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A Survey on Natural Language to SQL Query Generator

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***Abstract:** This paper provides a comprehensive review of a papers which are related to bank application designed for devices, focusing on its features, usability, security, and overall user experience. The application is evaluated based on its ability to perform typical banking tasks, such as checking account balances, transferring funds and managing transactions. The review also examines the application's design, navigation, and user interface, as well as its security features, including authentication, encryption, and protection against unauthorized access. Overall, the review concludes that the bank application is a highly effective and user-friendly tool for managing finances on the go, with robust security measures in place to protect sensitive information.*

I. INTRODUCTION

Artificial Intelligence, or AI, is a rapidly growing field that has the potential to revolutionize the way we live and work. At its core, AI involves the development of intelligent machines that can perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation. Another most exciting areas of AI research is deep learning, which involves the use of neural networks to model complex patterns in data. Deep learning has enabled breakthroughs in areas such as computer vision, natural language processing, and game playing, and has led to the development of applications such as image recognition, speech synthesis, and language translation.

There are several subfields of AI, each with its own specific focus and applications. Here are some of the main subfields of AI:

1) Machine learning: This involves the development of algorithms that can learn from data and improve their performance over time. Machine learning is used in a wide range of applications, from image recognition and natural language processing to fraud detection and predictive analytics.
2) Natural language processing: This involves the use of computer algorithms to analyse, understand, and generate human language. Natural language processing is used in applications such as voice assistants, chatbots, and machine translation.
3) Computer vision: This involves the development of algorithms that can analyse and interpret visual data, such as images and videos.
4) Robotics: This involves the development of intelligent machines that can interact with the physical world. Robotics has applications in fields such as manufacturing, healthcare, and logistics.
5) Expert systems: This involves the development of computer programs that can mimic the decision-making abilities of human experts in a specific domain. Expert systems are used in applications such as medical diagnosis and financial planning.
6) Cognitive computing: This involves the development of algorithms that can simulate human thought processes, such as perception, reasoning, and decision-making. Cognitive computing is used in applications such as fraud detection, customer service, and personalized marketing.
7) Reinforcement learning: This involves the development of algorithms that can learn through trial and error, by receiving feedback in the form of rewards or penalties.

Despite its many benefits, AI also poses significant challenges, particularly around issues such as privacy, security, and bias. As AI systems become more complex and powerful, there is a risk that they could be used to perpetuate existing social inequalities, or to violate individual rights and freedoms.
Organization of the report is as follows; in section 2, we will be discussing about the related work, in section 3 we will be discussing about the conclusion and future work.

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II. RELATED WORK

Voice based SQL Query Generation [1] In this paper the authors have discussed regarding system which was developed to change secure access of information to a voice-based programme (UI) by facultative voice-based authentication and degreed integration with an existing tongue process (NLP) system. It proposes Machine learning based technique to get the SQL question supported user voice, a unique information question type interface, that is in a position to dynamically generate question forms. In the first section, the information is collected within the type of speech associated keep as an input for successive section for process. In the second section, the input voice is endlessly processed and reborn to text. In the third section, the reborn text is analysed and processed mistreatment Python Script to spot the response to be taken against the command. Finally, output is generated supported the information generation.

Voice And Text Based Natural Language Query Processing [2] In this paper, the authors propose a system that aims to develop for users who do not know the database. The system accepts a user as an input in natural language text or via voice input and extracts the necessary information needed for the formation of a query. The main goal of the system is to allow communication between the database and its human users using natural language. This system will help T&P officers to easily retrieve and manage data from student database using their natural language such as English. There is no need for the user to learn complex query syntax to retrieve data. The facility to accept input in speech format and voice based makes the system user friendly.

TalkSQL [3] This paper introduces a voice-based query system named TalkSQL that takes voice inputs from a user, converts these words into SQL queries and returns a feedback to the user. It uses regular expressions, a representation of regular languages, to recognize the Create, Read, Update, Delete (CRUD) operations in SQL and automatically generate a feedback using pre-defined templates. A survey on 53 participants showed that 91.2% agreed that they were able to understand the CRUD command using TalkSQL. The expected contributions are two-fold: this work may assist a special e.g. TalkSQL was designed as a C# Windows Forms Application (WPF) that runs on the.NET framework. It translates natural language specified in verbal inputs into an executable SQL query to be used on a test database, and presents an output.

Structuring Natural Language to Query Language[4] the author discussed about how SQL (Structured Query Language) is a specialized language used to interact with data stored in a database management system. However, SQL's complex query commands can make it difficult for users without prior experience. To address this issue, researchers analysed existing Natural Language Processing models that can convert a user's native language query into an SQL query. This allows novice users to use SQL without the need to generate any complex queries.

