

**Design of Indonesian Sentence Grammar Checking Software Using Left Corner Parser****¹Berto Nadeak, ²Sony Bahagia Sinaga**^{1,2} STMIK Mulia Darma, Rantauprapat, Sumatera Utara, Indonesia**ARTICLE INFO**

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ABSTRACT

Grammar checking is an important component of Natural Language Processing (NLP), particularly for improving the quality of written communication. This article discusses the design of grammar-checking software for Indonesian sentences using the Left Corner Parser method. The Left Corner Parser is a syntactic parsing method that combines the advantages of top-down and bottom-up parsing, making it efficient in recognizing sentence structures. This study includes the stages of data collection, the design of Indonesian grammatical rules, the implementation of the parser, and the evaluation of checking accuracy. The results show that the software can effectively detect sentence structure errors in various types of sentences, from simple to complex. With further development, this tool has the potential to be applied in educational tools and automatic text editing applications.

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All rights reserved is Licensed under a [Creative Commons Attribution- NonCommercial 4.0 International License \(CC BY-NC 4.0\)](#)**INTRODUCTION**

Language plays a crucial role in human life as a means of communication between individuals. It can be expressed both orally and in writing. In written form, language serves as a medium to pass down knowledge from one generation to the next. Such writing can take the form of books, novels, magazines, scientific articles, news reports, and other written materials.

News can be delivered through three types of media: electronic media such as radio and television, print media such as newspapers and magazines, and online media such as [kompas.com](#), [detik.com](#), and similar platforms. When writing, including news articles in either print or digital media, it is essential to follow proper Indonesian grammar rules. This ensures that the intended message or idea is conveyed clearly and accurately to the reader. H. Rosihan Anwar, in his book *Bahasa Jurnalistik Indonesia dan Komposisi*, states that journalistic language must adhere to standard language, comply with grammatical rules, and observe correct spelling. Similarly, linguist David Wilkins once remarked that without grammar, little can be communicated; and without vocabulary, nothing can be communicated at all.

However, many news articles are found to contain grammatical errors. According to research by S.N. Wahyuni (2016), 46% of errors in the Citizen Journalism section of *Tribun Bali* were grammatical in nature, including spelling mistakes, ineffective sentence construction, the use of non-standard words, and violations of normative grammar rules. Similarly, in the *Postmetro Padang* morning daily, various writing errors were also found, one of which was incorrect sentence structuring.

Given the importance of understanding the use of effective sentences in news writing, an in-depth study is needed on the application of computational linguistics to examine sentence structure in the Indonesian language. For this purpose, the Left Corner Parser algorithm is selected, as it suits the characteristics of the Indonesian language by processing sentence elements sequentially from left to right.

One branch of computer science that studies the relationship between human language and computers is Natural Language Processing (NLP). NLP is part of the fields of computer science, artificial intelligence (AI), and computational linguistics, focusing on developing systems that enable computers to understand and process human language naturally. In natural language processing, a syntactic analysis of sentence structures is necessary. One of the techniques used for such analysis is parsing.

Parsing is the process of verifying whether a sentence structure conforms to specific grammatical rules while also obtaining its syntactic representation. Broadly speaking, parsing involves mapping a sentence to its

structural form in syntax. One algorithm that can be used for parsing Indonesian grammar is the Left Corner Parser.

METODE

The research methodology consists of three main stages. First, data collection methods were carried out using two approaches: literature review and online searches. The literature review involved finding, reading, and gathering information from various documents, particularly books. Meanwhile, online searches were conducted to obtain data or information related to the Indonesian language necessary to support the research. Second, needs analysis was performed to ensure that the system developed aligns with its intended objectives. This began with data analysis, which included identifying data sources to be used in designing the Indonesian grammar-checking application, such as root words and grammatical rules for forming sentence patterns. This was followed by user analysis to identify potential users of the system. Once the data and user requirements were identified, a system requirements analysis was conducted to determine the features to be provided according to user needs. Third, system design was carried out as a continuation of the needs analysis stage, where the system design was developed based on the analysis results.

RESULT AND DISCUSSION

In developing a grammar-checking application, an initial analysis is required to identify the application's needs and to design it appropriately based on the results of this analysis, so that the resulting application can function effectively and with a clear purpose. However, before presenting the results of the initial analysis of the application to be developed, it is necessary to first explain the implementation of the Left Corner Parsing algorithm on a sentence.

1. Implementation of the Left Corner Parsing Algorithm

To illustrate how a "left corner parser" works, consider the following example: Ika tertawa ("Ika laughs"). Assume the following grammar rules:

S → NP.
VP NP → PN
VP → IV
PN → Ika
IV → Tertawa

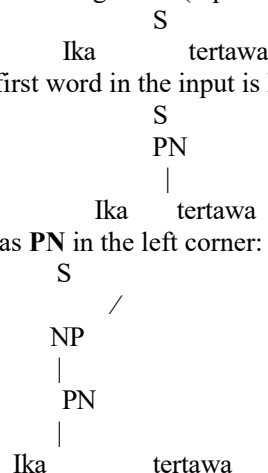
Explanation: S (Sentence), NP (Noun Phrase), VP (Verb Phrase), PN (Proper Noun), and IV (Intransitive Verb).

Here is how the left corner parser proceeds to recognize *Ika tertawa*:

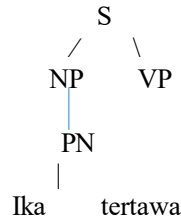
Input: "Ika tertawa." – Recognize S (top-down prediction).

The category of the first word in the input is PN (bottom-up step using lexical rules).

