USING GRAMMAR CHECKER TO REMOVE THE COMMON GRAMMATICAL ERRORS IN ARABIC LANGUAGE

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Abstract

There are so many languages in this world by which, we can speak or notice to communicate with other people. Among them Arabic is a Semitic language that is rich in its morphology and syntax. In old days, people are not familiar with this language. But, at present time, the users of it are increased due to learn as a new language or do work with Arab countries. Arabic Language has many complex grammar rules that may seem complicated to the average user or learner. In this paper, we have shown how the user can develop or promote Modern Stander Arabic by using Grammar Checker, which is called Arabic Grammar Checker. It plays a vital role in grammar teaching. It can help the average user by checking his/her writings for major or minor grammatical errors in a considered sentences like misspelled words, detect unknown words, grammatical errors either syntactic or morphology etc. It also describes the problems for him/her and offers suggestions for improvement. Its purpose is to extract patterns of grammatical rules from a projective dependency grap in order to designate the appropriate syntax dependencies of sentences. In addition, its implementation covers almost all regular Arabic grammar rules for non-vowelized texts as well as partially or fully vowelized texts. It can also detect more than 94% of grammatical errors and hint at their causes and possible correction. Therefore, the use of the Arabic grammar checker can increase productivity and improve the quality of the text for anyone who writes Arabic.

Key words: *Arabic natural language processing, Detecting misspelled words and grammatical errors, Common Arabic grammar errors, Arabic Grammar Checker*

Introduction

Grammar checker is the process of detecting grammatical errors or misspelled words in a written text. Now days, Grammar Checker is available in almost every language and we can see it in Arabic language. It help us to decrease the burden of memorizing the rules of the grammar, style and punctuation. A grammar checker allows us to correct a mistake while we do it knowingly or unknowingly. Moreover, it give us to clarify an error and give advice on how to avoid such an error in future. Therefore, this system not only corrects our mistake but offers to go towards an easy and painless way to refresh our grammatical knowledge also[1]. Grammar Checker is a system or tool to check spelling mistakes, punctuation or any inaccuracy in a text according to grammatical rules in any language. Our free grammar checker helps students, freelancers, bloggers and teachers to make their documents free of grammar mistakes and faults.

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[1] Harriehausen B, The computer as a 'teacher for and style errors,' (Literary and Lingustic Computing, 1991), pp: 47-57

Arabic is one of the most widely spoken languages in this world. It is using in many Non-Arab counties as well as Arab countries. So, as a language, its value and importance is increasing day by day in comparison with other languages. But the matter is that the grammatical problems are not issues for Arab people. Because they are already expert in this language. On the opposite side, Non-Arab people faces the problem in every stage at using time. So, to get rid of it, grammar checker plays an essential role.

Aims and Objects:

As before, we have discussed in this paper that Grammar Checker is a language that detects various grammatical errors in a given text based on the grammar of that particular language, and reports those errors to the user along with a list of helpful suggestion to rectify those error. It not only detects the grammatical errors, but suggests the possible errors also. And, it is not exceptional in case of Arabic language. So, the main aims and objects of the Grammar Checker are mentioned as below:

- ➢ To check the spelling and grammar correctly in Arabic language.
- ➢ To improve syntactic error correction system based on the automatic generation of correct sentences in Arabic.
- ➢ To identify the words from the considered sentences and generate all the possible sentences that are syntactically correct.
- ➢ To increase productivity or improve the quality of the text for anyone who writes in the Arabic language.

Methodology:

Grammar checker is one of the proofing tool used for syntactic analysis of the text. Various methods are used for the development of the grammar checker. These methods include rule-based method, statistical based method and syntax based method.

1. Syntax Based Method: In this method, full parsing is performed on the text. After parsing, each sentence is assigned a tree structure based on the underlying language's grammar. If complete parsing is not succeeded , then the text is considered as incorrect.

2. Statistics Based Method: In this approach, an annotated corpus is used to generate a list of part of speech tag. From these generated sequences, some sequences will be very common (for example: adverb, verb), others will probably not occur at all (for example: Verb adjective). Commonly occurring sequences will be considered correct in other texts also uncommon sequences will lead to errors.

