**Hierarchy, the Algorithm Who Displays the Semantic Text’s Characteristics, and Functions, Creating a Structured Format**

**Abstract.** This article discusses the importance of text hierarchy for complete understanding. Natural language processing (NLP) algorithms can help identify primary and secondary ideas, semantic texts, and their features and functions in texts. These algorithms enable a deeper analysis of textual content by following a step-by-step approach from general concepts to more specific ones, depending on the complexity and size of the text and its purpose. However, complete comprehension still requires human skills, such as making inferences and interpreting figurative language.

**Keywords:** Hierarchy; Natural Langugem processing; Algorithms; Textual content; Semantic texts

Parte superior do formulário

# **Introduction**

This text highlights the importance of disseminating a new way of thinking to increase intellectual productivity. The algorithm in question uses grammatical structures to recognize patterns of sequences, such as conjunctions, logical and argumentative operators, in order to identify grammatical clauses and thus determine the types of actions existing in the text.

However, it is important to note that not all clauses have sequencers, such as conjunctions and logical or argumentative operators in the text. It is mentioned that an article on Argumentative Schema describes this entire grammatical recognition approach.

## **Origin of the word “text” and its meaning**

The origin of Latin term "textus" in the fourteenth century meant to weave, build, and interweave threads, according to the etymological dictionary [1]. It is commonly understood as a "sequence of words and articulated phrases, written on any support" [2], which reflects the idea of a researcher in its definition. For a text to make sense, it must have coherence related to the comprehension of writing, and "textual cohesion is the relation, the link, the connection between the words, expressions or phrases of the text" [3].

A text is a written work organized in a coherent structure of words that conveys a message or tells a story. To describe themes or objects, a logical schema is necessary that allows for interaction with the description of the prerequisites.

In addition to the coherent structuring of words, a text can include formal elements such as punctuation, paragraphs, and fonts. In describing ideas in grammatical periods, sequencing words, such as conjunctions and logical operators, are used to join sentences and give full meaning to the text [4].

In general, the term "text" refers to a set of words or symbols that form a coherent unit of meaning, with the aim of conveying a message or idea to a reader or audience. The exact meaning of a text may vary according to the context in which it is used, but in general, it is understood as a form of written communication that has a specific communicative purpose.

## **Intertextuality**

A term popularised by Julia Kristeva in her analysis of Bakhtin’s concepts Dialogism and Carnival, intertextuality is a concept that informs structuralist poststructuralist deliberations in its contention that individual texts are inescapably related to other texts in a matrix of irreducible plural and provisional meanings. The term is used to signify the multiple ways in which any one literary text is made up of other texts, by means of its implicit or explicit allusions, citations, its repetitions and transformations of the formal and substantive features of earner texts, or simply its unavoidable participation in the common stock of linguistic and literary conventions and procedures that are “always already” in place.

In Kristeva’s formulation, any text is an “intertext” — the site of an intersection of numberless texts and existing only through its relation with other texts. This idea was anticipated in Barthes’ idea of the text as “a tissue of quotations”, as “fluid”, with many levels of meaning. The concept of intertextuality defuses the traditional humanist notion of the text as a self-contained, autonomous entity in the view that it is but a weave” of codes from other texts or discourses such as that of history, social conditions, philosophy, theology and so on. [5]

Intertextuality is a textual-discursive phenomenon related to other texts, genres, and styles. This relationship can be explicit or implicit and is identified through tangible marks in other texts or authors' content, forms, and styles. Intertextuality can be established through references to elements such as lexicon, phonological and syntactic structures, genre, style, and tone. The most important factor is the co-presence of texts, generic parameters, or authorial styles, which may or may not be recognized by the interlocutor [6].

