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Review -1

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**PhilanthroBot: A Trust-Centric Conversational Agent for NGO Discovery and Recommendation using Stateful RAG Architecture**

**22BIT0013 – Tanish Maheshwari**

**22BIT0100 – Manya Dsouza**

**Under the Guidance of**

**Chiranji Lal Chowdhary**

**Professor Grade 1**

**SCORE**

**Guide Signature with date**

Chiranji Lal Chowdhary

**ABSTRACT:**

The non-profit sector faces a significant "trust deficit," where potential donors struggle to identify, vet, and connect with organizations that align with their values due to information asymmetry and a lack of transparency. Traditional web platforms often fail to provide a guided and personalized discovery experience. This project proposes the design and implementation of PhilanthroBot, a novel conversational agent aimed at bridging this gap. PhilanthroBot leverages a Retrieval-Augmented Generation (RAG) architecture, grounded in a curated knowledge base of NGO profiles, to provide users with factual and contextually relevant information. The system is orchestrated using LangGraph to manage a stateful, multi-turn dialogue, enabling the capture of user preferences and the delivery of personalized NGO recommendations. Powered by the gemini-2.0-flash large language model, the agent is designed for rapid, accurate, and natural interactions. This report details the complete architectural blueprint, from data structuring and RAG pipeline construction to the implementation of the stateful conversational agent and its optional deployment via the WhatsApp platform, presenting a robust framework for building trust-centric AI in the philanthropic domain.

**Keywords:**

Conversational AI, Retrieval-Augmented Generation (RAG), LangGraph, NGO, Philanthropy, Trust, Chatbot

1. **INTRODUCTION:**

The act of charitable giving is a cornerstone of civil society, yet the ecosystem connecting donors to non-governmental organizations (NGOs) is fraught with friction and inefficiency. This friction stems not from a lack of generosity but from a fundamental breakdown in the channels of information and trust. Potential donors, armed with the desire to contribute, often find themselves navigating a complex and opaque landscape, unable to confidently direct their resources to causes they care about. This project posits that the application of modern conversational artificial intelligence (AI) presents a powerful new paradigm for addressing this challenge, transforming the process of philanthropic discovery from a frustrating search into a guided, trust-building dialogue.

1.1. The Philanthropic Trust Deficit

The primary obstacle hindering the flow of donations to NGOs is a pervasive "trust deficit". This deficit is a multifaceted problem rooted in several interconnected challenges that both donors and organizations face. Donors are often hesitant to contribute unless they are provided with concrete guarantees of accountability and transparency regarding how their funds will be utilized. This concern is validated by research from the Give.org Donor Trust Report, which found that while 67% of donors consider it "highly important" to trust a charity before giving, only 22% of people actually report having "highly trust" in charitable organizations This sentiment has worsened over time, with studies indicating a general decline in public trust toward the non-profit sector.

The specific anxieties that fuel this mistrust are well-documented. A significant portion of donors (34%) report being most discouraged from giving when they are uncertain about what a charity will actually do with their donation. Another major deterrent is the perception that a high percentage of funds is spent on fundraising and administrative overhead rather than on direct program activities. NGOs, in turn, struggle to counter these perceptions. They face immense competition for a limited pool of donor funding, making it difficult to stand out.Furthermore, demonstrating tangible impact, especially for long-term development projects, is a significant operational challenge. This creates a detrimental cycle: NGOs require funding to build robust systems for impact reporting and transparency, but they struggle to secure that funding precisely because they lack the means to demonstrate their trustworthiness effectively. The core issue, therefore, is not an absence of goodwill but a critical failure of the mechanisms designed to foster confidence and connection between givers and doers.

1.2. The Failure of Traditional Discovery Mechanisms

The digital platforms that have emerged to facilitate philanthropy—from individual NGO websites to large donation portals—have largely failed to resolve this trust deficit. In many cases, they exacerbate the problem by employing outdated and ineffective discovery models. The typical online fundraising funnel is notoriously "leaky," losing a substantial number of potential donors at various stages. A user might be driven to a website but abandon the process if the organization's mission is not communicated convincingly, if the user interface is confusing, or if the donation page itself is difficult to navigate.

Moreover, the shift to online transactions introduces a new set of risks that further erodes donor confidence. Security concerns are paramount, as donors are rightly cautious about sharing financial information on platforms susceptible to cybersecurity threats. Many platforms charge transaction fees, which can discourage donors who want to ensure the maximum portion of their gift reaches the intended beneficiaries. The anonymity and scale of the internet also create fertile ground for fraud, with malicious actors creating "look-alike" websites or fraudulent campaigns that prey on donor generosity. Faced with this environment, donors are often inundated with solicitations and find it nearly impossible to differentiate between the multitude of organizations vying for their attention, leading to decision paralysis and donor fatigue.

