

operation name or any non-useful word. To understand this; let the user query is as:

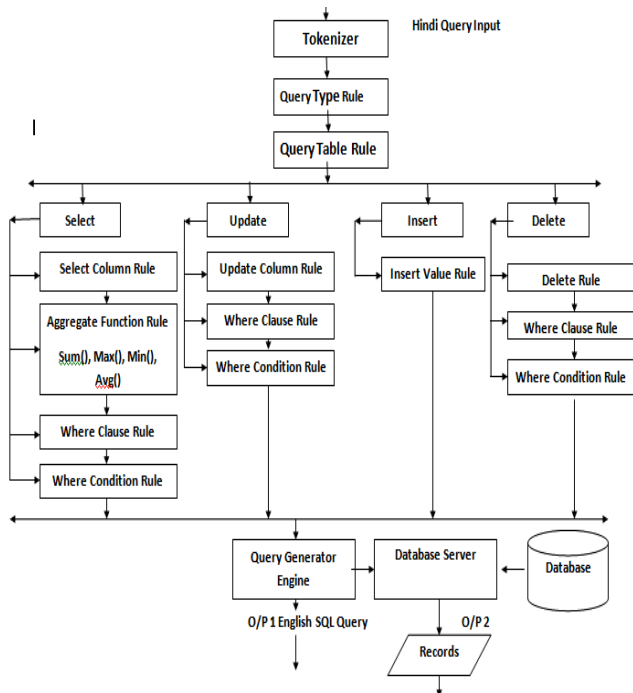


Figure 1: Architecture

सभी विद्यार्थी का नाम,अंक बताओ. This Hindi sentence has 7 tokens. First token is सभी which is the starting of sentence. Now सभी means it is reflecting like select all i.e. in SQL we say 'Select *', another token is विद्यार्थी it is reflecting the name of the database table i.e. 'student table' Some tokens may be fields name as in the above query नाम and अंक are the field names. There is conjunctions also like का as well as we also included the comas (,) in the list of tokens & finally last thing is बताओ which is reflecting as the 'select query' Therefore after this step we have all the tokens from which the sentence is composed of.

After that we will apply the query type rule. Query type rule is a rule which will identify which type of query it is whether it is select, insert, update, delete type of query. We are given with the query properties through which we can easily identify the associated Hindi word which is given in the sentence within a query and is given below in figure 2.

Later it will identify the table name with the help of query table rules. It will just see whether the given table is present there or not. These both the things have been possible because of the tokenizer and its tokens which we are matching under each rule. Once the query rules and table rules has been applied then we will proceed with the further tokens and we will apply the sub rules of the selected query.

If the query in Hindi will be the select query then it will look for the rules like column rules, aggregate function rule, where clause and where condition rule.

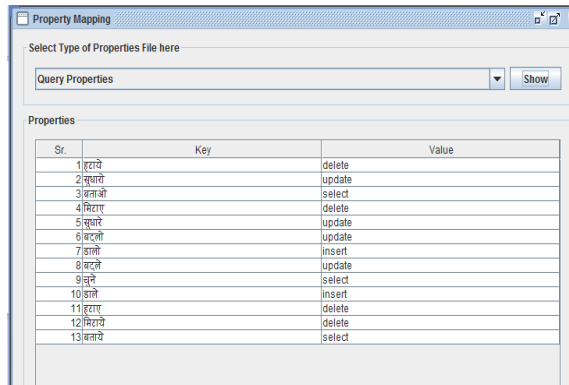


Figure 2: Query Properties

It will work with the help of tokens only. It is like column rules it will select the number of columns given in the Hindi query.

Aggregate function will identify whether it is min (), max (), sum (), avg () query or not . Other rules like where clause for that we are given with the properties i.e. It will identify all the associated Hindi English words which are given below in the fig 3.

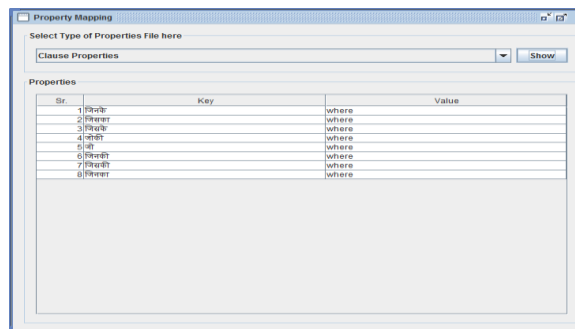


Figure 3: Where clause property

Similarly where condition is also there it will work like same as given above it is consisting of all the conditional part and its associated Hindi words including <, >, =, logical and ,or not etc. Similarly for update query it is having update column rule ,where clause rule and where condition rule and its working is same as explained above. The same way insert and delete also work. At last there is query generator which will generate query from Hindi sentence .that query generated will be fired to database and all the selected records selected rows has been displayed in Hindi Language. SQL is generated in this phase according to Hindi sentence. Execute query and display result to user the above SQL query is executed and result of which in Hindi language is displayed to user. The output is in the form of Hindi language and we are giving query also in Hindi language and processing of all this has been done by inner module as explained above.

