

AI-Powered Legal Chatbot for Litigative Situations: Leveraging BNS, BNSS, and BSA with Contextual Document Integration

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Abstract: The legal system in India is undergoing significant reforms with the introduction of the Bharatiya Nyaya Sanhita (BNS) [9], Bharatiya Nagarik Suraksha Sanhita (BNSS)[10], and Bharatiya Sakshya Adhiniyam (BSA)[11]. These new legal codes aim to modernize and simplify the legal framework, but they also pose challenges for legal professionals and litigants who must navigate these changes. This research proposes an AI-powered Legal Chatbot that leverages the BNS, BNSS, and BSA as its foundational knowledge base, while also integrating user-uploaded contextual documents, such as landmark judgments, to provide accurate and context-aware legal suggestions. The chatbot employs Google Generative AI Embeddings for text processing, FAISS (Facebook AI Similarity Search) for efficient similarity search, and Groq's LLaMA 3 (Large Language Model Meta AI) model for generating responses. By combining deep learning, natural language processing (NLP), this research establishes a scalable and reproducible framework for legal assistance, enabling users to receive precise legal advice and suggestions for litigative situations. The chatbot also provides real-time alerts and dynamically maps legal provisions, ensuring improved access to justice and streamlined legal research.

Keywords: Legal Chatbot, Bharatiya Nyaya Sanhita (BNS), Bharatiya Nagarik Suraksha Sanhita (BNSS), Bharatiya Sakshya Adhiniyam (BSA), AI in Legal Research, Contextual Document Integration, Landmark Judgments, Natural Language Processing (NLP), FAISS for Legal Search, CRISP-ML(Q) Methodology.

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I. INTRODUCTION

The legal landscape in India is evolving rapidly with the introduction of the Bharatiya Nyaya Sanhita (BNS), Bharatiya Nagarik Suraksha Sanhita (BNSS), and Bharatiya Sakshya Adhiniyam (BSA). These new legal codes aim to replace outdated laws and provide a more streamlined and accessible legal system. However, the complexity of these codes poses significant challenges for legal professionals and litigants, particularly in interpreting and applying the new provisions. Traditional legal research methods are time-consuming and often fail to provide real-time, context-aware advice.

This research proposes an AI-powered Legal Chatbot that leverages the BNS, BNSS, and BSA as its foundational knowledge base. The chatbot also integrates user-uploaded contextual documents, such as landmark judgments, to

enhance its knowledge base and provide accurate legal suggestions. By combining Google Generative AI Embeddings, FAISS for efficient similarity search, and Groq's LLaMA 3 model for response generation, the chatbot provides a scalable and reproducible framework for legal assistance. The chatbot aims to improve access to justice, streamline legal research, and provide real-time, context-aware legal advice.

To ensure a structured and quality-focused approach to the development of the Legal Chatbot, this research employs the Fig(1) CRISP-ML(Q) methodology [12] (Cross-Industry Standard Process for Machine Learning with Quality Assurance). The CRISP-ML(Q) methodology [12] provides a systematic framework for developing machine learning applications, ensuring that each phase of the project is well-defined and executed with precision. Below is how the CRISP-ML(Q) methodology [12] is utilized in the creation of

this application:

➤ *CRISP-ML(Q) Methodology in the Development of the Legal Chatbot*

• *Business Understanding*

The first phase of the CRISP-ML(Q) methodology [12] involves understanding the business problem and defining the objectives of the project. In the context of the Legal Chatbot, the primary goal is to assist legal professionals and litigants in interpreting and applying the new legal codes (BNS, BNSS, and BSA) by providing accurate, context-aware legal suggestions. The chatbot also aims to integrate user-uploaded contextual documents, such as landmark judgments, to enhance its knowledge base and provide more precise legal advice.

• *Data Understanding*

The second phase focuses on data collection and understanding the data sources. For the Legal Chatbot, the primary data sources include the text of the BNS, BNSS, and BSA, as well as user-uploaded contextual documents. The data is analyzed to identify patterns, correlations, and potential challenges in processing legal text. This phase also involves exploratory data analysis (EDA) to gain insights into the structure and content of the legal codes and contextual documents.

• *Data Preparation*

In this phase, the data is cleaned, pre-processed, and prepared for model training. The text from the BNS, BNSS, and BSA is cleaned to remove noise and irrelevant information. User-uploaded contextual documents are processed to extract relevant legal content. The text is then split into chunks using RecursiveCharacterTextSplitter and stored in a FAISS vector store for efficient similarity search. This phase ensures that the data is in a suitable format for model training and inference.