These platforms fundamentally misunderstand the nature of philanthropic decision-making. They treat the process as a simple keyword search or a database filtering task, assuming the user already knows what they are looking for. This approach fails to address the donor's more profound need: not merely to *find* an NGO, but to *understand* its mission, *vet* its operations, and ultimately, *trust* its ability to create meaningful change.

1.3. The Conversational AI Imperative

A new technological paradigm is required to bridge the trust gap, one that moves beyond static web pages and search bars. Conversational AI offers a compelling and necessary evolution in how donors discover and engage with NGOs. Unlike traditional interfaces that demand users learn specific navigation paths or query syntax, conversational AI allows for interaction in natural, plain language, thereby eliminating the learning curve and creating a frictionless experience from the outset.

The true power of this approach lies in its adaptability. A conversational agent can engage in a dynamic dialogue, gathering nuanced details about a user's interests, values, and preferences. It can ask clarifying questions, process contextual clues, and, in doing so, provide highly personalized and relevant recommendations, much like a trusted human advisor or an expert in-store salesperson. This transforms the discovery journey from a solitary, often frustrating, task into a collaborative and guided exploration.

By facilitating this kind of dialogue, a conversational agent can directly address the root causes of the trust deficit. It can answer specific, detailed questions about an NGO's financial transparency, governance, and impact metrics. It can proactively present the very information that donors need to build confidence, grounding the conversation in verifiable facts rather than marketing claims. This project, therefore, is founded on the imperative that a well-designed conversational agent can fundamentally reshape the philanthropic landscape, creating a more transparent, personalized, and trustworthy bridge between donors and the causes they seek to support.

1. **PROBLEM STATEMENT:**

The core problem is the significant **"trust deficit"** in the non-profit sector, which hinders the flow of donations from potential donors to non-governmental organizations (NGOs). This deficit is driven by several interconnected issues:

* **Lack of Transparency and Information Asymmetry:** Donors struggle to find, vet, and connect with NGOs that align with their values. They are often uncertain about what a charity will actually do with their donation and are concerned that a high percentage of funds is spent on administrative overhead rather than direct program activities.
* **Ineffective Discovery Mechanisms:** Traditional websites and donation portals are often confusing, fail to communicate an organization's mission convincingly, and treat the search for an NGO as a simple filtering task. This approach fails to address the donor's need to understand, vet, and ultimately trust the organization, leading to decision paralysis and donor fatigue.
* **Failure to Build Confidence:** The existing digital platforms are not designed to facilitate a guided, trust-building dialogue. This creates a detrimental cycle where NGOs struggle to secure funding because they lack the means to effectively demonstrate their impact and trustworthiness to a wide audience.

1. **OBJECTIVES:**

The primary objective of this project is to **design and implement PhilanthroBot**, a novel conversational agent to bridge the philanthropic trust gap. The specific goals are:

* To create a guided, personalized, and trust-building discovery experience for potential donors.
* To provide users with **factual, verifiable, and contextually relevant information** about NGOs by leveraging a Retrieval-Augmented Generation (RAG) architecture grounded in a curated knowledge base.
* To develop a **stateful, multi-turn conversational agent** using LangGraph that can capture and remember a user's preferences (e.g., causes, geographic focus) within a conversation.
* To deliver **personalized NGO recommendations** that align with a user's explicitly stated values and interests, much like a trusted human advisor.
* To build a system that directly addresses the root causes of donor mistrust by being able to answer specific questions about an NGO's financial transparency, governance, and impact metrics

1. **SCOPE OF THE PROJECT:**

The scope of this project encompasses the end-to-end development of the PhilanthroBot prototype. This includes:

* **Knowledge Base Construction:** Creating a curated knowledge base consisting of 5-10 detailed, dummy NGO profiles. Each profile will be a structured text document adhering to a specific schema designed to build trust.
* **RAG Pipeline Implementation:** Building a complete RAG pipeline that can load the NGO documents, split them into semantically coherent chunks, create vector embeddings, and store them in a local vector database (like Chroma or FAISS) for efficient retrieval.
* **Stateful Agent Development:** Using LangGraph to build a stateful conversational agent that can manage dialogue history, update and maintain a profile of the user's preferences for the duration of a session, and route the conversation intelligently based on the user's intent.

**Out of Scope:** The project will focus on session-level memory. **Long-term memory** that persists across different conversations over days or weeks, **proactive agent engagement**, and **multimodal capabilities** (processing or displaying images/videos) are identified as potential future enhancements, not part of the core implementation.

