



A Survey on Various Approaches used for Solving Verbal Reasoning Problems

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Abstract— *In computer science, rule based approach plays a weighty role to store and manipulate knowledge to interpret information in a noteful manner. In this paper, a simple rule-based approach which automatically acquires its rules which is used to determine the solution for verbal reasoning blood relationship problem in step by step manner. They are often used in artificial intelligence applications and research.*

Keywords— *Rule-based approach, Knowledge, Rules, Natural Language Processing, Inference Engine.*

I. INTRODUCTION

Language is all about communicating about the world. By studying language, a person can understand more about the world. But it is difficult to communicate with a system without having a framework or a platform and also to exploit the knowledge about the world, in combination with linguistic facts, to build computational natural language system [1]. Natural Language Processing is the branch of computer science and scientific study of a language that focused on developing a system which allows computers to communicate with people using everyday language. It is the process in which human language is provided as an input and the conversion of this input is used to form a representation [3].

NLP can be used to solve the problems of verbal reasoning blood relation problem. Rule based approach is used to develop a system that will provide answers to a problem in lieu of human beings.

II. LITERATURE SURVEY

Ning Fang and Yongqing Guo (2013), proposed a web-based interactive intelligent tutoring system that was developed and assessed in an engineering dynamics course. To improve student learning in an engineering dynamics course, a web-supported interactive ITS learning modules was developed. An intelligent tutoring system (ITS) is an interactive learning tool that allows students to solve technical problems with the direction of a virtual tutor. During problem solving, students can ask the virtual tutor questions or request hints on what to do next, just as may occur in an actual classroom environment where students can ask a human tutor questions or request hints. These ITS modules help students to study the Principle of Work and Energy to solve particle and rigid-body dynamics problems. Student literature gains were compared using a quasi-experimental research design that complex pretests and posttests in both a control semester ($n = 62$) and a management semester ($n = 44$). Therefore, the ITS modules increased student learning profitable by 37-43% [4].

Anatolii Vovk, Denys Girnyk (2013), distribute with the Web supported notation, which is used to accomplish a natural language representation of mathematical texts and preserves their semantics. A visualization of notation for browsers is developed and its export to standard data format TeX, Content MathML and PDF. The intimate WEB-notation provides an interactive connection over the Internet, as well as compatibility and interoperability of adapted texts in other applications. It does not fully shield the semantics of mathematical formulas, which is specified as a formal interpretation of the mathematical formation on a computer language and the structure of the online the transactions are also defined. An interactive communication over the Internet, with serve of the notation MTV, is carried out between internet browsers with the ActiveX-plugins, which yield the notation and add editing functions. The future work enclosed nature of plugins for open source software under the Linux OS [5].

Cinková, Silvie, Martin Holub, and Vincent Kríž (2012), debate about the experiments with semantic annotations which are supported on the corpus pattern analysis and the lexical resource that reveal the necessity of an evaluation measure that would recognize the efficient relation between the semantic granularity of semantic categories. In this automatic approach, personal names are noticeable manually. A corpus based learning method is presented by Kwak et al. that can index distinct types of nouns by using rules which are automatically extracted from a large tagged corpus. It is to be emphasized that reliable gain does neither directly assess the quality of the entry nor the quality of annotations. The output has to be analyzed by a man. This tool is capable enough that it can be manner with any kind of annotation where the tag set is to be enhance during the annotation [6].

Rutu, Mulkar-Mehta, Jerry Hobbs and Eduard Hovy (2011), debates on the phenomenon of granularity in native language. The level of elaborated description of an event is dissolve by using granularity. With the help of an annotation study validation of standard is being done and then develops a system for automatic granularity extraction and ultimately

compares its performance with the condition of an art technique for answering causality-style questions to empirically evaluate the significance of granularity structures for automated question answering [7].