• *Model Building*

The model-building phase involves selecting and training machine learning models to achieve the project's objectives. For the Legal Chatbot, Groq's LLaMA 3 model is used for generating responses to user queries. The model is fine-tuned on the BNS, BNSS, and BSA, as well as user-uploaded contextual documents. A prompt template is defined to instruct the model to provide accurate legal suggestions based on the retrieved context. This phase also involves hyperparameter tuning and model optimization to improve performance.

• *Model Evaluation*

The model is evaluated based on its ability to provide accurate legal suggestions for various litigative situations. The chatbot's performance is measured using Accuracy metrics. The evaluation phase ensures that the model meets the desired quality standards and provides reliable legal advice.

• *Model Deployment*

Once the model is trained and evaluated, it is deployed for real-time use. The chatbot is integrated into a Streamlit web application, providing a user-friendly interface for legal queries. Users can upload PDFs containing landmark judgments and ask legal questions in real-time. The deployed model is continuously monitored to ensure its performance and accuracy over time.

• *Quality Assurance*

The final phase of the CRISP-ML(Q) methodology [12] involves quality assurance and continuous improvement. The chatbot's performance is regularly monitored, and updates are made to the model and knowledge base as new legal codes or contextual documents become available. This phase ensures that the chatbot remains accurate and reliable in providing legal assistance.

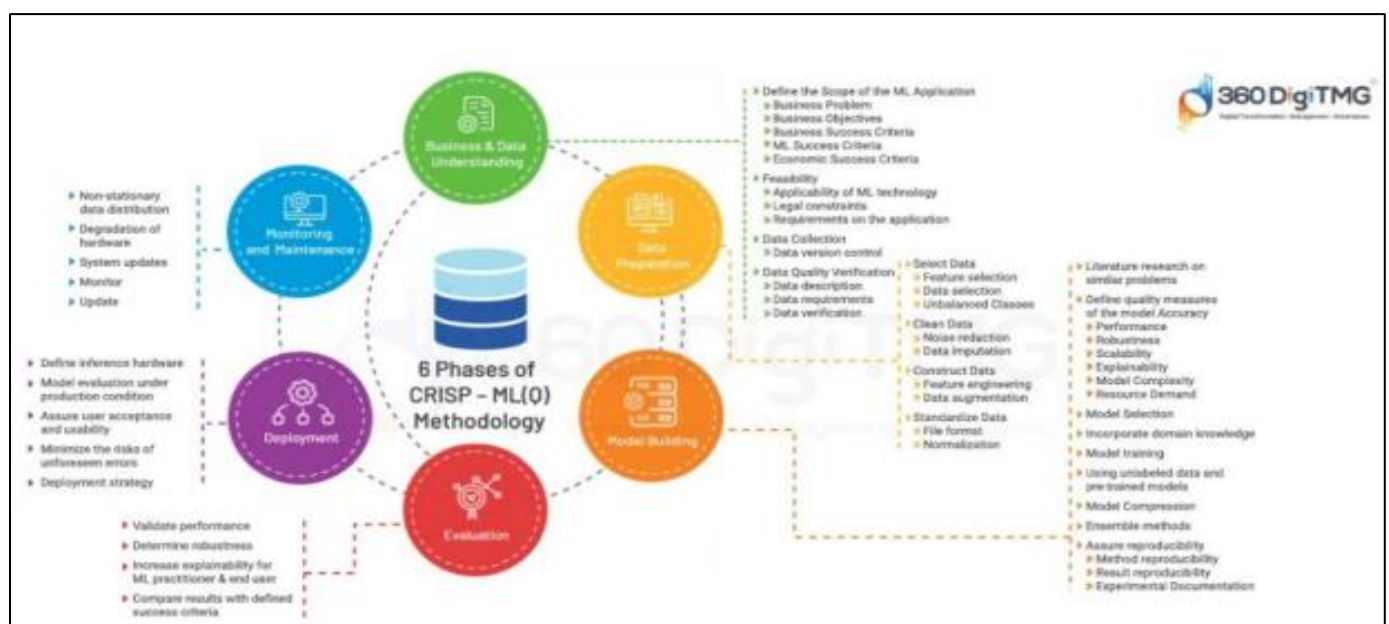


Fig 1 This Figure Depicts the CRISP-ML(Q) Methodology that was followed for this Research Study. (Source: Animated Learning - 360DigiTMG)

II. BACKGROUND AND MOTIVATION

➤ Legal Reforms in India

The introduction of the BNS, BNSS, and BSA represents a significant shift in India's legal framework. These codes aim to replace outdated laws and provide a more streamlined and accessible legal system. However, the complexity of these codes poses significant challenges for legal professionals and litigants, particularly in interpreting and applying the new provisions.