3. Rule Based Method: In this process, a set of predefined rules in the form of error patterns are matched against a text, which has at least been part POS tagged. Text is erroneous if a match is found for one of those patterns. Patterns can be based directly on words, their POS tags, or even chunk tags. This method is similar to the statistic based approach, but all the rules are developed manually.

Features of Grammar Checker

The main feature of grammar checker is made to rectify grammatical mistakes of written content accurately. This efficient tool identifies grammatical and punctuation in written content and suggests the correct use of grammar in the sentence or phrase. It also checks spelling mistakes in the content.

When you enter the text or copy/paste it from somewhere, it identifies spelling and grammatical in the text. Spelling mistakes are displayed as red underline, while grammatical mistakes are shown a green underline. When you click on the underline word or sentence, this grammar-checking tool automatically replaces it with the correct word or sentence.

The need for grammar Checker

Non-native people face difficulty whenever they communicate using English. There are a lot of rules which are obligatory to be followed. Having knowledge over rule is an essential thing, but implementation is difficult. To jump people facing difficulty while communicating in English, developers have made this tool.

There are different people from fields, who face problem like students, freelancers and bloggers. To resolve every obstacle and difficulty online grammar Check is the best option. It can not only solve grammatical problems but saves a lot of time as well. Manually going through each line and word as a lot more time consuming and difficulty task as well.

At first, the need for automatic grammar corrector was from professionals and non-native people, but now it is widely used by people around the globe every day to proofread there word and remove faults and mistakes.

Importance of the Arabic Language

Language is the heart of culture, and culture is the glue of society, without language, culture could not be transmitted from one generation to the next. Language is a medium of communicating ideas, thought and knowledge. Through this medium, ideas are conveyed from one person to another, from one place to another, from the past to the present and recorded for the future. Whether written or spoken, it remains as a medium through which people express their thoughts, images and emotions in a manner comprehensible to others.

Languages are not just sets of symbols. They comprise grammar, system of rules the control the symbols. We can only expressed our thoughts and ideas using suitable words with correct grammar. So, in language, grammatical rules play a vital role to communicate with others. Like other languages, Arabic is a medium of communication. It is a Semitic language and has a rich grammatical system in its morphology and syntax. It is a very complex subject of study. Even

Arabic-speaking people nowadays are not fully familiar with the grammar of their own language. Thus, Arabic grammar checker is a difficult task. The difficulty comes from several sources[2]:

- ➢ The length of the sentence and the complex Arabic syntax
- ➢ The omission of diacritics (vowels) in written 'at-taskil'
- ➢ The free word order nature of Arabic sentence
- ➢ The presence of an elliptic personal pronoun (ad-damir al-mustatir)

Aspects of Arabic Languages

The modern form of Arabic is called Modern Stander Arabic (MSA). MSA is a simplified form of Classical Arabic, and follows the same grammar. The main differences between Classical and MSA are that MSA has a larger vocabulary, and does not use some of the more complicated forms of grammar found in classical Arabic. For example: vowels are omitted in MSA such that letters of the Arabic text are written without diacritic signs.

As Arabic is strongly structured and highly derivational, understanding Arabic requires the treatment of the language constituents at all levels: morphology, syntax and semantics. Each component requires extensive study and exploitation of the associated linguistic characteristics[3].[4]

Arabic words are generally classified into three main categories[5]:

Noun: A noun in Arabic is a name or a word that describes a person, thing, or idea. Traditionally, the noun class in Arabic into derivatives and primitives. These nouns could be further sub-categorized by number, gender, definition, and case. This noun class also includes participles, adverbs, circumstantial accusative, pronouns, relatives, interrogatives, and demonstratives. For Example: خالد، تلميذ، قلب، مصر

Verb: The verb is any word that indicates the occurrence of an action. The verb class in Arabic is subdivided according to the following criteria: tense (past, present and future), with respect to the object (transitive and intransitive), structure (sound and weak), mood (perfect, imperfect, imperative), and voice (active and passive). Further sub-categorization of the verb class is possible using number, person and gender. Such as: ذهب، خرج، يقرأ .

