GovAIEasy: Simplifying Spanish Government Texts for Public Institutions with GPT-4o, AI-Driven Zero-Shot Learning, and Transformer Models

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Abstract

The presence of unknown words in a text can have a significant impact on the reader's understanding, leading them to misinterpret the content. This challenge is magnified when dealing with complex words, whose meaning often depends on context and is not easy to infer. This problem extends to users who access texts issued by public institutions. In response to this need, we present GovAIEasy, a web application based on Artificial Intelligence, designed to simplify the understanding of institutional texts by applying GPT-4o and Zero-Shot learning. This application transforms complex texts into accessible and easy-to-understand versions for the user. In addition, the GPT-4o model is used to generate a definition, an example, and a use case of the detected complex word, facilitating understanding for users with a low literacy level, cognitive difficulties, or disabilities, helping them better understand the instructions and procedures required in public offices.

Keywords

Complex Word Identification, Public Administration, Generative AI, Zero-Shot Learning

1. Introduction

The presence of infrequent words in a text significantly affects the reader's comprehension, as it can lead to misinterpretations, disinterest, or even abandonment of reading [1]. Similarly, complex words pose a considerable challenge, given that their meaning is closely tied to context and difficult to infer in isolation [2]. In this regard, sentence simplification, which involves restructuring the content to make it clearer and more accessible, emerges as a promising technique to support individuals with various reading difficulties [3].

Many people face significant reading comprehension barriers when dealing with public administration text [4]. Often, the contents of texts addressed to citizens contain a difficult to understand vocabulary, which complicates the interpretation and the initiation of activities and administrative procedures by users [5]. These barriers may include difficulty interpreting long sentences, technical or specialized words, unusual terms, or complex linguistic structures. These difficulties directly affect people with intellectual disabilities or with a low level of literacy. Even those with a high level of education, such as university students with specialized knowledge in various areas of study, can be found within the groups affected by reading difficulties [6]. Predicting which words are difficult to understand for a given target population is commonly known as complex word identification (CWI) [7]. This task is a vital step in many applications related to natural language, such as text simplification. Complex word identification is the task of detecting words in the content of documents that are difficult or complex to understand by people belonging to certain groups [8].

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Advances in artificial intelligence (AI) have attracted great attention from researchers and professionals and have opened a wide range of beneficial opportunities for its application in the public sector [9]. Emerging technologies and in particular AI have a high potential for public administrations in the digital era, improving process management through timely delivery of service responses to citizens and the internal efficiency of processes [10].

The relevance of **GovAIEasy**[1] lies in its valuable contribution to the assessment of lexical complexity in texts. Its main objective is to promote digital modernization, supporting the creation of more agile, open, and innovative governments. This tool offers various applications relevant to research in the field of natural language processing and language simplification in government documents:

- ***Automatic Complex Word Identification***. Automates the process of identifying complex words in a text, facilitating the analysis and review of large volumes of content, which is especially useful in government documents.
- ***Complexity Level Assignment***. The system assigns a difficulty score to each complex word in the range of 0 to 1, classifying them into three levels: moderately difficult, difficult, and very difficult. This classification is essential to assess the impact of words on text comprehension.
- ***Summary Generation***. In addition, the model generates simple summaries of the Spanish text, facilitating a quick and accessible understanding of the content without having to read the full text.
- ***Continuous improvement through data logging***. Data on complex words and their classification are stored in a database, allowing continuous monitoring of model performance and improving the accuracy of word identification and classification over time.

2. Related work

In recent times, the use of Artificial Intelligence (AI) has increased to address the governance challenges facing cities. Due to its advanced capabilities, AI is expected to become a critical resource for local governments in their pursuit of smart and sustainable development [11]. Although the potential of Artificial Intelligence has been widely explored in the private sector, its usefulness in the public sphere is increasingly recognized by governments themselves, which are adopting AI to strengthen their performance in various areas [12].

