

Disseminating Authentic Public Messages using Chatbots - A Case Study with *ElectionBot-SC* to Understand and Compare Chatbot Behavior for Safe Election Information in South Carolina

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Abstract

With the 2024 elections impacting nearly half the world's population, the need for accurate election information has never been more urgent. However, stakeholders continue to face difficulties in accessing reliable data, especially with rising concerns about generative AI, misinformation, and bots. We introduce *ElectionBot-SC*, a chatbot tool designed to provide personalized and reliable election-related information from a primary source (e.g., official election commission) and, if necessary, from a secondary source (e.g., non-profit) through a user-friendly interface. This demo highlights its multi-engine functionality, allowing users to choose between SafeChat (rule-based and powered by Rasa), Google Search, and an LLM (Mixtral 8x7b) to receive responses. *ElectionBot-SC* ensures transparency by clearly indicating the provenance of the information and encouraging users to evaluate responses from various AI engines critically. The tool was used for the 2024 elections in South Carolina to understand the effectiveness of chatbots in assisting users at a University comprising of students, including first-time voters, staff, and faculty, with election queries. Although we focus on elections and verifiable information dissemination using chatbots, our proposed approach is widely applicable like in health, traffic, education, and water. Demo Video link - <https://shorturl.at/1A7cc>

1 Application Context

Public agencies often attempt to reach out to residents with accurate information so that latter can make informed decisions for their individual and community good. With the increased availability of online AI services like search engines and Large Language Model (LLM)-based chatbots, residents have additional and convenient avenues for getting information even though such AI services may not be trustworthy for accuracy or completeness. But when AI technologies are actually put to test (e.g., elections in 2024 (OpenAI 2024) or COVID-19/ health in 2020 (Srivastava 2021)), the services have not been up to the task. The situation is common in many domains like in health, traffic, water, education, and elections. We will focus on elections in this paper but our proposed approach in response is widely applicable.

In the presented context, our approach is to use collaborative assistants technology, commonly called chatbots,

for **spreading reliable information in a user-personalized and consumable content format in terms of language, structure and delivery**. For reliable information, we use the strategy of primarily relying on the official information, like FAQs, provided by government agencies mandated to hold elections. When primary data is insufficient to meet user's informational needs and data from secondary sources are available, we will investigate if users prefer the fallback strategy of mixing data sources without losing trust in information to make informed decisions.

Notably, the presented *SafeChat* architecture provides grounded answers, supports a *do not answer (DNA)* mechanism to purposefully deflect a hypothetical response, and is scalable. We demonstrate the tool, how it was used in recent elections in South Carolina setting and how the lessons may generalize beyond.

2 Introduction

The foundation of a functioning democracy is the ability of its citizens to participate in elections and the orderly transfer of power that follows. While Artificial Intelligence (AI) is often associated with concerns about misinformation and security during elections, chatbots offer a promising solution for improving voter participation. They can provide essential information, such as voting dates, locations, and processes, in a user-friendly way, helping vulnerable populations, such as seniors (Narayanan et al. 2021) and first-time voters, navigate the complexities of voting. But as a baseline and illustration of the current situation, for elections in 2024, OpenAI declared that ChatGPT would defer election questions to human-curated Frequently Asked Questions (FAQs) (OpenAI 2024), even though it has one of the best performance in QA settings while other large language models (LLM) based chatbots do not fare any better (Rozado 2024).

Researchers have assessed the difficulty of voting in U.S. states using the Cost of Voting Index (COVI) (Schraufnagel, Pomante II, and Li 2020; COVI June 2022), where states like Oregon are ranked as the easiest, and New Hampshire as the most difficult. In this paper, we focus on South Carolina, which is ranked among the most complex states for voting (COVI June 2022). Elections in South Carolina cover a range of positions, including municipal, state, and federal offices. The state's election commission oversees key tasks such as voter registration and candidate certification. Given

the complexity of voting in South Carolina, there is an opportunity to use tools that simplify the process, especially for the aforementioned vulnerable voting groups.

We propose *ElectionBot-SC*, a tool designed to provide reliable and accessible election information, featuring three response engines: *SafeChat* (explained below), Google Search, and a free-tier Large Language Model (LLM): Mixtral 8x7b (Jiang et al. 2024). A search allows users to retrieve real-time information from the web, while an LLM provides responses based on its internal training data. Our work builds on an earlier version that used 2022 data and was showcased to only seniors (Muppasani et al. 2023). The full-fledged tool was used for the 2024 elections in South Carolina to help researchers understand the effectiveness of chatbots in assisting users at University comprising of students, including first-time voters, staff, and faculty, with election queries.