Particle: The particle is any word that has no meaning unless it is combined with one of the other two categories. Usually, it has fewer letters. It can be considered neither a verb nor a noun. In Arabic, participle are divided into three categories according to the type of word they can precede.

[2] Shaalan K, Farouk A, Rafea A. Towards an Arabic parser for modern scientific text, (Egyptian Society of Language Engineering, Egypt, 2000), pp. 103-114.
[3] Khayat M, Understanding natural Arabic, (KFUPM Workshop on Information & Computer Science, Saudi Arabia, 2001), pp. 201.
[4] Shaalan K, Machine translation of Arabic interrogative sentence into English, (Egyptian Computer Society, Egypt, 2000), pp. 473-483.
[5] Mokhtar H, An automatic System for English-Arab Translation of Scientific Text, (Cairo University, 2000.)

They can precede either a noun, a verb, or both. The particle class includes preposition, conjunctions, interrogative particles, exceptions, and interjections. Like من، في، إلى، عن.

The infection and conjugation of the Arabic word is so sophisticated that yield a complex word form. For this reason, most of the contemporary work in the field has been at the word level[6].

An Arabic sentence has two forms[7]:

Nominal Sentence: A nominal sentence is composed of two constructions. Such as Subject (مبتدأ) and predicate (خبر). A nominal sentence can embed a verbal/nominal sentence, as it is enunciative. A nominal sentence can start with Inna/Kan and its sisters, which change its case ending (الإعراب). Example: زيد قائم، الرجل جالس.

Verbal Sentence: A verbal sentence is composed of two constructions. Like verb (فعل) and subject (فاعل). If the verb is transitive, it needs to have an object(s) (مفعول). In its passive voice, it comprises a verb and a proagent (نائب فاعل). Such as: قام زيد، جلس الرجل.

An Arabic compound sentence is from a simple sentence followed by complementary, such as conjunction from (عطف), quasi-preposition (شبه جملة), and annexation form (تركيب اضافي). Because Arabic is a flexible language, constituent order may vary and the constructs may be curtailed (محذوف).

Approaches for implementing a Grammar Checker

A grammar checker is a complex program, which needs a lot of research and linguistic resources[8]. These days, grammar checkers, although still far perfect, are much better and easier to use. In fact, it is hard to ignore them.

There are three main approaches to implement a grammar checker, which are syntax based, statistics based, and rule based.

Syntax Based: Using this approach, a text is completely analyzed morphologically and syntactically. It requires a lexical database, a morphological analyzer and a parser. The parser assigns a syntactic structure to each sentence. The text is considered incorrect if the parsing does not succeed. According to the level of the linguistic analysis or a shallow syntactic to which the error belongs, syntax-base checker can be classified as either a deep syntactic analysis or a shallow

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[6] Rafea A, Shaalan K, Lexical analysis of inflected Arabic words using exhaustive search of an augmented transition network, (software Practice and Experience: 1993), pp. 567-588.

[7] Shaalan K, Farouk A, Rafea A. Towards an Arabic parser for modern scientific text, (Egyptian Society of Language Engineering, Egypt, 1999), pp. 103-114.

[8] Bustamante F, Declerck T, Leon F, Towards a theory of textual errors, Controlled Language Application, CLAW2000, Seattle, WA, April, 1999.

syntactic analysis. The feature relaxation technique is employed mainly in syntax-based checking, which relies on positive knowledge for detection and diagnosis procedure.[9]

The advantage of the syntax-based approach is that this checker will only recognize that the sentence is incorrect, it will not be able to tell the user what the exact problem is. For this extra rules are necessary in order to either parse ill-formed sentences or apply a technique to features associated with linguistic fragments. If a sentence can not be parsed using such an extra rule, it is incorrect.

Statistics-Based Checking: The availability of a large amount of text has motivated researchers to innovate statistical models to extract valuable linguistic knowledge from such text. Among statistical language tools part of speech taggers and statistical parser. Some grammar checking system use statistical tools to implement various tasks to detect grammar errors.

