Teachers' attitudes towards technology rich education in Bulgaria. In: EDULEARN proceedings. IATED (2016)
16. Kooli, C.: Chatbots in education and research: a critical examination of ethical implications and solutions. Sustainability **15**(7), 5614 (2023)
17. Molnar, G., Szuts, Z.: The role of chatbots in formal education. In: 2018 IEEE 16th International Symposium on Intelligent Systems and Informatics (SISY). IEEE (2018)
18. Vanichvasin, P.: Chatbot development as a digital learning tool to increase students' research knowledge. Int. Educ. Stud. **14**(2), 44 (2021)
19. Corral, J.: Artificially intelligent chatbots for health professions education. In: Digital Innovations in Healthcare Education and Training, pp. 127–135. Elsevier (2021)
20. Yang, S., Evans, C.: Opportunities and challenges in using AI chatbots in higher education. In: Proceedings of the 2019 3rd International Conference on Education and E-Learning. ACM (2019)
21. Baskara, F.R.: Chatbots and flipped learning: enhancing student engagement and learning outcomes through personalised support and collaboration. IJORER: Int. J. Recent Educ. Res. **4**(2), 223–238 (2023)
22. Debnath, B., Agarwal, A.: A framework to implement AI-integrated chatbot in educational institutes. J. Student Res. (2020)
23. Mageira, K., Pittou, D., Papasalouros, A., Kotis, K., Zangogianni, P., Daradoumis, A.: Educational AI chatbots for content and language integrated learning. Appl. Sci. **12**(7), 3239 (2022)
24. Belgaumwala, N.: Chatbot: a virtual medical assistant. Int. J. Res. Appl. Sci. Eng. Technol. **7**(6), 1042–1050 (2019)
25. Bell, S., Wood, C., Sarkar, A.: Perceptions of chatbots in therapy. In: Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems. ACM (2019)
26. Rahim, N.I.M., Iahad, N.A., Yusof, A.F., Al-Sharafi, M.A.: AI-based chatbots adoption model for higher-education institutions: a hybrid PLS-SEM-neural network modelling approach. Sustainability **14**(19), 12726 (2022)
27. Seeam, P., Teckchandani, N., Booneyad, H., Torul, V., Seeam, A.: Employment law expert system. In: 2018 International Conference on Intelligent and Innovative Computing Applications (ICONIC), pp. 1–6. IEEE (2018)
28. Queudot, M., Charton, É., Meurs, M.-J.: Improving access to justice with legal chatbots. Stats **3**(3), 356–375 (2020)

29. Tkachenko, T., Neupokoeva, L., Shestakova, A., Shestakov, I.: Chat-bot DigitalChiefBot. Technical report (2022)
30. Atabekov, A., Yastrebov, O.: Legal status of artificial intelligence across countries: legislation on the move. Eur. Res. Stud. J. XXI **4**, 773–782 (2018)
31. Nersessian, D., Mancha, R.: From automation to autonomy: legal and ethical responsibility gaps in artificial intelligence innovation. SSRN Electron. J. (2020)
32. Mockus, M., Vėgėlytė, E.: Legal issues of intellectual property rights in disrupted technologies era: chatbots and conversational computing platforms. In: Jusletter-IT (2020)
33. Ng, J., Haller, E., Murray, A.: The ethical chatbot: a viable solution to socio-legal issues. Altern. Law J. **47**(4), 308–313 (2022)
34. Bessant, J.: What experts say about artificial intelligence. In: The Great Transformation, pp. 156–182. Routledge (2018)
35. Raskar, A.D., Dongare, A.S., Inamdar, A.S., Kamble, R.B., Patil, P.L., Balshetwar, D.S.V.: Chatbot for children assistance. Int. J. Res. Appl. Sci. Eng. Technol. **10**(3), 1307–1310 (2022)
36. Završnik, A.: Criminal justice, artificial intelligence systems, and human rights. ERA Forum **20**(4), 567–583 (2020)
37. Xu, N., Wang, K.-J.: Adopting robot lawyer? the extending artificial intelligence robot lawyer technology acceptance model for legal industry by an exploratory study. J. Manage. Organ. **27**(5), 867–885 (2019)
38. Craigle, V.: Law libraries embracing AI. SSRN Electron. J. (2019)
39. Martinez, M.A.Q., Ramírez, A.F.A., Arias, S.T.C., Vazquez, M.Y.L.: Teaching Brooks law based on fuzzy cognitive maps and chatbots. In: Ahram, T.Z., Karwowski, W., Kalra, J. (eds.) AHFE 2021. LNNS, vol. 271, pp. 251–258. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-80624-8_32
40. Mowbray, A., Chung, P., Greenleaf, G.: Utilising AI in the legal assistance sector—testing a role for legal information institutes. SSRN Electron. J. (2019)
41. Firdaus, V.A.H., Saputra, P.Y., Suprianto, D.: Intelligence chatbot for Indonesian law on electronic information and transaction. In: IOP Conference Series: Materials Science and Engineering, vol. 830, no. 2, p. 022089 (2020)
42. Senthilkumar, M., Chowdhary, C.L.: An AI-based chatbot using deep learning. Intell. Syst., 231–242 (2019)
43. Singh, S.K., Kumar Srivastava, P.A., Tamrakar, P.S.: Universal artificial intelligence for intelligent agents: an approach to super intelligent agents. IOSR J. Comput. Eng. **12**(6), 43–48 (2013)
44. Navas, S.: The provision of legal services to consumers using LawTech tools: from "service" to "legal product". Open J. Soc. Sci. **07**(11), 79–103 (2019)
45. Fang, C., Wilkenfeld, J.N., Navick, N., Gibbs, J.L.: AI am here to represent you: understanding how institutional logics shape attitudes toward intelligent technologies in legal work. Manage. Commun. Q., 089331892311582 (2023)