Poster: Improving Customer Service Through Rapid Prototyping of Data Exploration Chatbots

Andrea Esposito
Giuseppe Desolda
Rosa Lanzilotti
andrea.esposito@uniba.it
giuseppe.desolda@uniba.it
rosa.lanzilotti@uniba.it
Department of Computer Science
University of Bari Aldo Moro
Bari, Italy

Maristella Matera
maristella.matera@polimi.it
Dipartimento di Elettronica,
Informazione e Bioingegneria
Politecnico di Milano
Milan, Italy

Rossella Pizzi
Stefano D'Ascoli
r.pizzi@eusoft.it
s.dascoli@eusoft.it
Eusoft S.r.l.
Bari, Italy

ABSTRACT

Companies are increasingly using relational databases to store their business data. In most cases, they would benefit from adopting conversational user interfaces to explore this data, allowing non-technical users to perform complex queries without the need to involve customer service or developers. This poster presents the details on the re-engineering of CHATIDEA (CHATbots for Interactive Data ExplorAtion), a novel no-code framework that supports the rapid prototyping of chatbots to explore information extracted from structured data sources.

CCS CONCEPTS

• **Human-centered computing** → **Natural language interfaces**;
• **Information systems** → *Search interfaces.*

KEYWORDS

data exploration, CHATIDEA, end-user development, AI customization

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1 INTRODUCTION AND BACKGROUND

More and more companies are using chatbots to communicate with their customers, as they allow for better human resources placement while still providing a highly accessible, fast way of communicating for users [5]. Most chatbots are currently used to retrieve information, typically stored in a knowledge base, to provide an exhaustive response to users [5]. The growing interest in Generative Artificial Intelligence and large language models may add to this trend.

Despite the progress made in many areas of conversational agents, the basic process of creating a chatbot remains the same. Whether it is the designer or the developer, they still have to start almost from scratch to handle all the queries and responses. In addition, there seems to be a lack of a comprehensive methodology for developing data-driven chatbots. In particular, the automatic extraction of intents and entities from data sources remains largely unexplored. Overcoming obstacles such as building the knowledge base for the conversational agent and integrating it with the dialogue system remain significant challenges.

To fill this gap, this poster details an ongoing re-engineering process of the CHATIDEA ("CHATbots for Interactive Data ExplorAtion") framework, an innovative methodology with a no-code platform that facilitates the design and rapid prototyping of chatbots for exploring data stored in relational databases. In the next section, we describe how CHATIDEA supports the creation of chatbots for customer service to decrease human intervention on simple requests [2, 3, 6] .

2 THE CHATIDEA FRAMEWORK

The CHATIDEA framework facilitates the rapid prototyping of chatbots that allow end users to explore information stored in structured data sources. Our approach is characterized by a series of modeling abstractions that help chatbot designers identify data elements and properties within a structured data source, which are essential for the automated construction and management of data exploration conversations. Specifically, our framework allows the definition of a chatbot starting from the annotation of the relational database [2]. Tables can be tagged as (i) "primary", i.e., they are the main focus of end-users' interest; (ii) "secondary", i.e., they contain data related to a primary table; (iii) "crossable", i.e., they are pivot tables used to cross n-to-n relationships.

Once the designers have annotated the database, CHATIDEA performs a series of automatic steps. First, it uses the designers' initial choices to automatically create a training dataset used in the second step to train the Natural Language Understanding (NLU) model. At runtime, this model interprets the user utterances, resolves the corresponding queries using the knowledge of the data

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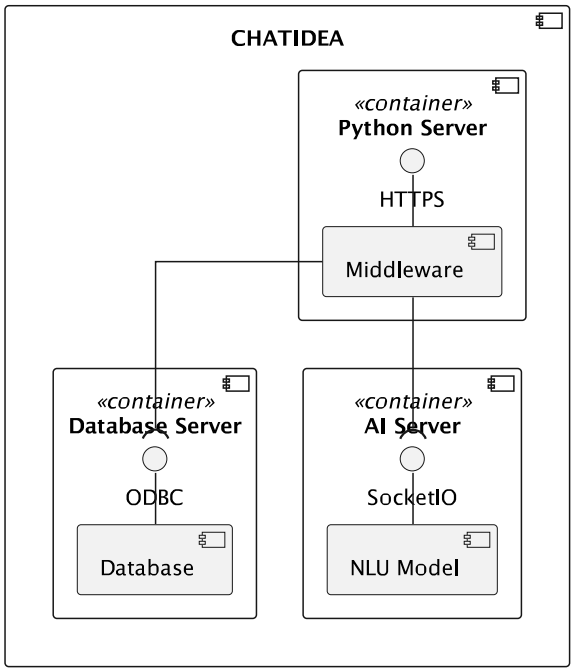

Figure 1: High-level architecture of CHATbots for Interactive Data ExplorAtion (CHATIDEA)

structure, and extracts and transmits the data through the chatbot channel. The final step is to build the chatbot UI and connect it to the NLU model.

The framework is implemented in the micro-services architecture represented in Fig. 1. In this first release, the NLU model is implemented using the default Rasa [1] model and pipeline. However, the micro-service architecture allows for easy replacement of any component (as long as the interface is the same), future-proofing the framework.

The ongoing refactoring of CHATIDEA is part of a collaboration between the University of Bari, the Politecnico di Milano, and Eusoft S.r.l. In particular, the core business of Eusoft is a Laboratory Information Management System (LIMS), a software that supports the operations of a modern laboratory by providing features such as sample management and workflow tracking [4]. Generally, LIMS offers ways of managing samples, workflows, and tests, centralizing all laboratory data. Users often query such data to provide analysis reports, aiming at evaluating regulation compliance and quality levels. Users may also query a LIMS to get an overview of the laboratory status. It is not uncommon for LIMS end-users to make requests that go beyond accessing a fixed knowledge base via a user interface: they are often interested in the specific data that the laboratory is currently managing. When such requests cannot be fulfilled or are difficult to address using a Graphical User Interface, they are escalated to customer support, which advises developers to perform database queries and provide the necessary results. The development of ad hoc chatbots on top of Eusoft's LIMS databases will allow end users to immediately formulate their information needs in natural language without involving customer service. This also alleviates the tasks of the company, which in this way, no longer needs technicians specialized in SQL for customer service, as the chatbot will now take over the same tasks.

3 CONCLUSIONS AND FUTURE WORK

In this poster, we presented the first refactoring and re-engineering of the CHATIDEA research prototype. In future work, we will improve and simplify the annotation step of the relational database using a visual approach as already explored in [6]. In addition, usability testing with end users will be required to assess the usability of the resulting chatbot. This will help determine whether or not the system is beneficial for day-to-day use and whether it effectively reduces the number of inquiries that would otherwise be directed to customer service.

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