Statistics-based parsers need to be trained over tagged text to infer a grammar that describes the structure of sentences. However, statistical parses bear the risk that their results are difficult to interpret. If the system raises false errors, users will wonder why their input is considered incorrect when no specific error message is given. In statistics-based checking, it is hard to implement a pure statistical system due to inherited shortcomings in the approach. Such system can be augmented with rule-based techniques for describing errors and proposing corrective actions.

Rule-Based Checking: This approach is similar to the statistics-based approach, but all the rules are developed manually. The error anticipation technique is employed mainly in rule-based checking, which relies on negative knowledge for detection and diagnosis.

The rule-based checker approach has many advantages. A sentence does not have to be complete to be checked. It is easy to configure, as each rule has expressive description and can be turned on and off individually. It can offer detailed error messages with helpful comments, even explaining grammar rules. It is easily extendable by its users, as the rule system is easy to understand, at least for many simple but common error cases.

Why We Should Use Arabic Grammar Checker Tool

We should use Arabic grammar Checker tool to check the accuracy of the documents that were provided by their students. A few days back a survey was conducted at the University of Pittsburgh. The university conducted an activity in which 33 undergraduate students participated. The main purpose of this activity is to check the difference in a reader's ability to check grammar and spelling errors with and without spelling and grammar checking tools.

A ample document was given to two different group of students to check and analyse the spelling and grammatical mistakes. One group of students were permitted to use the spell-checker tool

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[9] Sanchez-Leon F, Bustamante R, Declerck, Integrated set of tool for robust text processing, Proceedings of the Vextal Conference, 1999, pp. 1-7.

while the other does not. It is concluded in a activity that students having strong verbal skills rely strongly on grammar and spell checker tool. It is noticed that students do not correctly analyze documents even they will have strong verbal skills. They should need to use spellchecker tool otherwise, accuracy of documents will suffer.

It is a much difficult task for any teacher to check the grammatical mistakes of the particular document manually so we have to rely on tool. The grammar-checking tool will save the time for teachers. It is seen that some teachers say that the tool that was available on market are not accurate and these tools do not meet the requirements of teachers while checking grammatical mistakes in any particular document. However, this problem can be eliminated easily with our reliable grammar checker.

Most Common Types of Arabic Grammar Mistakes with Example

- *Active/Passive Voice Mistakes:* Many people think any particular sentence that consists of verbs like is, was, where etc. is a passive voice but this thing is not actually true. A sentence that will be converted to passive voice should have an object. Always keep in mind that all passive voice sentences have a form of a verb like was, were etc. but not all sentences that consist of those verb are passive. We should to be very careful while written passive voice in our articles.
- *Spelling Mistakes:* Spelling mistakes in an article create very bad impact in the mind of readers. The article or content should be clear from all type of spelling mistakes. Spelling mistakes can easily be avoided if article and content should be revised properly. Usually, most of the spelling mistakes will occur if the article if the article is not revised properly.
- *Redundant Expression:* The redundant expression is nothing but using the same keywords or words repeatedly whose meanings are same. The redundant expression should be avoided as much as possible. They will affect the efficiency of the paragraph. Consider a sentence "In a moment of hopeful optimism". The following expression will create the sense of redundancy. In most of the dictionaries, the meaning optimism is hopefulness for the future, so here the use of word optimism should be avoided because both words possess same meaning.
- *Proper From of Verbs and Tense:* The mistake of tenses are very common in article. Proper knowledge about tenses can reduce these mistakes. The proper from of verbs should be used depending on the scenario. We should have to be very careful about timestamp. If a writer about the present than the first form of the verb should be used.
- *Fragmentation of Sentence:* Online sentence correction is very important for sentences to be fragmented in a proper way. The writer should clearly identify that where the sentence fragmentation is needed and where to use it. Sentence that will needed fragmentation are sentenced, which is, depends on another sentence to completely elaborate the meaning of the sentence.
- *Invalid/Wrong Reference:* Wrong or invalid usage of reference of the pronoun can also affect the beauty of sentences. The writer should properly use pronoun references in sentences. The in the correction of pronoun reference can confuse readers. Consider a

sentence "John found his cat. Now he is very happy". It makes the sense of ambiguity in the mind of the reader that who is happy either John or his cat.