The proposed system helps novice users to retrieve data from a database using natural language queries in Hindi. The system uses four steps to convert these queries to accurate SQL queries. To extract the keyword from the query, the system uses word group and morphological analysis. Then, a pattern matching formula categorizes the keyword to eliminate difficulties in matching natural language to SQL queries. The system faces challenges in keyword mapping and join path inference, which are addressed using natural language processing, database implementation, and compiler design methodologies.

Conversion of Natural Language Query to SQL Query [5] The proposed system allows novice users to retrieve and modify data using text or speech. It uses four steps to convert natural language queries to accurate SQL queries and can handle queries in Hindi. The proposed model allows users to retrieve data from a database using English language, without the need for knowledge of complex query languages. It uses Java Database Connectivity and servlets for implementation and improves the performance of existing Natural Language Interfaces (NLIs) by using information in the SQL query log. However, communication with databases using natural language is still problematic. The future system aims to cater to Talent and Performance managers who are comfortable with simple English language and eliminate the need for knowledge of database languages such as SQL.

QUERYING DATABASE USING NATURAL LANGUAGE INTERFACE [6] In this the authors discussed about in which aim at creating a model to enhance the interactions that take place between a user and the database. Everyone who might need some information extracted from the database might not be well acquainted with MySQL or similar query languages. This acts like a barrier to both understanding, and profession. The model aims at providing functionality and ease of communication to a system in extraction of information, by allowing the user to communicate in English with the system, and state the query in natural language which is understood by the system and correctly reciprocated. his is followed by the linguistic component which advances in three phases such as Morphological analysis, Syntactic Analysis, Semantic analysis.

Speech has been considered as a more convenient way of communication and has been preferred over written and textual forms of communication, Natural language is claimed to be too wordy or too ambiguous for human-computer interaction. Unrealistic expectations- Mostly people depend on NLDBI systems capability to process a natural language query: they assume that the system is intelligent so it can comprehend facts.

A limited Data Dictionary is used where all possible word related to a particular system will be included .The system can be adopted by multiple business-oriented organisation where the extensive task of data analysis can be done by a statistical scientist rather than an engineer.

Voice based natural language query processing [7] The authors have come up with the system which explains the retrieval of data by giving user speech as input. Using speech recognition technique speech will be converted into text. It Splits the input query and store it in a list, i.e., tokenize the input sentence. Find all the attributes of all the tables which are required. Examine the query and find the table and the attributes present in the query. After examining, Separate the table which doesn't belong. . Now find the tables which will contain the pair of attributes which do not belong to the table in the query. Select any one table. Thus, we will obtain the tables required for natural join. Then form the outer query according to the different conditions. Merge both and generate the final query. Display the result on GUI. The advantage of using this model is it is Easily accessible; System will prompt user about the error while entering the query and provide auto-correction feature and handles complex queries. The aim of this model is to allow interaction among database and its human users using natural language.

nQuery[8] The authors have discussed about have proposed a system which takes natural language as an input and converts it into SQL query. The research aims to include complex queries along with simple queries with respect to any database. This system include aggregate function,various conditions in WHERE clause and advanced clauses like ORDER BY,GROUP BY and HAVING. The model mainly aims to retrieve the data and also provides the facility to convert DML natural language statements to SQL

Natural Language query using NLP by generating SQL query [9] The authors have proposed a model in NLP for converting the Natural language query to SQL query. The various steps followed during this process are tokenization, lemmatization, parts of speech tagging, parsing and mapping. The natural language interface is capable for translating the natural language query into an equivalent database query language.

The system contains an intelligent layer that accepts user's sentences in natural language as input, converts these sentences into standard SQL queries and executes them to retrieve data from relational databases. This system consists of several modules that are used to extract key words alone and leave out the redundant data. Input data initially goes through an NLP phase followed by a mapping phase.

This model has user friendly GUI through which the user can provide the English language query to the system and a query generator that provides the resultant Query of the user's request. The input provided by the user must be processed to identify the constraints and predicates required to formulate the desired SQL query. The NLP makes use of techniques such as tokenization, part of speech tagging, chunking and entity recognition. The NLP provides chunked tags which are processed to analyse the attributes and predicates. The query generator makes use of a query translation. The algorithm helps in identification of predicates based on the set of rules. A prediction model is, used when the translation algorithm fails to generate sufficient information to formulate the query, also included in the query generator to predict the query. The formulation of query is done with the help of pre-defined structure, attributes and predicates identified using NLP. Finally the database component is a response generator which takes the output of DBMS as its input and converts it into the English language.

