

# Using Generative AI for Simplifying Official Documents in the Public Accounts Domain

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**Abstract.** *Governments and societies have understood the benefits of transparency and access to information since the 1950s, aiming for greater social participation and even more control over corruption. In Brazil, initiatives such as the Access to Information Act and the Digital Government Act promote transparency. However, the complex language used in sectors of the public sector, especially the judiciary, prevents the consumption of this information by part of the population. In this context, this practical report aims to present a project to facilitate access to and consumption of the preliminary opinions published by the State Court of Accounts (TCEs), through automatic simplifications using Large Language Models (LLMs), especially the GPT-4. The automatically simplified texts contain the main points of the opinion, highlighting monetary values and percentages, with their respective explanations and laws that support the result of the preliminary opinion. The MVP generated is being validated by a state court of accounts for subsequent incorporation into its transparency framework.*

## 1. Introduction

Since the 1950s, governments and society have agreed on transparency, the "right to know," as well as the publication of data, which can bring various benefits to society [PARKS 1957]. This includes the promotion of the exercise of citizenship and social control, enabling improvements in the provision of public services, increasing the accountability of government agents, and allowing for the reduction of corruption [ANDERSEN 2009], among other social gains.

In Brazil, initiatives with this objective have been prioritized since 2011, with the country's participation in the Open Government Partnership, followed by the Access to Information Act [BRASIL 2011], and more recently with the Digital Government Act [BRASIL 2021]. These aim to regulate the availability of information from public agencies to citizens, primarily through digital means.

However, one of the reasons that prevents the full enjoyment of the benefits that public transparency can provide is the inability of the population to appropriate the data and information [BRITO 2014]. Particularly in the legal field, the language adopted for writing documents follows a formality and rigor that often makes it impossible for laypeople to understand [BELÉM 2013]. Support initiatives for the inclusion of plain language can already be found, such as in [RODRIGUES et al., 2023].

Still within the legal field, the State Courts of Accounts (SCA) play a fundamental role in society, as they are the bodies responsible for verifying the legality, legitimacy, and economy of the acts carried out by all those who manage resources from the public coffers of the states and municipalities [ATRICON 2024]. However, their decisions are predominantly written in legal jargon, making them difficult for non-technical people to understand. Therefore, the general population faces difficulties in understanding the content of the decisions published by the SCA, recognizing the value of the activities performed by them, and, most importantly, exercising the role of social control by the population.

Therefore, the Fiscal Responsibility Law (LRF) [BRASIL 2000], in its article 48, defines that plans, budgets, and budget guidelines laws; accountability and their preliminary opinions; the Summary of Budgetary Execution Report and the Fiscal Management Report; and the simplified versions of these documents must be widely disclosed. In this sense, although defined by law, the SCA have been facing difficulties in generating the simplified versions of the documents with the necessary accuracy and under budgetary constraints, due to the technical challenges and limitations faced both by the simplification area [AL-THANYAN 2021] and by the implementation of AI in public service [Pasco et al. 2023]. However, with the recent advances in Artificial Intelligence, especially in Natural Language Processing (NLP) and the popularization of Large Language Models (LLMs) [YANG 2023], new possibilities can be explored, such as the use of these models for document simplification.

In this context, this practical report aims to present a project to facilitate access to and reading of preliminary opinions issued by the State Court of Accounts of Pernambuco (TCE/PE) through the automatic generation of simplified and summarized versions, as well as visual simplification, of the court's decisions. To achieve this, research was conducted in the areas of Natural Language Processing (NLP) and Large Language Models (LLMs) to develop tools capable of simplifying and summarizing the texts of the decisions. These tools were subsequently incorporated into a Minimum Viable Product (MVP) and are available for testing and validation by TCE/PE, for possible future incorporation into its data transparency infrastructure.

## **2. Context**

Innovation in the public sector has been a focus of discussions at the State Court of Auditors of Pernambuco, exploring concepts such as Blue Ocean Strategy, Lean Startup, and Design Thinking (DT) [ALT 2023]. Therefore, in 2020, a technical cooperation agreement was established between TCE/PE and the Federal Rural University of Pernambuco (UFRPE) for the design and validation of innovative services.