Findings of Common Arabic Errors with Example

In the literature, errors analysis concerns only the most common Arabic grammatical errors without any indication of the frequency of occurrence of these errors.[10] This is intended to help Arabic writers to alleviate most of the grammatical problems that plague their writing. However, there is a need for a thorough study that answers questions like the following. Which errors are most frequent? Which errors for a particular language group are most frequent? Within a particular error type, are there differences in the kinds of errors produced by speakers of different languages? Unfortunately, we are not aware of any (either formal or informal) study that analysis the writing errors of either native Arabic speakers or learners. Moreover, we are not able to conduct essays of students/learners of Arabic that would be required for such an analysis.

In order to investigate the possibility of developing a computational Arabic grammar checker, we analyzed and classified the common grammatical errors that occur when formulating an Modern Stander Arabic (MSA) sentence in a formal style. These errors were verified by Arabic specialists to be the most common Arabic grammatical errors. These errors are representative of those encountered by the average word processor user when typing Arabic and are based upon a recent study.[11]

For Example

Table 1: Agreement of errors

Error type	Example	Correct Version
Number and gender agreement between the inchoative and the enuuciative	الجنود يدافعان* عن الوطن.	الجنود يدافعون عن الوطن.
Number and gender agreement between the circumstantial accusative modifies	جاءت بعض السيدات* تحمل أطفالهن.	جاءت بعض السيدات يحملن أطفالهن.
Number, gender, definition and case ending agreement	الرجال* الكريم يساعدون الناس.	الرجال الكرماء يساعون الناس.

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[10] Jassem A, Study on Second Language Learners of Arabic: An Error Analysis Approach, A.S Noorden, Malausia, 2000.

[11] El-Tatawey A, Al-Siha Al-Lugawiya, Cairo University, 2002.

between adjective and the noun it modifies		
Number and gender agreement between the demonstrative adjective and the noun it modifies	ذهبنا إلى هؤلاء *المعلم.	ذهبنا إلى هؤلاء المعلمين.
Gender agreement between a verb and the subject	*شرب البنت عصير البرتقال.	شربت البنت عصير البرتقال.
Agreement between a verb tense and the use of specific particle	الرجال لن* ذهبوا إلى القرية.	الرجال لن يذهبوا إلى القرية.
Case ending agreement between a number and its following descriptor	الفلاح زرع فدانين قمح*.	الفلاح زرع فدانين قمحا

Table 11: Wrong Constituent Forms

Error Type	**Example**	**Correct Version**
Case ending of inchoative or enunciative	*المعلمين ضربا الولد.	المعلمان ضربا الولد.
Case ending of the noun in genitive	ذهبنا إلى* الحديقتان الجميلتان.	ذهبنا إلى الحديقتين الجميلتين.
Case ending of the circumstantial accusative, subject or object	عادت الطائرتان* سالمتان.	عادت الطائرتان سالمتين.
Case ending the predicate of Kana or one of its sisters	كان المعلمون* مجتهدون.	كان المعلمون مجتهدين.
Number and case ending of the noun that follows of the noun that follows the interrogative particle Kam (How many)	كم* تلاميذ الفصل؟	كم تلميذا في الفصل؟

| Definition of inchoative | *رجل مهذب. | الرجل مهذب. |

Table 111: Missing Sentence Fragments

Error Type	Example	Correct Version
Missing the subject of a verbal sentence	*ذهب إلى الدار.	ذهب الغلام إلى الدار.
Missing the object of a verbal sentence	*فتح الولد.	فتح الولد الباب.

The Architecture of the Arabic Grammar Checker

Arabic Grammar Checker is a syntax-based grammar checker for modern stander Arabic. The system is based on deep syntactic analysis and relies on a feature relaxation approach for detection of ill-formed Arabic sentences.

Arabic Grammar Checker helps the user to write a sentence by analyzing each word and then only accepting the sentence if it is grammatically correct. The main features of Arabic Grammar Checker are:

➢ It performs complete grammatical analysis of sentences.
➢ It checks the sentence for common grammatical errors, describes the problem.
➢ It offers suggestions for improvement.