1. **PROPOSED SYSTEM:**

The proposed system, PhilanthroBot, is a sophisticated conversational agent built on a modern, trust-centric AI architecture.

* **Core Architecture:** The system is founded on a **Retrieval-Augmented Generation (RAG)** paradigm. This is a strategic choice to ensure that all generated responses are grounded in the factual, authoritative information from the NGO knowledge base, thereby mitigating the risk of LLM "hallucinations" and building user trust.
* **Orchestration Engine:** The agent's logic and conversational flow will be orchestrated using **LangGraph**, an extension of the LangChain framework. Unlike simple linear chains, LangGraph allows for the creation of complex, stateful workflows. A central AgentState object will be used to maintain the conversation history and the user's learned preferences, enabling true personalization.
* **Knowledge Base Engineering:** The RAG system's effectiveness will be ensured by a meticulously engineered knowledge base. Each NGO will be represented by a semi-structured document with standardized fields that directly address common donor concerns.
* **Core Intelligence:** The agent will be powered by the **gemini-2.0-flash** large language model. This model was selected for its combination of speed, which is critical for a natural chat experience, and its large context window, which offers flexibility in the RAG pipeline.

1. **LITERATURE SURVEY: (minimum 15 papers)**

**Follow APA format , Please discuss with your guide for the literature review format**

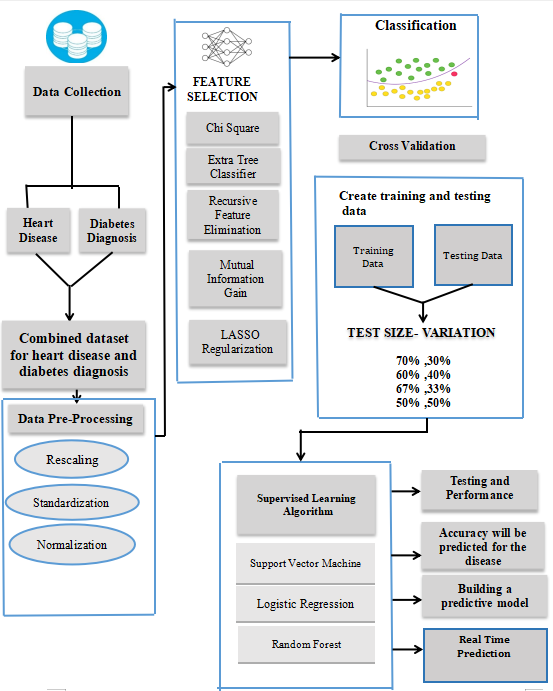
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| **S.NO** | **TITLE** | **MERITS** | **DEMERITS** |
| 1 | Diabetes and Heart Disease using Machine Learning. | This paper presents a new system for relating the significant features using machine learning models, which improves the diagnosis of multi-purpose disease prediction. The proposed system classifier that has sigmoid SVC, AdaBoost, and Decision tree algorithms. The paper also implements and presents the comparison of different models in terms of accuracy. | This paper needs a quality dataset. When using an Ada boost algorithm, noisy data and outliers should be avoided.  Feature Selection techniques are not properly explained. |
| 2 | Heart Disease Prediction using Exploratory Data Analysis | In this paper, the risk factors that causes diabetic-heart disease is considered and predicted using various classification algorithm and the analysis is carried out using a publicly available data for heart disease and diabetes. In the result section, the visualized data shows that the prediction is accurate and predict the probability. | Inconclusive results, lack of standardized analysis, small sample population and outdated information that can adversely affect the authenticity of information. |
| 3 | Diabetes Prediction using Machine Learning Algorithms | In this paper, we suggested a diabetic-heart disease prediction model for better classification that includes a few external factors that cause diabetes and tried to impose a gradient boosting and AdaBoost model for diabetic-heart disease prediction with the goal of increasing the accuracy of classification models heart along with regular factors. | They are unsteady, which means that a slight change in the data might result in a big change in the optimum decision tree's structure. |
| 4 | Prediction of Heart Disease using Machine Learning Algorithms | This research intends to provide a detailed description of logistic regression and decision tree classifier that are applied in our research particularly in the prediction of Heart Disease and Diabetes. Some experiment has been conducted to compare the execution of predictive data mining technique on the same dataset, and the consequence reveals that logistic regression out performs over KNN and decision tree classification models. | Hardware dependent  Complex Algorithms are foreseen disadvantages of Neural Networks  Approximate Results |
| 5 | Heart Disease Prediction Using Machine Learning | For the subset of the data, it builds as many trees as possible, then it aggregates the results of all the trees. This decreases the issue of overfitting in decision trees, as well as the variance, which raises accuracy. | This paper has not produce an accurate output for the classification models.  Random Forest creates a lot of trees and combines their outputs. |
| 6 | Application of data mining methods in diabetes prediction | The strategies that are heavily reliant on data mining techniques can be used to forecast the risk of high blood pressure. In this study, we investigate the early diabetes prediction using five various data mining techniques. The experiment's findings demonstrate that ANNs (Artificial Neural Networks) offer the greatest accuracy compared to other methods. | Data preparation for neural network models needs careful attention for the future use of models. |