Some areas of focus were developed during the term of the agreement. One of them is the summarization and textual simplification of preliminary opinions issued by TCE/PE. Preliminary opinions are documents issued by Courts of Auditors after analyzing the public accounts of government agencies, municipalities, city councils, among others, indicating whether the accounts were approved, approved with reservations, or rejected, and specifying the reasons. These are typically composed of three sections: considerations ("considerandos"), recommendations and determinations, and the final evaluation, which can be included anywhere in the document. Generally, these documents have predominantly technical language, making it difficult for a large

portion of the population to understand them, as shown in Figure 1. Some studies can be found in the literature attempting to summarize the main points of these documents, such as in [LIMA 2022], but with only partial success.

CONSIDERANDO que no Balanço Geral do Estado estão contidos os Balanços Orçamentário, Financeiro e Patrimonial e os Demonstrativos das Variações Patrimoniais, bem como os demonstrativos previstos na Lei Complementar 101/200 (Lei de Responsabilidade Fiscal), estão escriturados de acordo com a normatização de regência;

CONSIDERANDO que foram observados os limites de despesas com pessoal, previstos na Lei de Responsabilidade Fiscal, em todos os quadrimestres do exercício de 2015;

CONSIDERANDO que foram igualmente observados os limites de endividamento, realização de operações de crédito, pagamento da dívida e concessões de garantias, previstos no já citado diploma fiscal;

CONSIDERANDO que ao lado do cumprimento de outros limites, houve a observância dos limites mínimos constitucionais para aplicação de recursos nas ações e serviços públicos de saúde e na manutenção e desenvolvimento do ensino (CF artigos 198, § 2º, e 212);

CONSIDERANDO que foi observado o cumprimento das exigências na remuneração dos profissionais de educação;

CONSIDERANDO que foram respeitados todos preceitos exigidos pela Lei de Responsabilidade Fiscal;

CONSIDERANDO ainda que foi respeitado o limite de despesa com contratos de Parcerias Público Privadas em relação a Receita Corrente Líquida;

**Figure 1: Part of the considerations of a preliminary opinion.**

In mid-2022, LLM models gained widespread popularity, particularly due to the success of the ChatGPT tool, which reached 1 million users in just 5 days<sup>1</sup>. A tool capable of generating new data from input queries (prompts) [DENG 2022] emerged as a significant interest, with the potential to enhance and improve various government services [Huang 2023]. Consequently, the prototype developed and presented at <https://decisoestce.innovagovlab.org/> was revisited to incorporate this capability for textual simplification.

### 3. Actions Performed

Given that this is an innovation project, it was decided to use the classic DT model, incrementally and with direct participation from the teams at TCE/PE and UFRPE, in biweekly meetings.

From the DT process, three phases were defined: (i) Discover and Define; (ii) Develop; and (iii) Deliver. Since it is an innovation process, the evolution is non-linear. Thus, throughout the development, new discoveries were made, making the process cyclical, involving discovery, development, and validation with the TCE/PE team.

#### 3.1 Discover and Define

In the discovery stage, meetings were held to discuss the problem, possible approaches, and identify potential solutions. In the definition stage, some data acquisitions were made through the TCE/PE API for preliminary validation of certain possibilities.

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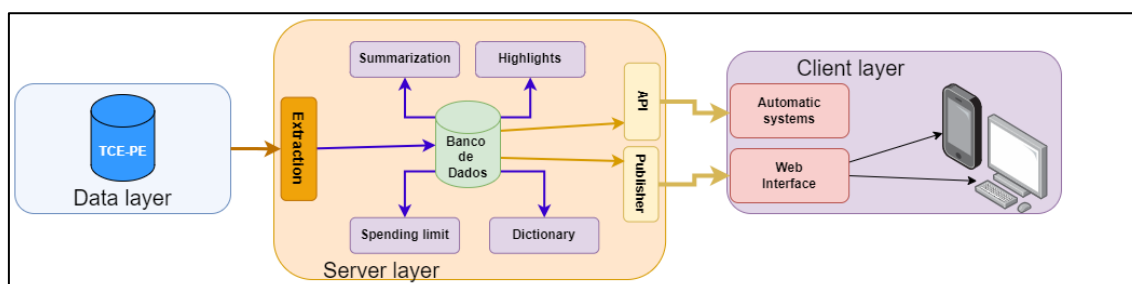
<sup>1</sup> <https://www.statista.com/chart/29174/time-to-one-million-users/>

### 3.2 Develop

The development phase encompasses most of the work. It's when the ideas and plans outlined in the discovery and definition stages, coupled with feedback from deliveries, converge into the development of tangible solutions.