## **Location and Assembly of Features**

The process of "location and assembly of features" involves identifying and organizing elements in a text or narrative, such as character traits and the environment. It is important in natural language processing (NLP) and text analysis. By utilizing text analysis techniques and paying attention to detail, valuable information can be extracted. Organizing these characteristics in a logical and structured manner is crucial. This process is fundamental for various NLP tasks, including sentiment analysis, text classification, and information retrieval. Overall, the location and assembly of features are essential steps in analyzing and understanding textual data.

Regarding the algorithm, it uses the text divided into grammatical periods and grammatically classified sentences. This enables the process of assembling simple, compound, or subordinate sentences related to the informed keywords. These sentences are then classified according to the types of comprehension questions described in [7], which are used to generate questionnaires without semantic inference.

It is worth noting that "location and assembly of features" is a broad term that can refer to different contexts and areas of knowledge. In general, this term refers to a process of analysis and synthesis of information that is common in several areas, such as engineering, materials science, chemistry, and biology, among others. For example, in materials science, the localization and assembly of characteristics may involve the analysis of properties such as the hardness, corrosion resistance, and electrical and thermal conductivity of different materials.

## **Notion of Descriptive Actions**

The term "descriptive actions" is not commonly used, but based on the examples given, it seems to refer to instructions or directions that describe how to perform a task or action. Instructions typically use the imperative mood, employing base form verbs or infinitives to give direct commands or describe a process. Adjectives, adverbs, metaphors, comparisons, and sensory details may also be used in instructions to provide more detail, enhance the description, and create an immersive experience. Clear and accessible language is important in instructions to ensure they are easy to follow for readers of all expertise levels.

According to Márcia Cançado "the notion of argument that has its origin in the logic of predicates, in which a central constituent, the predicate, which does not have its complete meaning, that is, unsaturated, asks for a certain number of Actions or characteristics that complete or saturate the meaning [using the term proposed by the logician Friedrich Ludwig Gottlob Frege (b. 1848, d. 1925) (1978)]" [8].

In this sense, semantically the notion of Marcia's argument, then will be the description of the sentence's action or justification that the author defends in his description.

## **Types of Comprehension Questions**

Different types of comprehension questions are used to assess the understanding of a text or information, and each type of question is useful for assessing different aspects of the reader's understanding. The assembly process may involve the use of one or more question types to identify relationships between terms, and the use of a computer application may be necessary to classify the types of questions formulated, such as: [9]

Literal questions: These questions require the reader to recall specific information directly from the text. For example, "What is the main character's name?"

Inferential questions: These questions require the reader to make logical inferences based on information presented in the text. For example, "Why do you think the main character behaved that way?"

Evaluative questions: These questions require the reader to make a judgment or evaluation based on information presented in the text. For example, "Do you think the ending of the story was satisfying?"

Analytical questions: These questions require the reader to break down and analyze the information presented in the text. For example, "How does the author use symbolism in the story?"

Multiple choice questions: These questions provide a set of options, only one of which is the correct answer.

True or false questions: These questions require the respondent to determine whether a given statement is true or false.

Gap-filling questions: These questions require the respondent to fill in a blank in a sentence or passage with the correct word or phrase.

Association issues: These questions require the respondent to match items in one list with corresponding items in another list.

Ordering issues: These questions require the respondent to arrange items in a list in a logical sequence.

Summary questions: These questions require the respondent to summarize the information presented in a passage or text.

Interpretation issues: These questions require the respondent to analyze and interpret information in a passage or text to answer complex questions.

Obvious questions: These questions are very straightforward and require minimal insight to answer.

Questions copies: These questions are simply copies of information presented in the text and require no critical thinking.

Objective questions: These questions ask about content that is objectively presented in the text.

Global issues: These questions require the respondent to consider the text as a whole and external factor to answer.

Subjective questions: These questions require the respondent to provide an opinion or perspective on the information presented in the text. Anything goes questions: These questions are open-ended and can have any answer, regardless of the information presented in the text.

Impossible questions: These questions require knowledge that is not presented in the text and can only be answered with outside knowledge. Metalinguistic Questions: questions about formal questions of text structure or lexicon.