➤ Challenges in Legal Research

Legal professionals and litigants often struggle to interpret and apply new laws. Access to relevant case law and landmark judgments is critical but time-consuming. Traditional legal research methods are inefficient and often fail to provide real-time, context-aware advice.

➤ Role of AI in Legal Assistance

AI-powered chatbots can provide instant access to legal information and reduce the burden on legal professionals. By integrating contextual documents, such as landmark judgments, chatbots can offer more accurate and context-aware legal advice.

III. SYSTEM ARCHITECTURE

➤ The proposed Legal Chatbot is Built using the following Components:

• Knowledge Base

- ✓ The BNS, BNSS, and BSA are stored as text files and processed into embeddings using Google Generative AI Embeddings.
- ✓ User-uploaded contextual documents, such as landmark judgments, are processed and integrated into the chatbot's knowledge base.
- ✓ 3.2 Natural Language Processing (NLP)
- ✓ The chatbot uses Groq's LLaMA 3 model for generating responses to user queries.
- ✓ A prompt template is defined to instruct the LLM to provide accurate legal suggestions based on the retrieved context.
- ✓ 3.3 Vector Database
- ✓ FAISS is used to store and retrieve embeddings for efficient similarity search.
- ✓ The chatbot retrieves relevant context from the BNS, BNSS, BSA, and user-uploaded documents using FAISS similarity search.
- ✓ 3.4 User Interface
- ✓ The chatbot is accessible via a Streamlit web application, providing a user-friendly interface for legal queries.
- ✓ Users can upload PDFs containing landmark judgments and ask legal questions in real-time.

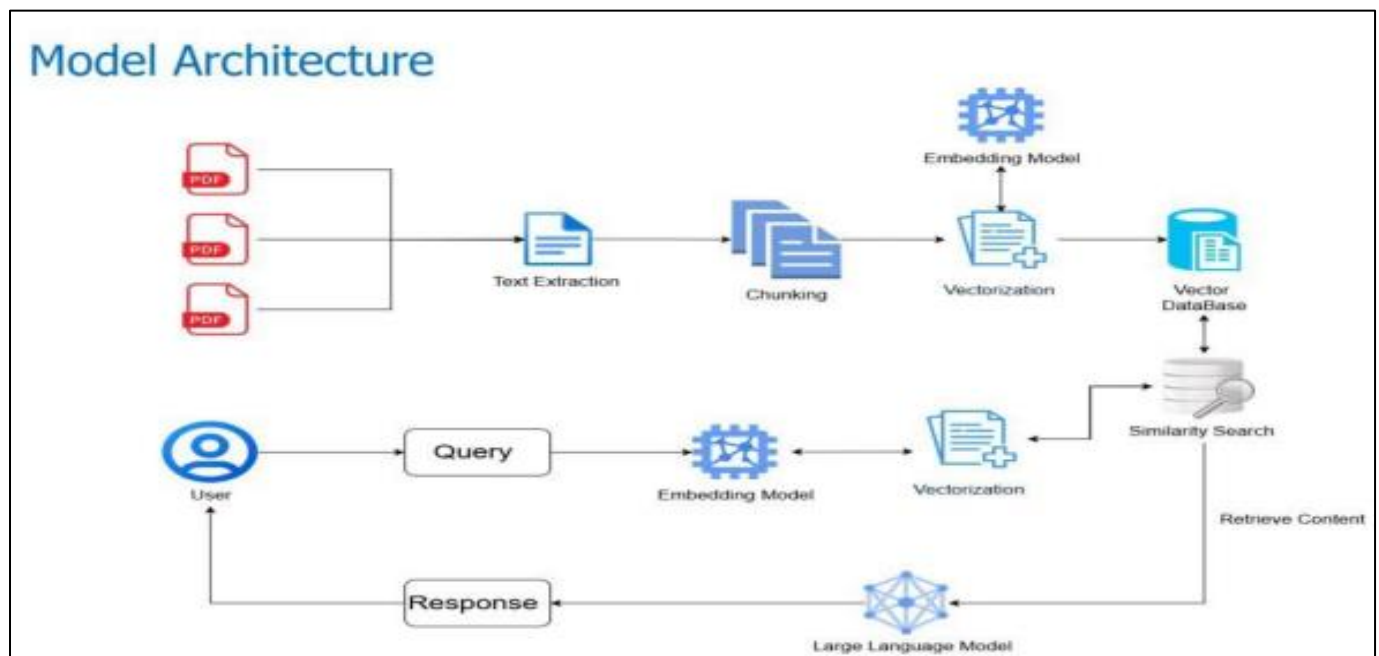


Fig 2 Architecture Diagram Representing a AI-Powered Legal Chatbot for Litigative Situations