- **Web application prototype:** When a prototype of a web application was developed to validate potential outputs and behaviors;
- **Academic research and validation:** The stage used for constructing the theoretical framework, verifying the state of the art, techniques, methods, models, and AI tools that could be applied in the project;
- **Evolution of MVP:** This stage followed a continuous improvement process that resulted in three versions of the MVP. Version 1 was for concept validation; version 2 included summarization of the preliminary opinion, dictionaries, and visual resources; and in version 3, simplification through GPT-4 was added.

After successive validations of the MVPs, it was possible to establish the client-server architecture for the web platform. MVP-v3 made an addition to the architecture so that not only the processing of text from preliminary opinions could be done on the application server but also the processing of text for generating a simplified version using GPT-4.



**Figure 2: System Architecture**

The communication between the server layer and the TCE/PE API is daily; every day, the server collects new preliminary opinions and adds them to the database. The **Summarization** component handles communication between the database and the GPT-4 API. When a user accesses a process, **Summarization** checks if a summary has been generated via GPT-4 in the database. If it doesn't exist yet, the component requests GPT-4 to simplify the preliminary opinion and saves the model's language response in the database.

### 3.3. Deliver

In this phase, the solutions were refined, validated with stakeholders, and the documentation was consolidated for the transfer of technology developed by the UFRPE team to TCE/PE.

## 4. Results

Starting from the **academic research and validation** stage, it was found that the state of the art in NLP, at the beginning of the project, did not allow for high-quality simplification of the preliminary opinion with the data the group had. In other words, translating a text

from legal vocabulary to a more accessible vocabulary for the general population was not feasible. Therefore, the decision was made to summarize the decision, as presented in [LIMA 2022], by collecting the main excerpts from the text and adding dictionaries for the most complex words defined by the TCE/PE and UFRPE group. When clicked, these dictionaries show the meaning of the word. From version 2 of the MVP, the system also included a list of indicators in the sidebar format, as shown in Figure 3. These indicators guide the decision-making of the process reporter. The green color of the card indicates compliance with the indicator, while red indicates a violation of the indicator.

Motivated by the popularization of generative AIs, a new framework was added to the system aimed at simplifying the text of the opinion using GPT-4. The prompt used for text simplification was created and refined through trial and error, with human analysis of the responses. The final prompt is presented in Figure 4 and consists of a description of what should be done, aiding points for the model to better understand the task, and the text intended for simplification.

Lines 1 and 2 describe the problem to be solved by the language model. Between lines 3 and 11, supporting points are presented. This prompt fragment is important for shaping what we will get in the GPT-4 output. For example, if we don't include what should be included, it will suppress important information (e.g., monetary values, percentages, dates, and laws - Figure 5). In it, the preliminary opinion at <https://decisoestce.innovagovlab.org/processo?id=17100179-5> was simplified using only the shaping point from line 11.

Figure 6 shows the simplification of the same opinion from Figure 5 using the complete prompt from Figure 4. We can see the presentation of monetary values and percentages, which are of interest to the general population.

Sumário | Texto Completo

Pontos de Destaque

A **LOA** ? **LEI** Municipal nº 2.180/2019 autorizou a alteração orçamentária por meio de créditos adicionais até o limite de **5,00%** (**R\$ 2.520.000,00**), sendo esse o limite único possível para alteração orçamentária, e a alteração orçamentária foi no percentual de **15,43%** no valor de **R\$ 10.296.318,27**, ultrapassando, assim, o limite autorizado em **R\$ 7.776.318,27 (10,43%)**;

O Prefeito contribuiu para a geração do **DEFICIT** orçamentário supracitado, uma vez que: a) autorizou despesas orçamentárias em patamares superiores ao devido, graças a não **ANULAÇÃO** das dotações indicadas como fontes de créditos adicionais; b) apresentou a programação financeira e o cronograma de desembolso financeiro de forma deficientes; c) superestimou a **RECEITA** prevista no exercício dessas contas;

O presente **PROCESSO** trata de auditoria realizada nas Contas de Governo, compreendendo a verificação do cumprimento de limites constitucionais e legais;