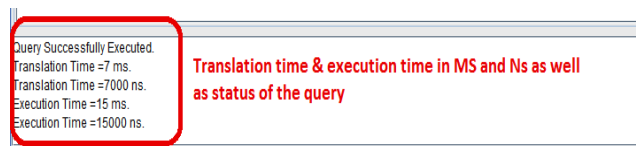


Figure 4: GUI & timing results

Once the query has been executed and the result has been shown side by side it will also show the timing result which

include whether the query has been successfully executed or not if it is failed it will show the unsuccessful message as shown in the fig4. It will also give the translation time in milliseconds as well as nanoseconds to notice the minute difference during conversion and same in the case of execution time also, it will show the time required to execute the query.

4. Conclusion

Rule based graphical user interface to relational database is presented in this paper. The system will accept Hindi sentence as a query and gives output in Hindi itself. It is very much useful for the people who do not have any prior knowledge of database and SQL queries languages. We are using different rule along with the NLP to perform operation such as insert, update, delete, select as well as the aggregate functions such as min (), max (), sum (), avg () etc. This system can be enhanced by making it more generic. We can also implement it for very complex queries like join operations & order by operations (queries). To make the system more friendly the dialogue based system can be used in which user will provide the input Hindi query through speech interface.

References

- [1] Zongmin Ma, "Intelligent Databases: Technologies and Applications", IGI publishing, 320 pages, 2007.
- [2] Burlesan, Donald K., Joe Celko, John Paul Cook, and Peter Gulutzan. 2003. Advanced SQL Database Programmer Handbook. BMC Software and DBAZine.
- [3] Dietmar Wolfram, "Applications of SQL for Informetric Data Processing", Proceedings of the 33rd conference of the Canadian Association for Information Science, 2005.
- [4] "IntelligentDatabase" from [Http://searchsqlserver.techtarget.com/sDefinition/0,,sid87_gci1124415,00.html](http://searchsqlserver.techtarget.com/sDefinition/0,,sid87_gci1124415,00.html)
- [5] M. Brodie, "Future Intelligent Information Systems: AI and Database Technologies Working Together" in Readings in Artificial Intelligence and Databases, Morgan Kaufman, San Mateo, CA, 1988.
- [6] Donald P. McKay and Timothy W. Finin, "The Intelligent Database Interface: Integrating AI and Database systems", In Proceedings of the 1990 National Conference on Artificial Intelligence, pp. 677--684, 1990.
- [7] Androutsopoulos, G. Ritchie, P. Thanisch, Natural language interfaces to databases – an introduction, Journal of Natural Language Engineering 1 (1) (1995) 29–81.
- [8] Johnson T. (1985), Natural Language Computing: The commercial Applications. Ovum Limited, London.
- [9] Weizenbaum J, (1966). "ELIZA- A computer program for the study of natural language communication between man and machine", Communications of the ACM, 9(1), pp.36-45.
- [10] W.A. Woods, R.M. Kaplan, B.N. Webber, The lunar sciences natural language information system: Final report, BBN report 2378, Bolt Beranek and Newman Inc., Cambridge, Massachusetts, 1972.
- [11] Androutsopoulos, G. Ritchie, P. Thanisch, MASQUE/SQL – An efficient and portable natural

language query interface for relational databases, in: Proceedings of the Sixth International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems, Edinburgh, 1993, pp. 327–330.

- [12] Rangel, Rodolfo and Joaquín Pérez, O. and Juan Javier González, B. and Gelbukh, Alexander and Sidorov, Grigori and Rodríguez, M. (2005), "A Domain Independent Natural Language Interface to Databases Capable of Processing Complex Queries", MICAI 2005: Advances in Artificial Intelligence LNCS 3789 pp 833-842.
- [13] B. Juan J. González, Rodolfo A. Pazos Rangel, I. Cristina Cruz C., H. Héctor J. Fraire and L. de Santos Aguilar, et al. (2006) "Issues in Translating from Natural Language to SQL in a Domain-Independent Natural Language Interface to Databases" LNCS 4293, MICAI: Advances in Artificial Intelligence, pp 922-931.
- [14] B. Sujata, S. Viswanadha Raju and Humera Shaziya, "A Survey of Natural Language Interface to Database Management System" International Journal of Science and Advance Technology", vol.2, no. 6, June 2012 .
- [15] Mohit dua, Sandeep Kumar, Zorawar Singh Virak, "Hindi Language Graphical User interface to Database Management System" 12th International Conference of Machine Learning and Application 2013.
- [16] Ashish kumar, "Hindi Language Interface to Database using Semantic Matching" Oriental journal of Computer Science and Technology vol 6, no(2) pgs 133-140 Issue 0974-6471, June 2013.
- [17] Abhijeet R. Sontakke, Prof. Amit Pimpalkar "A Review Paper on Hindi language Graphical User Interface to Relational Database using NLP" International journal of Advanced Research in Computer Engineering & technology (IJARCET) volume 3 Issue 10, October 2014

References



Systems.

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