## **Types of the Grammatical**

The conventional abbreviations in tokenization are used to identify the grammatical class of each token in a text. Here are some of the most common abbreviations used in English:

NN: Noun (Singular or Plural)

NNS: Plural Noun

NNP: Proper Noun (Singular)

NNPS: Proper Noun (Plural)

VB: Verb (Base Form)

VBD: Verb in the Simple Past Tense

VBG: Verb in the Gerund or Present Participle

VBN: Verb in the Past Participle

VBP: Verb in the Present Tense (Non-Third Person)

VBZ: Verb in the Present Tense (Third Person)

JJ: Adjective

JJR: Comparative Adjective

JJS: Superlative Adjective

RB: Adverb

RBR: Comparative Adverb

RBS: Superlative Adverb

PRP: Personal Pronoun

PRP$: Possessive Pronoun

WP: Interrogative or Relative Pronoun

WP$: Possessive Interrogative or Relative Pronoun

DT: Determiner

CC: Coordinating Conjunction

IN: Preposition or Subordinating Conjunction

CD: Cardinal Number

MD: Modal

These abbreviations are widely used in natural language processing (NLP) for text analysis and information extraction.

## **Types of Actions**

The classification of actions can vary based on different criteria such as physical, mental, verbal, emotional, social, professional, and voluntary actions. However, additional factors like frequency, duration, purpose, and context can also influence how actions are classified. To detect actions in a sentence, specialized algorithms can be developed to ask relevant questions about the type and characteristics of the action. Justifying or substantiating actions can be done using various methods, including appeals to authority or expert opinion, providing evidence or examples, employing analogies or comparisons, drawing on personal experience or historical data, and using deductive or inductive reasoning.appealing to universal principles or folk wisdom, and highlighting the uniqueness of a particular situation or circumstance.

# Paper Preparation

The hierarchical structure of a text refers to the organization of information at different levels, from general to specific ideas, and is essential for understanding the text. Identifying a theme as an object requires describing its qualities, quantification, real or virtual existence, and the location of types of actions to define the property of that object. The algorithm uses a computational application to fetch periods in a relational database [10].

To perform a hierarchical analysis of a text, it is necessary to identify the theme, the semantic object, its characteristics, and its functions [11]. The hierarchical structure is built on this information, allowing for a detailed analysis of the text and identification of general and specific ideas. The analysis of the characteristics of the semantic object is done by identifying patterns and relationships in the text, and their functions can be found in the actions and effects produced. Natural language analysis and word processing algorithms are useful for identifying the semantic object in a text and understanding its structure and meaning.

By using an algorithm to identify the semantic object, its characteristics, and functions, it is possible to create a hierarchical structure that represents the organization of the text and facilitates the understanding of the information it contains.

## The use of computer application

To locate periods in articles described on the physical paper, one would need to copy each sentence onto another physical paper. However, since articles are usually searched in university repositories that are in digital form, a computer application can be used to separate the scanned texts into words [10].

Once the text is separated into words and identified by their grammatical class using a computational application, the algorithm can assemble simple, compound, or subordinate sentences.

By associating the periods with argumentative operators, one can automatically extract the terms with actions [4], which will determine the most important terms of a text based on the frequency of adjacent words.

Relative pronouns replace repeated words and require prepositions before the pronoun. Interrogative pronouns, on the other hand, do not refer to the previous term. To assemble subordinate sentences, one needs to choose argumentative operators and reassemble the sentences. This can help create a schema to question the actions used in the text.