Matsuda, Noboru, (2008) debates on SimStudent which is a machine-learning agent which is initially developed to aid newbie authors to create cognitive tutors without weighty programming. A Cognitive Tutor Authoring Tools (CTAT) is used to renew into an existent suite of software tools. SimStudent helps authors to compose an expert model for a cognitive tutor to solve the problems. In Authoring by Tutoring, the author interactively tutors SimStudent by posing problem, gives feedback on the basis of response conceive by the SimStudent and provide hints when SimStudent can't accomplish steps correctly. So Authoring by Tutoring is beneficial in creating a high quality expert model which is bulky due to the feedback on the accuracy of learned predictions applied while explain the problems. It was analyzed that programming by tutoring is a practical and effectual technology automated cognitive modeling[8].

Punyakonok, Vasin, Dan Roth, and Wen-tau Yih (2008), observes that the semantic parsing of sentences is to be a weighty task on natural language understanding and has an instant application in tasks resembling, information extraction and question answering. The main scheme of Semantic Role Labeling (SRL) is to recognize all constituents that fill a semantic role, and to figure out their roles in a superficial semantic parsing task, which is necessity for each predict ate in a sentence. The goal of the semantic role labeling task is to discover the predicate–argument structure of each predicate in a stated input sentence. In this process, the full parse tree is disposed as an input to SRL system which is considered to be the most ordinary system architecture [3,9].

Barcala, Francisco-Mario(2002), concentrate on a professional tokenizer that is necessity to analyze an ample amount of texts by applying a set of natural language processing techniques which induce to a number of linguistic phenomena and also for pre-tagging tasks alike proper noun recognition. It gives the itemized description of pre processor module for the precise segmentation of texts which demonstrate number of complicated linguistic phenomena, which includes the recognition of proper nouns. Several other originators have also examined the significance of name recognition of retrieval system. Pfeifer et al. study the search methods for the efficiency of several methods of single surname. In comparison with automatic approach, Kwak et al. present a corpus supported learning method that can index several types of (common) compound nouns by using rules that are automatically extracted from a colossal tagged corpus[10].

M. El - Arabaty (1998), describes the approach for ESSAP architecture which is an expert system for solving the problem of aerospace by using artificial notice techniques and the mathematical models. The ESSAP can be developed to aid the expert in the analysis of experiments and their result definition. So while designing the ESSAP architecture the researcher determines that the system has the capability to take a advice action automatically if the user agrees in outcome. ESSAP has the aptitude that it can accept the advice an act on it so as to communicate their result with one another and suggestion changes dynamically when the system trace the user interface[11].

Jonathan J. Webster and Chunyu Kit (1992), addresses the weight and the complicity of tokenization at the beginning of Natural Language Processing. From the sight points of lexicography and pragmatic implementation, respectively notions of word and token are discuss and defined. Practical approaches are developed to recognize the compound tokens in English, like idioms, phrasal verbs and fixed expressions are developed. In NLP, while taking the basic units for granted, it is canonical to concentrate on simple analysis. In this process, the notion of token must be determine first and after that computational processing can progress [12].

III. GENERAL ARCHITECTURE FOR SOLVING THE PROBLEM OF NLP

A. Rules Based

Knowledge can be represented either in the form of rules or facts. Conclusions can be drawn on the basis of experience, beliefs based on existing or new information, attitudes, self-determination and institutions. To generate the rules for verbal reasoning a person should have a sound knowledge of the blood relation in order to solve the questions. The sequent simple example has five clauses [3].

- parent(kate,albert).
- parent(X,Y):- father (X,Y).
- parent(X,Y):- mother(X,Y).
- father(jordon, henry).
- mother(jane, henry).

B. Tokenization

Tokenization is the process of breaking down of a sentence into units called tokens which is generated by list of actual words by which sentence are being made. It is used for Natural Language Processing of human languages such as English to make it understandable to computers.

e.g. text:"Imagination is the highest kite you can fly."[1].

Then after tokenization sentence may be:

[‘Imagination’, ‘is’, ‘the’, ‘highest’, ‘kite’, ‘you’, ‘can’, ‘fly’ ‘.’]

C. Parts of speech tagging

Part-of-speech tagging (POS tagging)/POST is a process of giving identification to words of a sentence such as noun , pronoun , verb, adverb, adjective, determinants etc as shown in Fig. 1.[2]. The main purpose of this process is parsing. In this step, a simple sentence is granted as an input which is converted into a hierarchical form that address to the units of meaning in the sentence.

e.g. text: I spotted an elephant in my city.