| 7 | Diabetes and Heart Disease Prediction Using Machine Learning Algorithms | To predict the occurrence of heart disease as well as diabetes in patients who have it with outrageous exactness. In order to detect these disorders before they are coordinated, ML counts to be explicit and was applied to ANN, ELM, PCA, LASSO, ensemble learning, and SVM. On the basis of datasets for diabetes and heart disease, the accuracy of the aforementioned ML algorithms is assessed. | The skill of assembling is challenging to learn, and any poor decision might lead in a model with worse prediction accuracy than an individual model. |
| 8 | Heart Disease Diagnosis and Prediction Using Machine Learning and Data Mining Techniques | It has a successful system for assessing missing information and keeps up accuracy when a vast extent of the data is missing, it has methods for adjusting error in class populace unequal data sets. | It does not oblige models or parameters to choose aside from the quantity of indicators to pick at arbitrary at every node. |
| 9. | Practicability of Heart Attack Prediction using Machine Learning | This paper provides the unique strategy for identifying relevant characteristics using data mining algorithms, which increases the quality of metabolic syndrome prognosis. Possible variations of characteristics and many well-known classification methods are used to establish the statistical model. | In comparison to other current techniques, they suggested  hybrid method produces results of 86.8% for F measure |
| 10 | Heart Disease Prediction System Using Data Mining and Hybrid Intelligent Techniques | This paper produces an automated system which predicts the heart disease accurately based on the symptoms according to gender/age and domain knowledge of experts in the field at the lowest cost. | Classification via clustering achieves poor compared to other two methods. Author intends to extend the work for predicting the intensity of the disease using fuzzy methods. |
| 11 | Modeling and design of evolutionary neural network for heart disease detection | This paper indulge the design of diagnosis system for heart disease detection will become easy, cost effective, reliable and efficient. | Scientific data also demonstrates that socio-economically poor populations are now primarily affected by CVD and associated risk factors, which evicts them from their homes. |
| 12 | Machine Learning Classification Techniques for Heart Disease Prediction | In We present an overview of the machine learning classification methods that have been suggested to aid medical practitioners in the diagnosis of heart disease in this work. The most popular classification algorithms for the diagnosis of heart disease. Finally, we examine research studies that are representative of this field's use of machine learning classification approaches. Also, a thorough tabular comparison of the papers surveyed is provided. | The mortality rate and total complications can be reduced by early identification of heart disorders. |
| 13 | Heart Disease Prediction using Artificial Intelligence | The patient and the doctor provided the project's input information. Heart illness is then analyzed using various AI algorithms using the doctor's inputs. The results are now compared to those of other models that have been used in the same area and are determined to be superior. | Accuracy cannot be guaranteed by a computerized system alone, and warehouse data is only as reliable as the data input that produce |
| 14 | A Computational Intelligence Method for Effective Diagnosis of  Heart Disease using Genetic Algorithm | The technology is more useful when we come across the patients suffer with more than one type of disease of same category. In such cases the information obtained from the patient may be interrelated with the signs and symptoms in the medical diagnosis where the physicians may not be able to diagnose accurately. | The problem of uncertainty is due to different reasons which includes patients not describing accurately what has happened to them or how they suffer, doctors and nurses cannot explain exactly what they detect, some degrees of error in the laboratory reports, inability of the medical researchers not precisely characterizing how diseases modify the normal functioning of the body and no one can precisely determine ones prognosis. |
| 15 | Prediction of Diabetes Using Artificial Neural Network Approach | Using test data from a sample population, this model performs at 92% accuracy in predicting the risk of diabetes. | To function, the neural network needed training. For large neural networks, a lot of processing time was required. |

**[6.1] FINDINGS IN LITERATURE SURVEY:**

**[7. ] METHEDOLOGY:**

**[8.] SOFTWARE REQUIREMENTS: Functional and Non Functional Requirements**

**[9.] SYSTEM ARCHITECTURE:**



**Fig. 9.1** System Architecture

**[10]. UML DIAGRAMS:**

**Use Case & Class Diagrams are compulsory**

**[11]SUMMARY:**

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