**Indicadores**

- Aplicação na remuneração dos profissionais do magistério da educação básica (Violado)
- Aplicação na manutenção e desenvolvimento do ensino (Cumprido)
- Aplicação nas ações e serviços públicos de saúde (municipal) (Cumprido)
- Repasse do duodécimo à Câmara de Vereadores (Cumprido)
- Dívida consolidada líquida - DCL (Cumprido)
- Despesa total com pessoal - 3º quadrimestre/ 2º semestre (Cumprido)
- Limite das alíquotas de contribuição - Patronal (aplicável apenas a RPPS sem segregação de massa) (Cumprido)

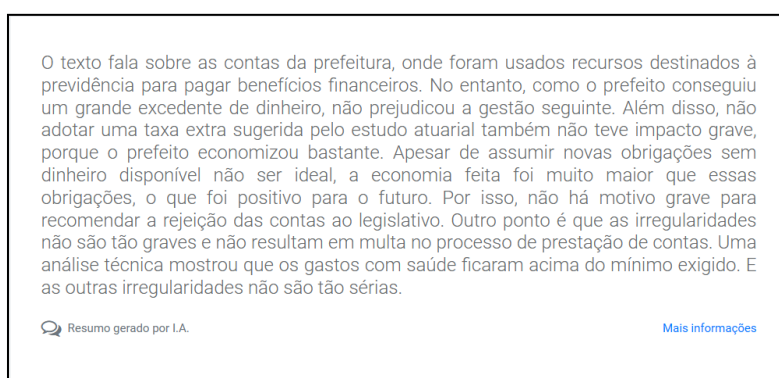
Figure 3: Sidebar with compliance with indicators

The determination of which information holds greater importance was consolidated through discussions between the TCE/PE and UFRPE teams. Monetary value emerged as the most crucial data point, followed by percentages, dates, and finally laws. The supporting point in line 11 aims to set a maximum character limit for the

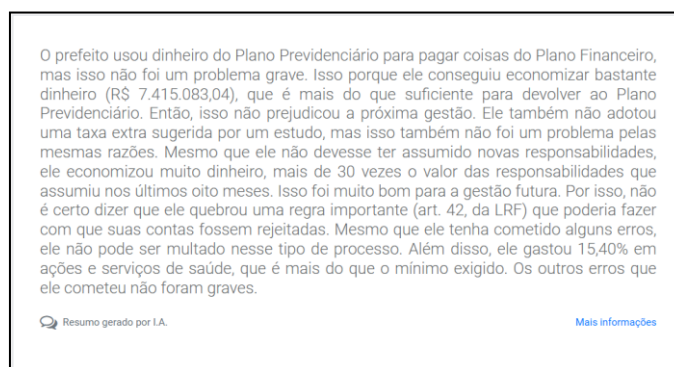
summary. This ensures that the summary fulfills its purpose of being concise and straightforward.

1	Faça uma síntese do texto abaixo e além de sintetizar, escreva em uma linguagem simples para que
2	2 pessoas com baixa escolaridade consigam entender.
3	Você não precisa colocar o município a qual pertence esse parecer
4	Foque na simplificação do texto, então termos jurídicos não podem ser utilizados no seu resumo
5	Ao fim do texto coloque ao menos 3 palavras chaves que corroboram com o resultado do parecer (Palavras-chave: ...)
6	O que você deve colocar na síntese por ordem de prioridade:
7	1 - Valores monetários com a descrição do que é esse valor encontrado no texto (R\$ 123.323,99, etc)
8	2- Porcentagens com a descrição do que é esse valor encontrado no texto
9	3- Datas com a descrição do que se refere essa data
10	4 - Leis
11	Esse resumo simplificado pode ter até 1500 caracteres.
12	Texto para ser resumido:

**Figure 4: Command prompt for simplification**



**Figure 5: Simplified text without the expected result modelers**



**Figure 6: Simplified text with expected result modelers**

## 5. Conclusions and Lessons Learned

The main contribution of this article is to provide a practical account of a project aimed at facilitating access to and reading of preliminary opinions published by TCE/PE through automatic text simplifications of decisions using the GPT-4 LLM. The simplified texts present content with little or no technical language, while highlighting the key points of the decision. They provide important data to the user, such as monetary values and percentages, accompanied by relevant

explanations, as well as references to laws that may guide the outcome of the preliminary opinion.