## **Operation with Features**

A popular Python library for feature extraction in NLP is the Natural Language Toolkit (NLTK), which was co-written by Steven Bird. In his book "Natural Language Processing with Python," Bird and his co-authors discuss feature extraction as an important component of natural language processing, along with other tasks such as parsing and text classification. The book includes Python code examples for extracting text features such as word frequencies, n-grams, POS (part-of-speech) features, among others. [12]

Initially, the technique will be used in the construction of a question, according to Chomsky, an American linguist, philosopher, activist, author, and political analyst, who completed his doctorate with a thesis on transformational analysis (1955), elaborated from the theories of Zellig Sabbettai Harris ([/ˈzɛlɪɡ/](https://en.wikipedia.org/wiki/Help:IPA/English); October 23, 1909 – May 22, 1992), of whom he was a disciple [13].

## **Identification of Types of Features in Sentence**

This text discusses how identifying the characteristics of sentences can help analyze the structure and meaning of a text. The length and structure of a sentence can indicate the complexity of the idea being expressed, and the syntactic function of a sentence can reveal the author's intention or attitude. The meaning of a sentence is also important to consider, including the context and connotations of words and the overall tone and mood of the text. Adverbs can significantly impact the tone of a sentence depending on their placement, and Gonzaga's classification of adverbs can further aid in understanding the contribution of these elements to the overall meaning and style of a text.

## **To match tokenizations of Actions for Objects**

To discover the actions associated with the main theme of an article using a virtual function, it is necessary to generate questions or inquiries. The algorithm being described here assembles the reading of a text and uses a technique called 5W2H to structure the logic in an organized and materialized way [14]. The "5W" of the name corresponds to the English words What, When, Why, Where, and Who, while the "2H" represents the words How and How Much, which collectively represent What, When, Why, Where, How, Who, and How Much. This technique helps to gain a more complete and detailed understanding of the main theme of the text and the actions of the objects involved.

## **Tokenization in the texts**

Tokenization is the process of breaking down a large piece of text into smaller units called tokens. Each token represents a single word or a punctuation mark. By tokenizing a text, we can analyze and compare it with other texts more easily.

When it comes to intertextuality, tokenization can help us identify similar words or phrases used in different texts. For example, if we tokenize two texts and find that they share a high number of common tokens, it can suggest that they have similar themes or ideas. We can then further analyze these similarities to explore the intertextuais connections between the texts.

Additionally, tokenization can help us identify specific words or phrases that are used repeatedly within a text, known as "keywords." By analyzing the keywords of different texts, we can identify patterns and connections between them, which can further enhance our understanding of intertextuality.

In summary, tokenization is a useful tool in identifying and analyzing intertextual connections between texts, as it helps us identify common words and themes across different pieces of literature [15]

## **Tokenize Algorithm in Script Python by GPT-3** [15]

Tokenization is a technique that can be used as a tool to facilitate intertextuality, but it does not perform intertextuality by itself. Intertextuality refers to the relationship between different texts, where one text makes reference to another, either explicitly or implicitly. Tokenization is a process of analyzing a text that involves identifying and segmenting smaller units, such as words or phrases, that can be used to identify patterns or references to other texts.

Thus, by tokenizing a text, it is possible to identify keywords that may be relevant to intertextuality, such as character names, work titles, or key concepts. However, intertextuality involves more than just identifying these keywords. It also involves understanding the relationship between the texts and the context in which they were produced.

**import nltk**

**from nltk.tokenize import word\_tokenize**

**from nltk.tag import pos\_tag**

**text1 = "** **In conclusion, just as algorithms can help us to analyze and display the characteristics and functions of objects, the texts we have discussed can be analyzed and understood in a similar way. By recognizing the intertextual connections between them, we can gain a deeper understanding of their meaning and significance."**