3 SafeChat based ElectionBot-SC

When applying current chatbot building methods, including LLM based (McTear 2021; Almansor and Hussain 2020), to this and similar trust-sensitive domains, the challenges one faces are: (a) difficulty to link output to input data sources (provenance), (b) difficulty to control output, including hallucinations (c) inability to prevent inappropriate content like abusive language, (d) being usable across modes while reducing the possibility of exhibiting bias, (e) costly and slow development due to requirements of deep AI skills to build and lack of testing guidance. We seek to address them within a general solution.

The *SafeChat* architecture (Figure 1) is a rule-based approach, implemented using RASA (Bocklisch et al. 2017), with handlers to retrieve answers from both built-in domain-independent data sources (e.g., chit-chat) as well as domain-dependent (e.g., election) question-answer (QA) data sources (meeting challenges a, e). In addition, *SafeChat* supports a *do not answer (DNA)* mechanism to purposefully deflect a response. The system ensures safety by maintaining a database of verified QA pairs and only responding when it recognizes user intents with high confidence and can provide grounded answers traceable to official sources (meeting challenges b, c). It also logs interactions for audit purposes and supports multiple interaction modes, including voice, to enhance accessibility (challenges d). The system integrates key components, including an intent generator to map user queries to intents, a paraphraser to handle variations of questions, and a response generator that supports multi-modal content such as text, images, and audio. We use the RASA chatbot framework for natural language understanding (NLU) and dialogue management, ensuring flexible response generation through various customizable actions and response variations at scale (meeting challenges d, e). Common services like logging, and accessibility options further enhance safety and usability.

Dataset: To train *ElectionBot-SC*, we utilized FAQs from the official South Carolina election website (South-Carolina 2024) and the League of Women Voters (Vote411 2024). Our dataset evolved from an initial October 2022 version (30 QA pairs, 10 topics) to a September 2024 update (23 QA pairs, 8 topics). We retained 7 QA pairs from the older version

that were missing, but relevant, in the update. Additionally, we incorporated 11 QA pairs from Vote411 to broaden coverage. The final dataset comprises 41 QA pairs covering 9 topics, enhancing official state information with reputable non-governmental sources. Table 1 presents key statistics of the FAQ dataset, including QA pair counts, average question and answer lengths, and topic coverage across sources.

User Interface and Interactivity: Upon accessing the *ElectionBot-SC* platform, users are greeted with an intuitive interface comprising a header, a collapsible sidebar, and a main chat area. The sidebar contains information about the chatbot, including its purpose, sample questions, and contact details. This design ensures that users have easy access to context and guidance throughout their interaction. A key feature of the *ElectionBot-SC* tool is its ability to switch between three different response engines. This functionality allows users to compare responses from different sources, enhancing their understanding of how various AI systems interpret and respond to election-related queries. Importantly, the interface clearly indicates when the response engine changes, ensuring transparency in the source of information. **Survey Integration:** To gather user feedback and assess the chatbot’s effectiveness, the demo platform includes a survey feature. Users can access this survey via a dedicated button, which presents a comprehensive set of questions.

4 Tool Demonstration and Impact

The *ElectionBot-SC* demonstration platform showcases a user-friendly chatbot interface designed to provide users with a multi-faceted experience in accessing election-related information. As illustrated in Figure 2, the user presents an in-scope question (“*When is the 2024 General Election?*”) and a do-not-answer question (“*Are Republicans going to win the elections?*”) to the 3 response engines in the *ElectionBot-SC* chatbot. Regarding the *SafeChat* engine, the system provides an accurate answer with the appropriate source details for the first query. However, for the second query, the system declines to answer as the query’s intent is recognized and flagged as a do-not-answer question. Next, when the user presents the same queries, now to the Google Search engine, the system returns a valid date for the first query, but irrelevant information for the second query. This result highlights the limitations of search engines as an effective tool for appropriate information retrieval. Lastly, the LLM gives correct and unbiased answers but adds unrequested and speculative details. While accurate, this extra information can confuse rather than inform the user. The series of 3 described interactions with the *ElectionBot-SC*

	South Carolina	Vote411	Used	
# QA pairs	30	23	11	41
Avg question length	10.9	7.58	14.5	11.9
Avg answer length	80.9	51.29	80.9	70.6
# Topics	10	8	11	9
Last updated	Oct2022	Sep2024	Sep2024	Sep2024

Table 1: Statistics about FAQ data. Question and answer lengths are in #words.