The application of chatbots in the public sector is not new [13]. This work proposed an innovative approach by designing an advanced implementation of Artificial Intelligence technologies, such as chatbots, in the public sector addressing a major challenge: improving communication between the government and citizens, an aspect that has been problematic for a long time. A more recent work proposed the implementation of an artificial intelligence chatbot to improve the help desk system in the Loreto regional government through the WhatsApp instant messaging platform [14]. The main objective of the project was to optimize the management of requests and events, which will result in more efficient user service, process automation, and an overall increase in service effectiveness. After this implementation, a significant improvement in user satisfaction was observed.

3. GovAIEasy

GovAIEasy (Artificial Intelligence Makes It Easy) is an innovative AI-powered lexical simplification system employing the powerful GPT-4 human language generation model. Its main function is to convert complex texts into more accessible and easy-to-understand versions for users. This system is based on Lexical Simplification, with the aim of providing automatic summaries that improve users' understanding of the text. Its approach aims to especially benefit people with low levels of literacy, cognitive problems, or disabilities that make it difficult to understand procedures in public offices. By

[1]The GovAIEasy application is available at https://www.govaieasy.com/

transforming the complexity of language into a more understandable format, GovAIEasy contributes significantly to making state information more accessible and equitable for all. Figure 1 shows the graphic symbol that represents the GovAIEasy platform.

Figure 1: GovAIEasy, an AI-based solution designed to optimize document management and text simplification in ecuadorian government administrations, improving the efficiency and accessibility of public information.

GovAIEasy automates the identification of complex words in the texts consulted by the user. To improve your understanding, the system automatically provides definitions, examples, and use cases for complex words, allowing us to illustrate the inner chain of thought (CoT) strategy followed by the model. This approach further facilitates the process of understanding the content for the user, providing them with the necessary tools to address specific difficulties that may arise when interacting with state documents, and providing a pedagogical way to improve reading abilities.

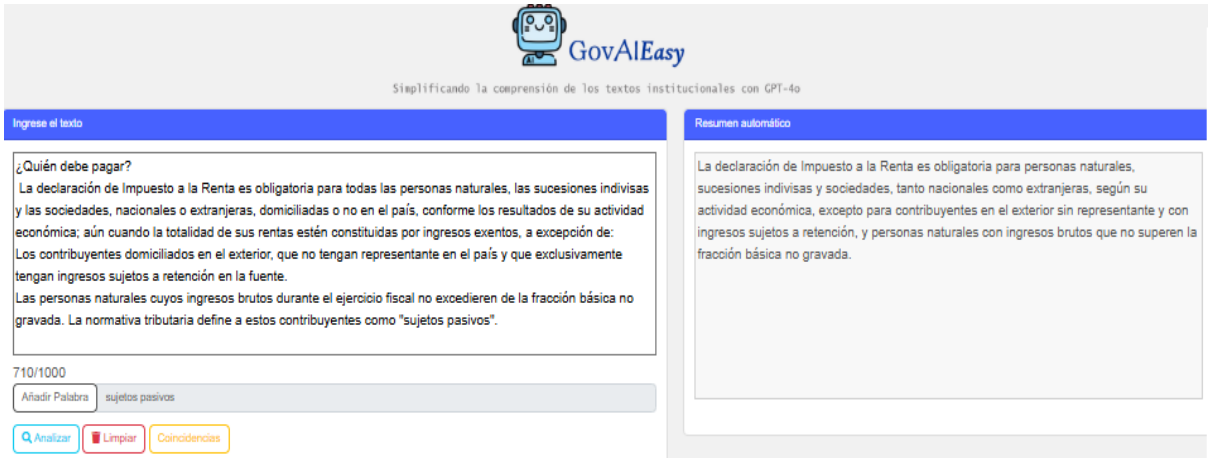

Figure 2: Snapshot of the GovAIEasy platform, highlighting its interactive interface and advanced AI tools that streamline document management and improve information accessibility in the government sector.

3.1. Proposed system

Our strategy focuses on applying zero-shot techniques to the GPT-4o model to generate accurate text sequences. Using the OpenAI API, the model is optimized to effectively meet the needs of GovAIEasy users, a solution that combines artificial intelligence to improve government documents and facilitate access to information in government. GovAIEasy offers tools to analyze, clean and simplify texts, reducing complexity and improving comprehension (see Figure 2). It also uses GPT-4o for automated content analysis and summarization. Details of the features of the model are provided in Table 1.