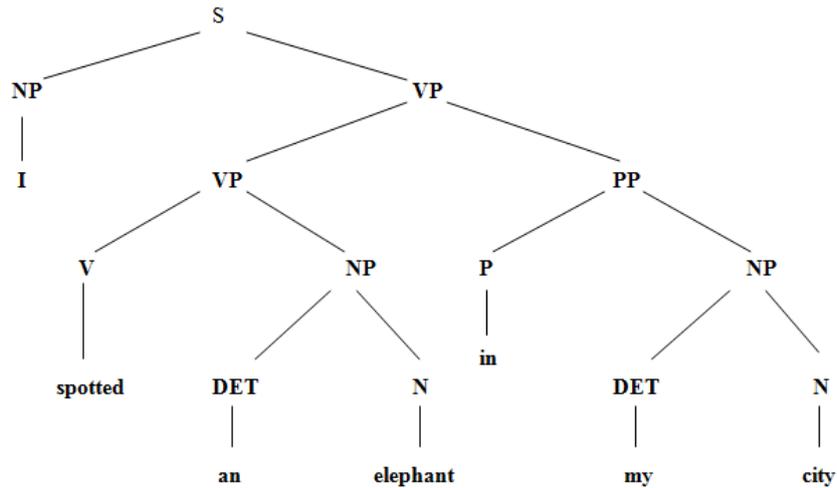


Fig 1. Example of POS tagging [2].

D. Mapping

Mapping is the drawing conclusions from the given premises to solve problems and make decisions. It basically manipulates the given knowledge and generates new knowledge. It derives the new knowledge with the help of logics or by using inference engine.

Table I. Database for mapping

S.No.	PERSONA	RELATION	PERSON B
1	Woman	Husband	Man
2	Man	Wife	Woman
3	Boy	Father	Man
4	Girl	Father	Man
5	Boy	Mother	Woman
6	Girl	Mother	Woman
7	Boy	Girl	Brother
8	Girl	Boy	Sister
9	Man	Daughter	Girl
10	Woman	Daughter	Girl
11	Man	Son	Boy
12	Woman	Son	Boy

E. Display

In this module, by using Net Beans as a tool the solution of the problem is shown and also the expected relationship for the respective problem will be displayed to the user as shown in Fig. 2.

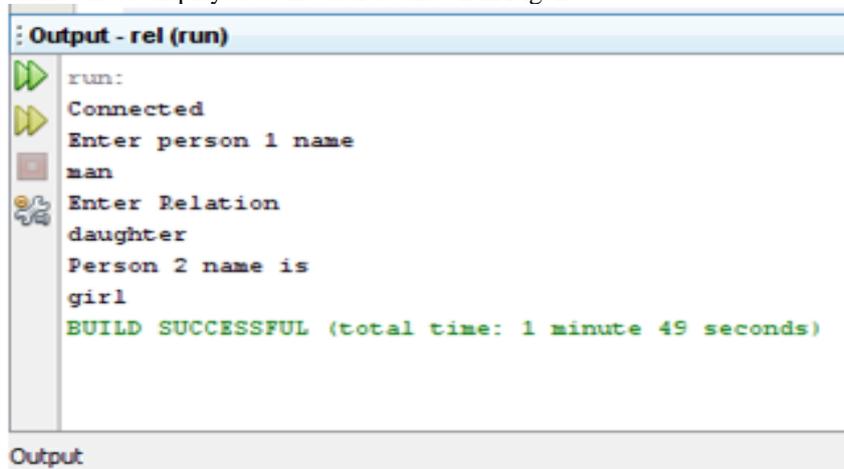


Fig 2. Expected Outcome.

IV. CONCLUSIONS

This paper will provide a survey for solving verbal reasoning problem. The system will solve the problem in step by step manner. This paper also provides details about how Natural Language Processing can make a machine understand different sentences and can interact with humans. This work can be extended to make a decision support system that will work in a similar manner like humans and can respond just like humans by understanding the different forms of sentences given to it as an input.

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