Arabic Grammar Checker Evaluation: Comparative Result

The evaluation of Arabic Grammar Checker is classically divided into two main approaches: glass-box and black box.[12] In black-box evaluations, the evaluator has access only to the input and output of the system under evaluation. In glass-box evaluation, the evaluator also has access to the various workings of the system and can thus assess each sub-part of the system. Component-based evaluation and detailed error analyses are also important types of evaluation.[13]

In our work, we have chosen the black-box evaluation approach due to the fact that we want to compare our result with commercial system, and, obviously, we do not have access to their inner

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[12] Hutchins W J, Somers M. An Introduction to Machine Translation, Academic Press, New York, 1992.
[13] Amokl DJ. Evaluating MT systems, December, 1995, http://clwww.essex.ac.uk/~doug/book/note75.html

workings. In such a setting, the evaluation may not be able to pinpoint the error source, however it will give an indication as to what subsystem is malfunctioning.

A set of 100 Arabic sentences was used to test Arabic Grammar Checker and evaluate its correctness. This set was prepared by an Arabic specialist, who is not a member of the Arabic Grammar Checker's team. The set include both grammatical and ungrammatical sentences, taking into consideration the coverage of both the grammar rules and grammatical errors handled by Arabic Grammar Checker. The majority of these sentences were short and simple. We used short, simple sentences, as they are easier to understand by the reader, they are easier to evaluate by the linguist, and they are suitable for comparison with the only commercially available grammar checker program.

Table IV: Correctness of Arabic Grammar Checker

Sentence	Correct	Almost	Wrong	Total
Grammatically Correct	10	0	0	10
Ungrammatical	86	1	3	90
Total (In Percentage)	96%	1%	3%	100

Table V: Correctness of the commercially available Arabic Grammar Checker

Sentence	Correct	Almost	Wrong	Total
Grammatically Correct	5	0	5	10
Ungrammatical	34	17	39	90
Total (in Percentage)	39%	17%	43%	100

The evaluation procedure was carried out by comparing the Arabic Grammar Checker results with those obtained on presenting the same sentences to an automatic grammar checker, rather than testing the commercially available Arabic grammar checker.

Of the 100 Arabic sentences, there were 10 grammatically correct sentences and 90 incorrect sentences. The average sentence length was four words and the longest sentence was 24 words long. The parser was capable of successfully parsing sentence. The system includes 162 grammar rules.

A summary of the evaluation results is shown in Table IV and V. the first column shows the category of the input sentences. A human reader rated the correctness of the output of both the Arabic Grammar Checker and commercially available Arabic grammar checker (correct, almost, wrong). These results are shown in columns 2-4 of both tables. The output was considered correct if the grammar checker gave a correct diagnosis of the ungrammatical sentence or accepted the grammatically correct sentence. The output was considered almost correct if the grammar checker detected inconsistencies in the ungrammatical sentence but did not give an explanation, the explanation was not correct, or the spelling checker flagged an error instead. The output was consider wrong sentence or did not detect the ungrammatical sentence.

The overall correctness is shown in the bottom row, which indicates the percentage of the input sentence marked as correct, almost, or wrong, in total. It shows 96% of the grammatical checking of Arabic Grammatical checking of Arabic Grammar Checker was correct compared with 39% of the commercially available Arabic grammar checker, and 3% of the grammatical checking of Arabic Grammar Checker was wrong compared with 43% of the commercially available Arabic grammar checker.

Conclusion

An Arabic grammatical checker is a complex program that needs extensive research and linguistic resources. In this paper, we reported our experiences gained from a project to develop Arabic Grammar Checker, a syntax-based grammar checker for modern standard Arabic. The system is based on deep syntactic analysis and relies on a feature relaxation approach for detection of ill-formed Arabic sentences. This useful tool is capable of detecting and suggesting improvements for certain common grammatical errors.

By reviewing the result obtained using Arabic Grammar Checker, it has been shown to be superior to commercially available Arabic grammar checker. However, this experiment was limited to a set of simple Arabic sentences, manually prepared by an Arabic specialist.

It is hoped that the presented findings will be useful for development of Arabic grammar checkers, as well as for improving existing Arabic grammar checking software.

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