III. CONCLUSION AND FUTURE WORK:

In conclusion, bank application is a powerful tool for financial institutions to improve their customer service and engagement. By providing customers with quick and easy access to banking services through a conversational interface, banking chatbots can help reduce wait times, improve response times, and provide personalized recommendations and advice.

It is also important for financial institutions to ensure that our chatbot complies with relevant banking regulations and data privacy laws, and to provide clear and transparent information about how customer data is being used and protected.

Overall, a well-designed and well-implemented JARVIS app can help financial institutions improve their customer service, reduce costs, and stay ahead of the competition in an increasingly digital world.

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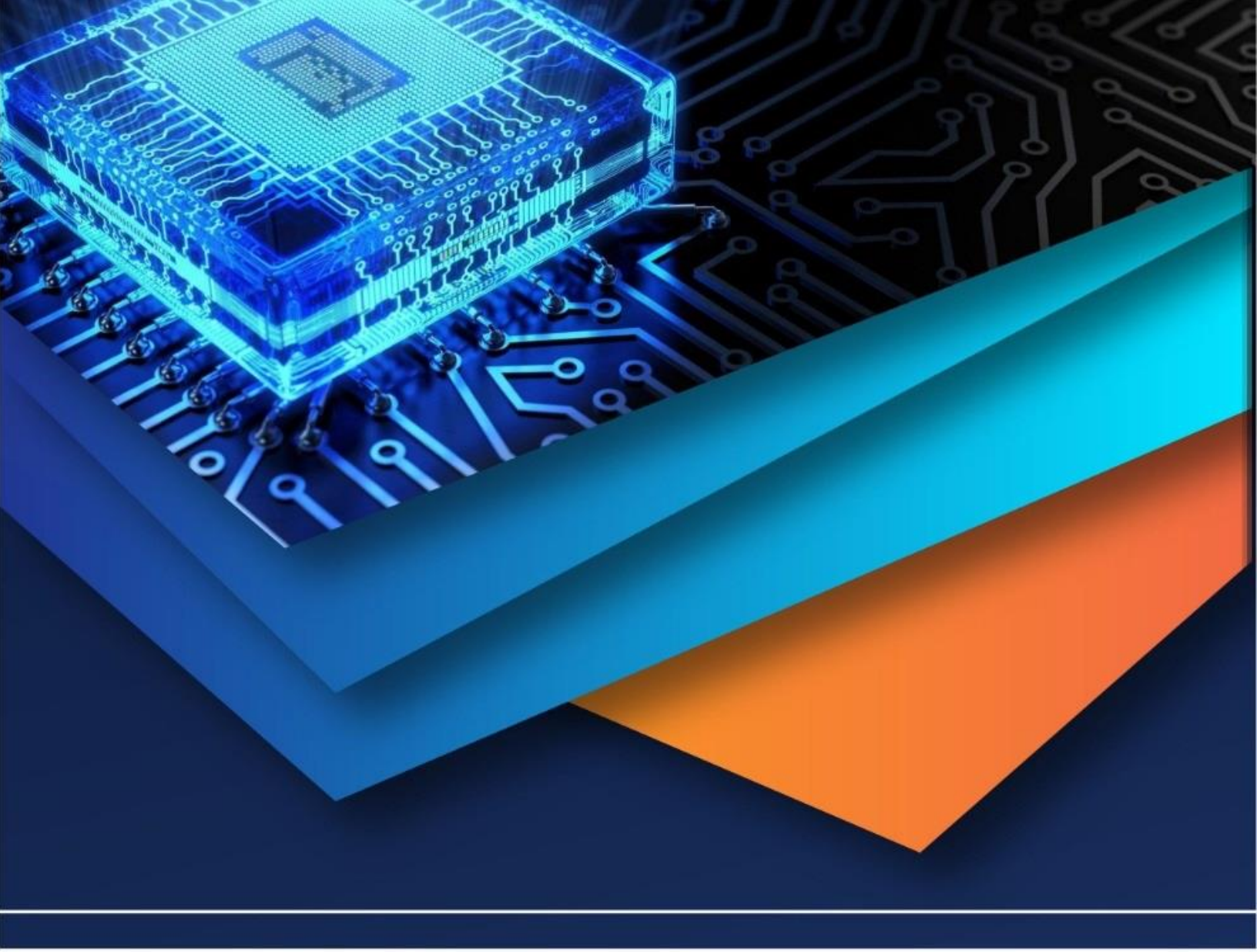
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