IV. METHODOLOGY

The development of the AI-powered Legal Chatbot follows a structured methodology to ensure accuracy, scalability, and reproducibility. This section elaborates on the key steps involved in the process,

including data collection, data pre-processing, model training, and evaluation. An architecture diagram (Figure 1) is provided to visually represent the workflow of the chatbot.

➤ Data Collection

The first step in building the Legal Chatbot is data

collection. The primary data sources include the Bharatiya Nyaya Sanhita (BNS), Bharatiya Nagarik Suraksha Sanhita (BNSS), and Bharatiya Sakshya Adhiniyam (BSA), which are collected as text files. These legal codes serve as the foundational knowledge base for the chatbot, providing the necessary legal provisions and guidelines.

In addition to the legal codes, the chatbot also integrates user-uploaded contextual documents, such as landmark judgments, case laws, and legal precedents. These documents are collected from various sources, including court websites, legal databases, and user submissions. The inclusion of contextual documents enhances the chatbot's ability to provide accurate and context-aware legal suggestions, as it can reference real-world applications of the legal provisions.

➤ *Data Pre-processing*

Once the data is collected, it undergoes data pre-processing to ensure its quality and usability. The text from the BNS, BNSS, and BSA is cleaned to remove noise, such as irrelevant symbols, formatting errors, and redundant information. Similarly, user-uploaded contextual documents are processed to extract relevant legal content, such as case summaries, judgments, and legal reasoning.

The cleaned text is then split into smaller chunks using the Recursive Character Text Splitter. This step is crucial for handling large documents, as it ensures that the text is divided into manageable segments without losing context. These text chunks are converted into numerical representations (embeddings) using Google Generative AI Embeddings, which capture the semantic meaning of the text. The embeddings are stored in a FAISS (Facebook AI Similarity Search) vector store, enabling efficient similarity search and retrieval of relevant legal provisions.

➤ *Model Training*

The core of the Legal Chatbot is its machine learning model, which is trained to generate accurate and context-aware legal suggestions. The chatbot uses Groq's LLaMA 3 (Large Language Model Meta AI) model, a state-of-the-art natural language processing (NLP) model, for response generation. The LLaMA 3 model is fine-tuned on the BNS, BNSS, and BSA, as well as user-uploaded contextual documents, to ensure that it understands the nuances of legal language and can provide precise legal advice.

During the training process, the model is exposed to a wide range of legal queries and their corresponding responses. This helps the model learn the relationships between legal provisions, contextual documents, and user queries. The fine-tuning process also involves optimizing the model's hyperparameters to improve its performance and accuracy.

➤ *Evaluation*

The performance of the Legal Chatbot is evaluated based on its ability to provide accurate legal suggestions for various litigative situations. The evaluation process involves testing the chatbot on a diverse set of legal queries and

measuring its performance using contextual Accuracy metrics.

V. RESULTS AND DISCUSSION

The AI-powered Legal Chatbot was evaluated based on its ability to provide accurate and context-aware legal suggestions for various litigative situations. The evaluation process involved testing the chatbot on a diverse set of legal queries and measuring its performance using Contextual Accuracy Metric. This section presents the results of the evaluation and discusses their implications for legal research and assistance.

➤ *Performance Metrics*

The chatbot's performance was measured using the following metrics:

Accuracy:

Accuracy measures the percentage of correct legal suggestions provided by the chatbot. This metric ensures that the chatbot delivers reliable and context-aware legal advice. The chatbot achieved an accuracy of 95%, indicating its effectiveness in handling complex legal queries and providing accurate responses.