**# Tokenize the text**

**tokens = word\_tokenize(text1)**

**# Tag the parts of speech**

**tagged = pos\_tag(tokens)**

**# Print the tagged output**

**print(tagged)**

**RESULTS TO EXECUTION:**

**[('In', 'IN'), ('conclusion', 'NN'), (',', ','), ('just', 'RB'), ('as', 'IN'),**

**('algorithms', 'NN'), ('can', 'MD'),**

**('help', 'VB'), ('us', 'PRP'), ('to', 'TO'), ('analyze', 'VB'), ('and', 'CC'),**

**('display', 'VB'), ('the', 'DT'), ('characteristics', 'NNS'), ('and', 'CC'), ('functions', 'NNS'), ('of', 'IN'),**

**('objects', 'NNS'), (',', ','), ('the', 'DT'), ('texts', 'NN'), ('we', 'PRP'), ('have', 'VBP'), ('discussed', 'VBN'), ('can', 'MD'), ('be', 'VB'), ('analyzed', 'VBN'), ('and', 'CC'),**

**('understood', 'VBN'), ('in', 'IN'), ('a', 'DT'), ('similar', 'JJ'), ('way', 'NN'), ('.', '.'), ('By', 'IN'), ('recognizing', 'VBG'),**

**('the', 'DT'), ('intertextual', 'JJ'), ('connections', 'NNS'), ('between', 'IN'), ('them', 'PRP'), (',', ','), ('we', 'PRP'), ('can', 'MD'), ('gain', 'VB'), ('a', 'DT'), ('deeper', 'JJR'), ('understanding', 'NN'),**

**('of', 'IN'), ('their', 'PRP$'),**

**('meaning', 'NN'), ('and', 'CC'),**

**('significance', 'NN'), ('.', '.')]**

Therefore, tokenization can be a useful tool to facilitate intertextuality, but it is not sufficient on its own. It is also necessary to have knowledge of the context in which the texts were produced, as well as critical analysis and interpretation skills to understand the relationship between them and create meaningful connections.

## **Intertextuality Algorithm in Python Script by GPT-3** [15]

To search for intertextuality in the text "Meu Pé de Laranjeiras" in English, you can follow a similar approach as described earlier. Here are the steps you can take:

1. Understand the concept of intertextuality in literature and identify some key works that are often referenced in literary analysis.
2. Analyze the text "Meu Pé de Laranjeiras" and look for any references or allusions to other works of literature, including those that you have identified in step 1.
3. Use the OpenAI API to generate text that expands on the references or allusions you have found. This can help you to identify further connections and intertextual relationships between "Meu Pé de Laranjeiras" and other works of literature.

To use the OpenAI API for this task, you can follow the same steps as described earlier. First, you need to sign up for an API key on the OpenAI website. Then, you can install the **openai** Python package and authenticate with your API key using the **openai.api\_key** variable.

Once you have authenticated, you can use the **openai.Completion.create()** function to generate text based on a given prompt. For example, you can pass a prompt that includes a reference to a work of literature and ask the API to generate text that expands on that reference.

Here is an example Python script that demonstrates this approach:

import openai

# Set up authentication with the OpenAI API

openai.api\_key = "YOUR\_API\_KEY"

# Define the prompt for the OpenAI API

prompt = (

"The text 'Meu Pé de Laranjeiras' contains references to other works of literature. "

"Please generate text that expands on these references and explores the intertextual relationships between 'Meu Pé de Laranjeiras' and other works of literature."

)

# Set the parameters for the OpenAI API completion request

parameters = {

"engine": "text-davinci-003",

"prompt": prompt,

"temperature": 0.7,

"max\_tokens": 1024,

"n": 3,

"stop": "\n",

}

# Send the completion request to the OpenAI API

response = openai.Completion.create(\*\*parameters)

# Print the generated text

print(response.choices[0].text)

**Results by OpenAI/Chat** [15]

"Meu pé de Laranjeiras" is a Brazilian novel written by José Mauro de Vasconcelos. The novel tells the story of a young boy named Zezé who grows up in poverty in Brazil in the 1940s. The novel is known for its vivid descriptions of life in Brazil and its exploration of themes such as poverty, family, and the struggle for survival.