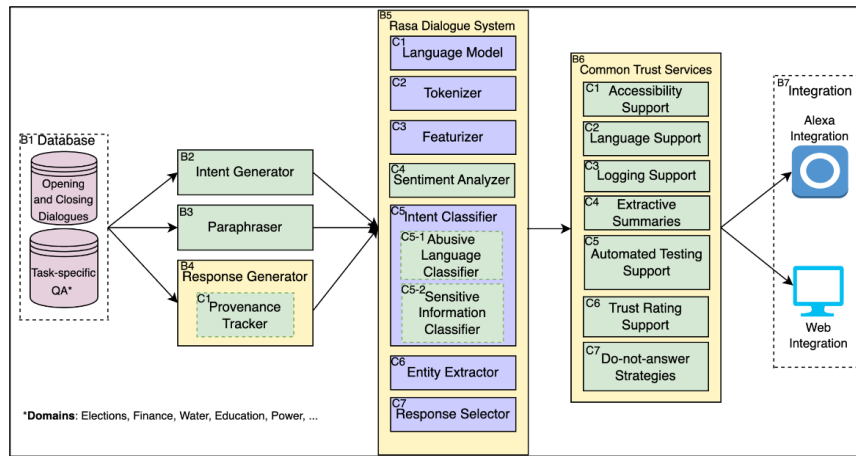


Figure 1: The *SafeChat* System Architecture. Novel components are B4-C1 (provenance tracker), B5-C4 (sentiment analyzer), B5-C5 (Intent Classifier), and all sub-components of B6 (i.e., B6-C1 to B6-C7). Others are leveraged from Rasa.

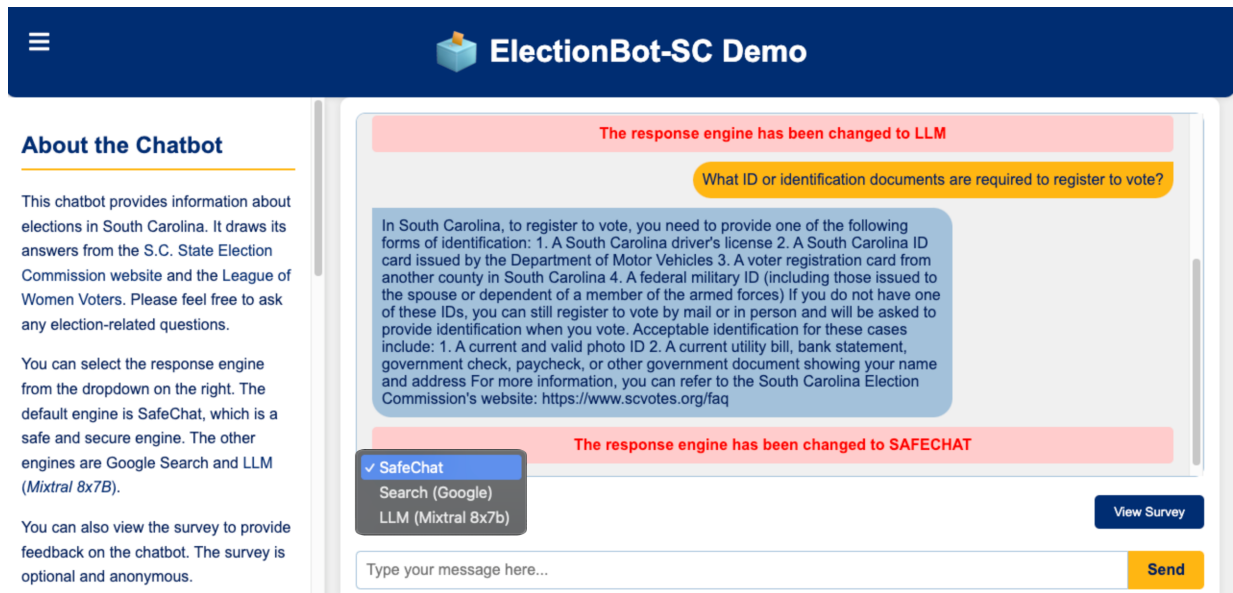


Figure 2: A screenshot of *ElectionBot-SC* demo showing user interactions and the option to switch between *SafeChat*, Google Search, and LLM engines.

chatbot illustrate that *SafeChat* helps produce the most concise and correct answers, while strictly declining to answer potentially sensitive topics.

Educational Value and Transparency: By allowing users to switch between different response engines, the *ElectionBot-SC* demo serves an educational purpose. It highlights the variations in responses from different AI systems and search engines, promoting critical thinking about information sources. This transparency is crucial in the context of election information, where the accuracy and origin of information are paramount. In the spirit of supporting Computer Science-related research and fostering collaboration within the scientific community, our demo application is hosted on a Chameleon Cloud instance (Keahey et al. 2020). Through this interactive and multi-faceted approach, the *SafeChat* demonstration platform not only provides valuable election-

related information but also offers insights into the workings of different AI and search technologies.

Generalizing Beyond SC: As *ElectionBot-SC* is implemented using the generic *SafeChat* architecture with the only dependency on the region being the (election question and answer) data, it is easy to generalize the chatbot. For this, we have created an open election FAQ dataset (Lakkaraju et al. 2024) with data from across the leading global democracies as well as US states. As a result, we envisage that different stakeholders will create highly trustable and usable local chatbots (e.g., *ElectionBot-xy* where *xy* is for there US state or 2-letter country identifier) that can help voters with local election data from primary and secondary sources.

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