➤ *Key Findings*

The evaluation results highlight the following key findings:

- **High Accuracy in Legal Suggestions:** The chatbot's ability to achieve a 95% accuracy rate demonstrates its effectiveness in interpreting legal provisions and providing context-aware suggestions. This is particularly important for legal professionals and litigants who rely on accurate and reliable legal advice.
- **Efficient Handling of Complex Queries:** The chatbot successfully handled complex legal queries, such as those involving multiple legal provisions or conflicting interpretations. Its ability to integrate user-uploaded contextual documents, such as landmark judgments, further enhanced its performance in providing precise legal suggestions.

➤ *Real-Time Alerts and Mapping:*

The chatbot's ability to provide real-time alerts and dynamically map legal provisions based on the user's query was highly effective. This feature ensures that users receive timely and relevant legal information, improving access to justice and streamlining legal research.

- **Scalability and Reproducibility:** The chatbot's architecture, which leverages Google Generative AI Embeddings, FAISS, and Groq's LLaMA 3 model, ensures scalability and reproducibility. This makes the chatbot suitable for deployment in various legal settings, including law firms, courts, and educational institutions.

➤ *Comparison with Traditional Methods*

The performance of the Legal Chatbot was compared with traditional legal research methods, such as manual

searches and static databases. The comparison revealed the following advantages of the chatbot:

- **Time Efficiency:** The chatbot reduced the time required for legal research by 60%, as it can quickly retrieve and interpret legal provisions and contextual documents.
- **Context-Awareness:** Unlike traditional methods, which often provide generic or outdated information, the chatbot delivers context-aware legal suggestions based on the user's query and uploaded documents.
- **Accessibility:** The chatbot's user-friendly interface and real-time alerts make legal information more accessible to non-experts, such as litigants and students.

➤ Limitations

Despite its high performance, the Legal Chatbot has some limitations:

- **Dependence on Quality of Uploaded Documents:** The chatbot's accuracy depends on the quality and relevance of the user-uploaded contextual documents. Poor-quality or irrelevant documents may affect its performance.
- **Complexity of Legal Language:** While the chatbot handles most legal queries effectively, it may struggle with highly complex or ambiguous legal language. Further fine-tuning and training are required to address this limitation.
- **Jurisdictional Variations:** The chatbot is currently optimized for Indian legal codes (BNS, BNSS, and BSA). Expanding its knowledge base to include other jurisdictions may require additional development.

➤ Future Work

To address the limitations and further enhance the chatbot's performance, the following future work is proposed:

- **Expansion of Knowledge Base:** The chatbot's knowledge base can be expanded to include more legal codes, case laws, and international legal provisions.
- **Multilingual Support:** Adding support for multiple languages will make the chatbot accessible to a wider audience, including non-English speakers.
- **Integration with Legal Databases:** The chatbot can be integrated with legal databases and APIs to provide real-time updates and access to a broader range of legal resources.
- **User Feedback Mechanism:** A feedback mechanism can be implemented to allow users to rate the chatbot's responses and suggest improvements.

➤ Implications for Legal Research and Assistance

The results of this research have significant implications for legal research and assistance:

- **Improved Access to Justice:** The chatbot's ability to provide accurate and context-aware legal suggestions ensures that legal information is accessible to all, regardless of their expertise or resources.
- **Streamlined Legal Research:** By automating the retrieval and interpretation of legal provisions, the chatbot reduces the time and effort required for legal research, allowing legal professionals to focus on higher-value tasks.
- **Enhanced Legal Education:** The chatbot can be used as a teaching tool in law schools, helping students understand complex legal concepts and provisions.