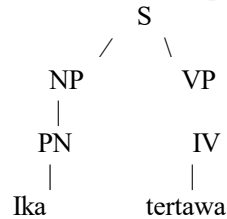
Select the rule that has **PN** in the left corner: **NP → PN** (bottom-up step using phrase structure rules).



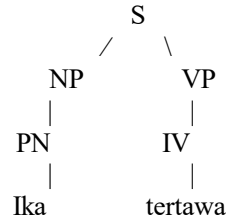
- 1) Select the rule that has NP in the left corner: $S \rightarrow NP VP$ (bottom-up step).
- 2) Match! The left-hand side of the rule matches S, the category being recognized.



- 3) Input: Tertawa. Recognize VP (top-down prediction).
- 4) The category of the first word in the input is IV (bottom-up step).



- 5) Select the rule that has IV in the left corner: $VP \rightarrow IV$ (bottom-up step).
- 6) Match! The left-hand side of the rule matches VP, the category being recognized.



It can be seen how the bottom-up steps apply alternative rules alongside top-down predictions in this example. Thus, from the sentence “Ika tertawa” we obtain a sentence pattern that conforms to Indonesian grammar, namely the basic Indonesian sentence structure consisting of a subject and a predicate.

2. Testing Results

The following is the display of the testing process for checking Indonesian grammar.

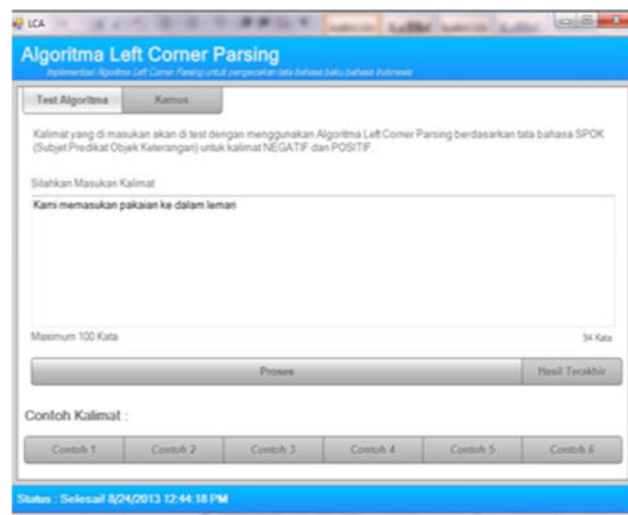


Figure 1. Algorithm Process Display

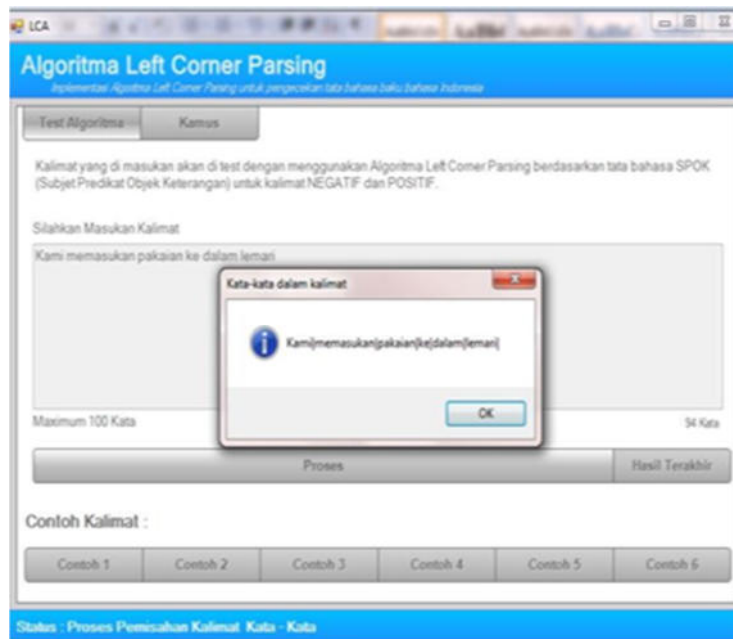


Figure 2. Process Notification Display

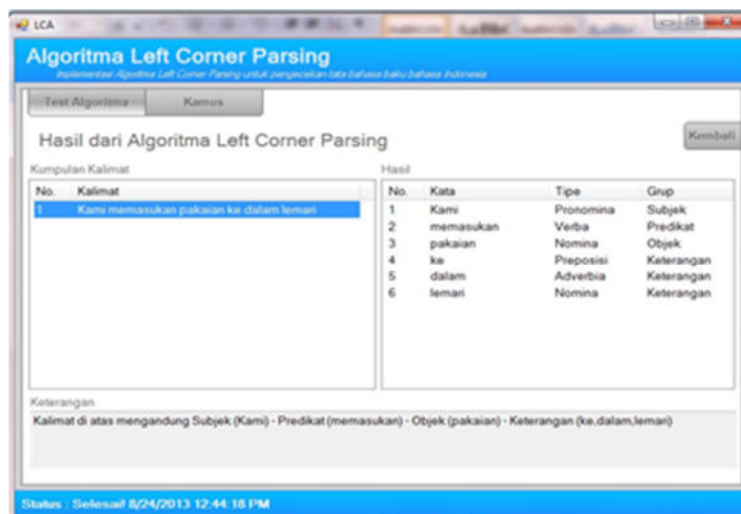


Figure 3. Test Results Display

CONCLUSION

Based on the overall discussion, several conclusions can be drawn. The Left Corner Parsing algorithm can be applied in software to check grammar in Indonesian sentences. The algorithm's success in the application greatly depends on the accuracy of word type selection; correct classification of word types enables proper rule recognition, while errors in word type selection lead to incorrect rule recognition. Additionally, the use of periods and commas affects sentence segmentation.

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