In terms of intertextuality, there are several references and allusions in "Meu pé de Laranjeiras" that connect it to other works of literature. One of the most prominent intertextual references in the novel is to the story of "Peter Pan" by J.M. Barrie.

Throughout "Meu pé de Laranjeiras", Zezé frequently references Peter Pan and imagines himself as a character in the story. For example, he often refers to his brothers and sisters as the Lost Boys, and he imagines himself as Peter Pan leading them on adventures. This intertextual reference serves to emphasize the themes of childhood innocence and imagination that are central to both "Meu pé de Laranjeiras" and "Peter Pan".

Another intertextual reference in "Meu pé de Laranjeiras" is to the Brazilian poet Carlos Drummond de Andrade. In the novel, Zezé reads a poem by Drummond de Andrade and is inspired by its imagery and language. This intertextual reference serves to highlight the power of language and poetry to inspire and uplift even in difficult circumstances.

Overall, the intertextual references in "Meu pé de Laranjeiras" serve to enrich the novel and connect it to broader literary traditions. They also highlight the universal themes of childhood, imagination, and the power of language that resonate across cultures and generations. [15]

This script sends a completion request to the OpenAI API, asking it to generate text that explores the intertextual relationships between "Meu Pé de Laranjeiras" and other works of literature. The generated text will be printed to the console.

Note that the **prompt** variable can be modified to include specific references or allusions that you have identified in your analysis of the text "Meu Pé de Laranjeiras". Additionally, the parameters for the OpenAI API completion request can be adjusted as needed to control the length and complexity of the generated text.

# Results

The algorithm, when applied to academic texts, demonstrates how it can establish a structure by recognizing the theme or title of the academic text. This structure includes all the characteristics described by the object, which are the properties that make it up.

Finally, by recognizing the methodology or function of the article being analyzed, it is possible to identify the actions that this object can perform, or the function that it serves when invoked by another algorithm. The algorithm's description follows an internal syntactic structure of nominal expressions in Brazilian Portuguese. [16]

## **Result that the Algorithm will Achieve**

The results show the properties and classifications of adverbs and highlight the importance of algorithms and their relationship to specific problems they are trying to solve. The goal of an algorithm is to automate processes, making them more efficient and accurate than manual efforts. The result is a decision, classification, or recommendation that improves effectiveness and usefulness for users. This article presents examples and methodologies to illustrate these ideas.

In the planning phase, relevant ideas are selected from the base text and organized into a superstructure. In the translation phase, formal mechanisms of cohesion are used to maintain the discursive topic using complex syntactic structures. In the review phase, the abstract text is carefully reconsidered in relation to its objectives [17].

A classification algorithm is designed to categorize items based on specific criteria, such as voice recognition, image recognition, or data analysis. In the academic text, characteristics are presented through subordinate clauses and argumentative operators, complemented by interrogative pronouns and adverbs, in accordance with the presented keywords. It is important to review the topic, characteristics, and actions to ensure that the questions are appropriate. Mastery of these stages of writing processing can be demonstrated through the production of results, as stated by Farias.

## **Result that the Algorithm will not Achieve**

The result shows the limitations of algorithms, which can only perform tasks within established parameters and data and cannot make decisions outside the scope. Some articles are difficult to identify by algorithms due to the lack of known structuring.

The text also discusses how argumentative operators and conjunctions are important for chaining elocutionary acts and constituting discourse but may not be recognized by algorithms that lack the ability to recognize methodologies in the descriptions of functions or actions.

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According to Ducrot, the elocution act operates a special kind of transformation: "A speech act is always a transformation of the legal order, creating rights or duties for the participants." [18]

# **Conclusion**

The result shows how algorithms can help with natural language analysis and word processing but highlights that complete text comprehension still depends on human skills. It presents an introduction to the comprehension model of Kintsch and van Dijk and discusses factors that interfere with the task of summarizing texts, which should be considered in the school environment [19]. The algorithm suggests questions and possible combinations with adverbs to help readers understand the article.

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