The good results obtained in simplifications are a consequence of the prompt design. Small changes in it can lead to negative and inconsistent results with what we expect or achieve even better results. Additionally, LLM models undergo constant updates, so continuous evaluation of the results obtained is necessary. The MVP is available online for testing and evaluation at <https://decisoestce.innovagovlab.org/>. However, we emphasize the fundamental need for decisions to undergo human review when incorporating this proposal into public systems, with the tool used as support for simplification rather than a substitute.

As a primary future work, we consider the need for a formal evaluation of the produced summaries in an experiment involving people of diverse ages and educational backgrounds. This evaluation aims to verify both the correctness of the generated summaries and their understanding by the population. We also emphasize the potential for testing new prompts. Finally, we highlight that this methodology can be adopted by other public agencies with the same goal of generating simplified documents for easy access by the population, thereby enabling the widespread realization of the benefits expected by the information access law.

## References

- ATRICON, Associação dos Membros dos Tribunais de Contas do Brasil. (2024). Função dos Tribunais de Contas. <https://atrimon.org.br/institucional/funcao/>
- AL-THANYAN, Suha S.; AZMI, Aqil M. Automated text simplification: a survey. *ACM Computing Surveys (CSUR)*, v. 54, n. 2, p. 1-36, 2021.
- ALT, Luis et al. O que é Design Thinking?. Mamtra [2017]. Disponível em: <[www.mamtra.com.br](http://www.mamtra.com.br)>. Acesso em, v. 23, p. 12, 2023.
- ANDERSEN, Thomas Barnebeck. E-Government as an anti-corruption strategy. *Information Economics and policy*, v. 21, n. 3, p. 201-210, 2009.
- BELÉM, Mariana. A simplificação da linguagem jurídica como meio de aproximação do cidadão à justiça. *Revista Jurídica da Seção Judiciária de Pernambuco*, n. 6, p. 313-320, 2013.
- BRASIL. Lei nº12.527, de 18 de novembro de 2011, “Lei de Acesso a Informação”, Brasília, DF: Diário Oficial da União, 2011
- BRASIL. Lei Complementar nº 101, de 4 de maio de 2000, Estabelece normas de finanças públicas voltadas para a responsabilidade na gestão fiscal e dá outras providências. Brasília, DF: Diário Oficial da União, 2000
- BRASIL, Lei nº14.129, de 29 de março de 2021, Dispõe sobre princípios, regras e instrumentos para o Governo Digital e para o aumento da eficiência pública, Brasília, DF: Diário Oficial da União, 2021.

- BRITO, Kellyton et al. Brazilian government open data: implementation, challenges, and potential opportunities. In: Proceedings of the 15th annual international conference on digital government research. 2014. p. 11-16.
- DENG, Jianyang; LIN, Yijia. The benefits and challenges of ChatGPT: An overview. *Frontiers in Computing and Intelligent Systems*, v. 2, n. 2, p. 81-83, 2022.
- HUANG, Jerry; HUANG, Ken. ChatGPT in Government. In: *Beyond AI: ChatGPT, Web3, and the Business Landscape of Tomorrow*. Cham: Springer NatureSwitzerland, 2023. p. 271-294.
- PASCO, C. D. R., Viterbo, J., & Bernardini, F. (2023). Desafios para a computação na implementação e implantação de solução baseada em IA em governo: uma análise da literatura. *Anais Do XI Workshop de Computação Aplicada Em Governo Eletrônico (WCGE 2023)*, 49–59.
- PARKS, Wallace. Open Government Principle: Applying the right to know under the Constitution. *Geo. Wash. L. Rev.* 26 (1957): 1.
- RODRIGUES, A. P., Marques, G. M., Rodrigues, L. B., Mattos, P. A. A., Nunes, V. T., Cappelli, C., Oliveira, R., & Moraes, R. M. de. (2023). Uma proposta de Automação para o Índice Nacional de Avaliação de Linguagem Simples em Serviços Públicos. *Anais Do XI Workshop de Computação Aplicada Em Governo Eletrônico (WCGE 2023)*, 106–117.
- YANG, Jingfeng et al. Harnessing the power of llms in practice: A survey on chatgpt and beyond. *ACM Transactions on Knowledge Discovery from Data*, 2023.
- LIMA, Tiago et al. Using Natural Language Processing to Improve Transparency by Enhancing the Understanding of Legal Decisions. *EGOV-CeDEM-ePart 2022*, p. 173, 2022.