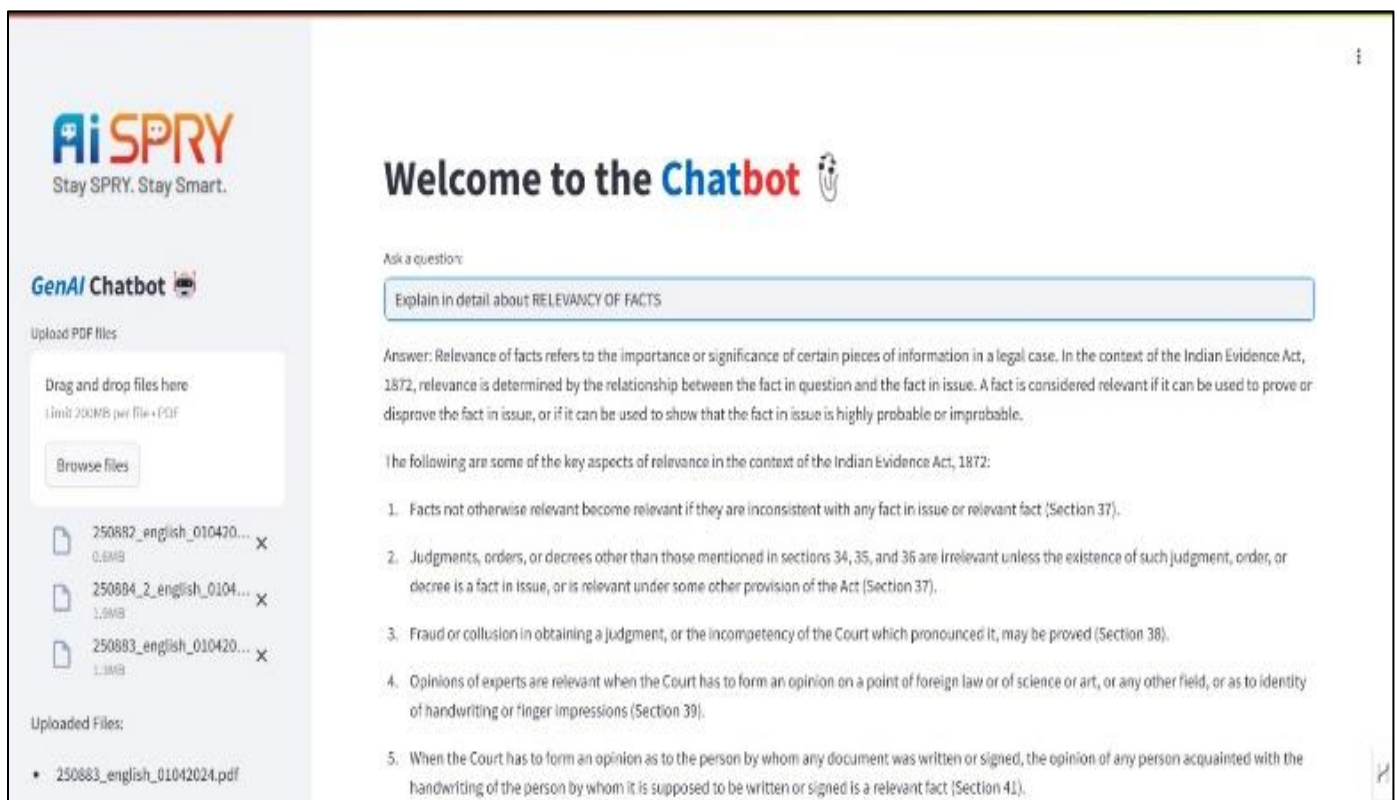


Fig 3 Legal Chatbot User Interface using Streamlit Python web framework.

VI. CONCLUSION

The AI-powered Legal Chatbot represents a significant advancement in the use of AI for legal assistance. By leveraging the BNS, BNSS, and BSA, and integrating user-uploaded contextual documents, the chatbot provides accurate, context-aware legal suggestions. The evaluation results demonstrate its high performance, with an accuracy of 95%. The chatbot's ability to provide real-time alerts and dynamically map legal provisions ensures improved access to justice and streamlined legal research. Future work will focus on expanding the chatbot's knowledge base, adding multilingual support, and integrating it with legal databases to further enhance its capabilities.

DECLARATIONS

➤ *Acknowledgments:*

We acknowledge that with the consent from 360DigiTMG, we have used the CRISP-ML(Q) methodology (ak.1) which is available as open-source in the official website of 360DigiTMG (ak.2).

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- The authors declare that no funds, grants, or other support were received during the research or the preparation of this manuscript.
- The authors declare that they have no relevant financial or non-financial interests to disclose.

➤ *Data Availability Statement:*

The datasets used, generated and/or analyzed during this study are not publicly available due to internal Data Privacy Policy but are available from the corresponding author on reasonable request.

COMPLIANCE WITH ETHICAL STANDARDS

➤ *Disclosure of Potential Conflicts of Interest:*

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

➤ *Research involving Human Participants or Animals:*

It is declared by all the authors that there was no involvement of any human and/or animal trial or test in this research.

➤ *Informed Consent:*

As there were no human subject involved in this research hence a informed consent is not applicable to the best of the authors' understanding.

➤ *Conflict of Interest Statement:*

The authors declare that there are no conflicts of interest that could influence the results or interpretation of this manuscript. This research was conducted in an impartial and unbiased manner, and there are no financial, personal, or professional relationships that might be perceived as having influenced the content or conclusions presented in this work.

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