3.1.1. Process Flow Description

The stages considered in this study are fundamental to understanding the process of assessing lexical complexity in texts. Through a systematic approach, various phases are addressed that allow not only the identification of complex words but also their level of difficulty, generate accessible summaries, and store the results for later analysis. This comprehensive approach allows for a more precise assessment of the impact of complex words on text comprehension, which is essential for simplifying language in

Table 1
GPT-4o Model Details

Parameter	Value
Model	GPT
version	gpt-4o
Temperature	0.1
Max_tokens	1000
prompt	# Get complex words “Find the complex words in this text and I want the answer to be a python array of only the complex words [ ]: ” # Get summary “Summarize the following text in Spanish:” # meaning, an example and a use case of the complex word” “Give me the meaning, an example and a use case of the following word. The answer must be in Spanish and in a Python dictionary: format: “meaning”: text, “example”: text, “caseUse”: text

technical and official documents. Figure 3 presents the main stages involved in this process, described below.

1. **Input data**: The user provides a text.
2. **Generate prompts**: Two prompts are generated to send to the language model:
   - **Prompt for complex words**: The model identifies complex words and assigns a difficulty value.
   - **Prompt for summary**: The model generates a concise summary of the text.
3. **Processing by the model**: The model processes both prompts and returns the results: identified complex words and summary.
4. **Post-processing**: Complex words are assigned a difficulty level.
5. **Storage and Response**: The results (complex words, their difficulty, and summary) are stored in a database and returned as a response to assess and study their lexical complexity, which will be used in future research. This storage enables not only to analyze the presence and distribution of difficult terms in the processed texts, but also to monitor the model’s performance in identifying and classifying these words.

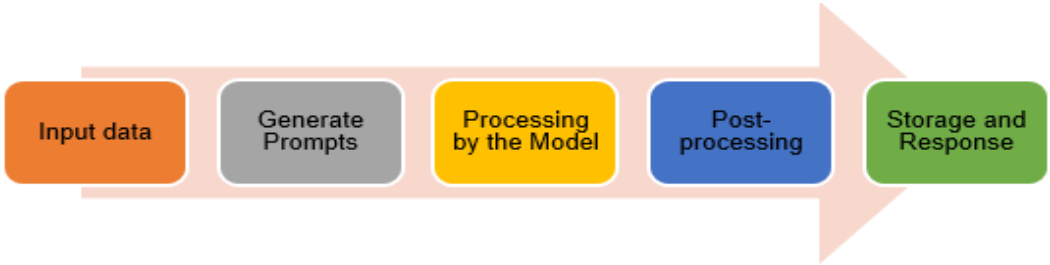

Figure 3: Process Flow for Automatic Identification of Complex Words.

3.2. GPT-4 with Prompt Generation

Prompt design optimizes the way the model interacts with. The main advantage of this technique is that it does not require additional resources, as the performance of the existing model can be improved simply by adjusting the input presented to it [15]. Furthermore, it has been shown that proper prompt

design in a general model, such as GPT-4, can outperform a model trained for a specific task [16] [17]. Since not all prompts generate the desired behavior in language models, it is essential to develop a prompting strategy that fits the task at hand. Although prompts often need customization for specific tasks, they can often be generalized within an appropriate prompt framework [18].

We define two main prompts that are sent to the language model to process the text:

1. ***Prompt for complex words***. The first prompt aims to identify the most complex words in the text. The language model must extract a list of difficult words, assign them a difficulty value within the range of 0 to 1, and mark whether these words are acronyms. This process is carried out on the basis of instructions that establish different levels of difficulty (moderately difficult, difficult, and very difficult) according to the calculated complexity value.
2. ***Prompt for summary***. The second prompt asks the model to generate a concise summary of the text in Spanish. This step allows obtaining a simplified version of the content that facilitates comprehension.

The prompt applied in the model is in Table 1.

3.3. Exploring Process of GPT-4o

Our methodology generates a simplified version of the original text, transforming complex content into a more accessible version, as shown in Table 2. Our approach adapts to the most common vocabulary of users of ecuadorian public institutions, ensuring that the simplification preserves the naturalness of administrative language. From a linguistic perspective, the resulting text preserves the meaning of the original, ensuring the retention of key terms, such as proper nouns, within the legal framework. An example of this is the reference to "Impuesto a la renta" a specific tax with defined regulations, whose name is retained. Furthermore, the model optimizes the writing by avoiding redundant and irrelevant content, without requiring prior linguistic knowledge from the user. Table 3 presents a comparison between the original text and the simplified version, highlighting the preservation of key terms, linguistic clarity, and the elimination of irrelevant information, while Table 4 presents a comparison between the original text and the simplified version, highlighting structural modifications and readability improvements.

Table 2
Example of lexical changes applied by the model in text simplification

Source Text	Simplified Text
¿Quién debe pagar? La declaración de Impuesto a la Renta es obligatoria para todas las personas naturales, las sucesiones indivisas y las sociedades, nacionales o extranjeras, domiciliadas o no en el país, conforme los resultados de su actividad económica; aún cuando la totalidad de sus rentas estén constituidas por ingresos exentos, a excepción de: Los contribuyentes domiciliados en el exterior, que no tengan representante en el país y que exclusivamente tengan ingresos sujetos a retención en la fuente. Las personas naturales cuyos ingresos brutos durante el ejercicio fiscal no excedieren de la fracción básica no gravada. La normativa tributaria define a estos contribuyentes como "sujetos pasivos".	La declaración de Impuesto a la Renta es obligatoria para personas naturales, sucesiones indivisas y sociedades, tanto nacionales como extranjeras, según su actividad económica, excepto para contribuyentes en el exterior sin representante y con ingresos sujetos a retención, y personas naturales con ingresos brutos que no superen la fracción básica no gravada.

Although CoT is considered the primary tool for reasoning in large-scale language models (LLMs), complex reasoning remains a major challenge for these models [19] [20]. Recent research has shown that explanations generated using CoT can be influenced by content biases, negatively affecting both their robustness and fidelity [21]. In Figure 4, our experiments demonstrated that the definitions,

Table 3
Comparison between the original text and the simplified version, highlighting the retention of key terms, linguistic clarity, and the elimination of irrelevant information

Original Sentence	Simplified Sentence	Lexical Change
conforme los resultados de su actividad económica	según su actividad económica	"conforme los resultados de" → **"según"** (more concise)
Los contribuyentes domiciliados en el exterior, que no tengan representante en el país y que exclusivamente tengan ingresos sujetos a retención en la fuente.	contribuyentes en el exterior sin representante y con ingresos sujetos a retención	"domiciliados en el exterior" → "en el exterior", "que no tengan representante en el país" → **"sin representante"**, "exclusivamente tengan ingresos sujetos a retención en la fuente" → **"con ingresos sujetos a retención"**
Las personas naturales cuyos ingresos brutos durante el ejercicio fiscal no excedieren de la fracción básica no gravada.	personas naturales con ingresos brutos que no superen la fracción básica no gravada.	"cuyos ingresos brutos durante el ejercicio fiscal no excedieren de" → **"con ingresos brutos que no superen"**

Table 4
Comparison between the original text and the simplified version, highlighting structural modifications such as reorganization, elimination of redundant elements, and improved readability

Original Sentence	Simplified Sentence	Structural Change
¿Quién debe pagar? (Interrogative sentence)	❌ (deleted)	The initial question was removed, as the simplification begins directly with the statement.
La declaración de Impuesto a la Renta es obligatoria para todas las personas na-turales, las sucesiones indivisas y las sociedades, nacionales o extranjeras, domiciliadas o no en el país.	La declaración de Impuesto a la Renta es obligatoria para personas naturales, sucesiones indivisas y sociedades, tanto nacionales como extranjeras.	**"todas"** and **"domiciliadas o no en el país"** were removed to make the sentence more concise.
aún cuando la totalidad de sus rentas estén constituidas por ingresos exentos, a excepción de:	❌ (deleted)	This section was removed because it did not provide essential information for defining who is required to file a tax return.
Los contribuyentes domiciliados en el exterior... + Las personas naturales cuyos ingresos brutos... (two separate sentences).	excepto para contribuyentes en el exterior sin representante y con ingresos sujetos a retención, y personas naturales con ingresos brutos que no superen la fracción básica no gravada.	Both exceptions were merged into a single sentence, making the structure more fluid.
La normativa tributaria define a estos contribuyentes como "sujetos pasivos"	❌ (deleted)	The definition of **"sujetos pasivos"** was removed, as it is not essential to understanding the tax obligation.

examples, use cases, and the complexity level of words identified as complex generated by GPT-4o through its CoT approach, provide accurate and consistent reasoning in the context of state texts. This CoT demonstrates the model's relevance, as it processes and understands the input text through multiple levels of abstraction to produce a coherent and contextually relevant output. We highlight its effectiveness when evaluated on texts of varying complexity, achieving state-of-the-art performance and demonstrating consistent improvements in robustness.

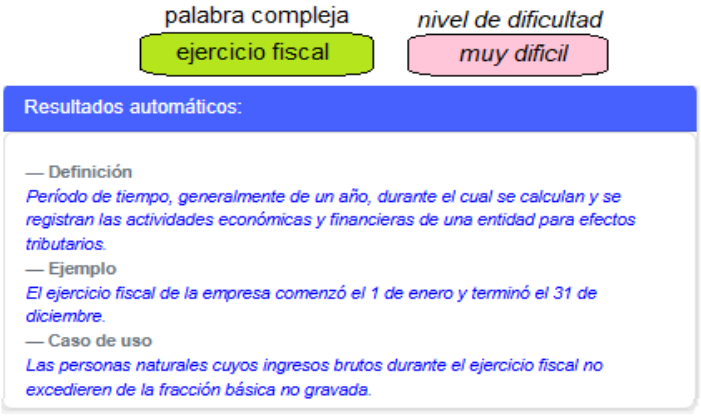

Figure 4: Information generated by the model for a complex word. The image displays the ***definition***, ***usage example***, and ***use case*** of the selected complex word, automatically generated to facilitate understanding. These data help contextualize the word within the text.

3.4. Scalability and Maintenance

The GovAIEasy application is designed to expand its application in the future to various types of text beyond public administration content. The system has a modular architecture that makes it easy to add or update features as needed. Periodic maintenance tasks are carried out on the collected data, as well as version updates to improve both the interface and the inclusion of new processes that enrich the analysis of the data in addition to performing regular error analysis to ensure performance and reliability precision of the automated system.

4. Conclusions and Recommendations

AI represents a field of research and technological application demonstrating a significant impact on the improvement of public services specifically about attention and assistance to users. Governments can also use AI to improve communication with citizens, as well as to increase the efficiency and quality of public services [22]. This article relies on state-of-the-art systems, based on the premise that recent advances in artificial intelligence, particularly through the application of the Generative Pre-trained Transformer (GPT-4o) model, offer a promising opportunity to transform government administration and enhance public services for the direct benefit of citizens.

It is important to highlight that storing complex words and their difficulty levels in a database not only allows for a detailed analysis of lexical complexity in texts, but also provides a key tool for evaluating model performance and improving its accuracy in future implementations. This information is essential for developing strategies that promote language accessibility and comprehension, especially in official and public interest documents. Thus, research in this field contributes to the creation of more effective strategies for text simplification, facilitating communication and ensuring that information is more understandable to a wider audience.

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Declaration on Generative AI

During the preparation of this work, the authors used ChatGPT (OpenAI) to improve the writing in terms of clarity, coherence, and comprehensibility, and the free version of Grammarly—integrated with the online LaTeX editor Overleaf—for grammar and spelling correction. After using these tools, the authors manually reviewed and refined the content as needed and take full responsibility for the final version of the manuscript.

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