

## Modernizing Police Writing: Android App Prototype for Writing Incident Reports

### Modernizing Police Reporting: An Android Application Prototype for Incident Report Writing

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#### SUMMARY

This paper describes the development of an Android application prototype to assist military police officers in preparing incident reports. The application uses Google's Gemini AI API to provide real-time grammar correction and intelligent suggestions for writing improvements, acting as an experienced police officer who reviews and improves the text. The application's architecture, based on the MVVM (Model-View-ViewModel) pattern, and the interface design, focused on simplicity and usability, are detailed. The implementation of the Gemini AI API, including the *system prompt* The framework that defines the role and behavior of AI is explored, along with cost analysis and comparison with other popular natural language processing APIs such as OpenAI and Anthropic. Test results with real-world reports demonstrate the application's ability to improve the clarity, conciseness, and professionalism of texts, as well as provide relevant suggestions for police practice, such as missing information, legal procedures, and evidence collection. The paper discusses the impacts and benefits of the application for the PMPR, the limitations of the technology, and suggestions for future work, including integration with other platforms and expanding the AI's capabilities. **Keywords:** Artificial Intelligence, Android application, Public Safety.

#### ABSTRACT

This article presents the development of an Android application prototype designed to assist Military Police officers with writing incident reports. The application leverages Google's Gemini AI API to provide real-time grammar correction and intelligent suggestions for writing improvement, acting as an experienced officer reviewing and enhancing the text. The app's architecture, based on the MVVM (Model-View-ViewModel) pattern, and the user interface design, focused on simplicity and usability, are detailed. The implementation of the Gemini AI API, including the system prompt that defines the AI's role and behavior, is explored, along with cost analysis and comparison with other popular natural language processing APIs like OpenAI and Anthropic. Test results using real incident reports demonstrate the app's ability to improve text clarity, conciseness, and professionalism, as well as provide relevant suggestions for police practice, such as missing information, legal procedures, and evidence collection. The article discusses the impacts and benefits of the application for the PMPR, the limitations of the technology, and suggestions for future work, including integration with other platforms and expansion of AI functionalities.

**Keywords:** Artificial Intelligence, Android application, Public Safety.

#### 1 INTRODUCTION

1 Clear and concise written communication is essential in many contexts, playing a crucial role in the effective transmission of information. In specific scenarios, such as the preparation of incident reports, accuracy and grammatical correctness become even more important. Inaccurate or ambiguous reports can compromise investigations, hinder decision-making and generate unintended consequences. The language used in these documents should be objective, avoiding jargon and technical terms that may make it difficult for different audiences to understand.

Professionals from various fields, such as public safety, law and administration, often face challenges in writing accurate and grammatically correct descriptions in incident reports. Time pressure, the complexity of situations and the lack of writing aid tools contribute to

the occurrence of grammatical, spelling and stylistic errors, compromising the clarity and credibility of documents. The need for manual reviews, often carried out by third parties, makes the process time-consuming and prone to errors.

In view of this scenario, this article presents an Android application developed with the objective of assisting in the preparation of incident reports, providing real-time grammatical correction and suggestions for writing improvements based on Artificial Intelligence (AI). The application uses the Gemini AI API to process the text entered by the user, identifying grammatical, spelling and stylistic errors, and suggesting more appropriate alternatives. The intuitive interface and *feedback* features provided by the application aim to simplify the writing process and ensure the quality of the reports.

The main objective of this project is to describe the development and functionalities of the Android application, detailing the technologies employed and the design decisions adopted. In addition, the article seeks to demonstrate the benefits of the application for users, contributing to the improvement of written communication in professional contexts that require precision and clarity.

## 2 THEORETICAL FRAMEWORK

The principles of Natural Language Processing (NLP), the functioning of Artificial Intelligence (AI) and the Gemini AI API, the mobile technologies involved in Android development and a brief review of the literature on related works will be covered.

### 2.1 NATURAL LANGUAGE PROCESSING (NLP)

Natural Language Processing (NLP) is a subfield of Artificial Intelligence that focuses on the interaction between computers and human language (Chowdhury, 2016). The goal of NLP is to enable computers to understand, interpret, and generate human language in a meaningful way. In the context of this project, NLP is used to analyze user-inputted text, identify grammatical, spelling, and stylistic errors, and suggest improvements in writing. NLP techniques such as syntactic analysis (Jurafsky & Martin, 2020), which examines the grammatical structure of sentences, and semantic analysis (Cambria & White, 2014), which focuses on the meaning of words and phrases, are employed by the Gemini AI API. Additionally, language models, which learn language patterns and structures from large sets of textual data, are key to the API's ability to generate contextually relevant suggestions (Radford et al., 2019).

Grammatical correction, for example, is based on grammatical rules and syntactic analysis to detect errors in agreement, government, punctuation, among others. Suggestions for improving writing may involve replacing words with more appropriate synonyms, restructuring sentences for greater clarity and identifying ambiguous expressions, using semantic analysis resources and language models.

### 2.2 ARTIFICIAL INTELLIGENCE (AI) AND APIS

Artificial Intelligence (AI) is a field of computer science that seeks to create systems capable of performing tasks that normally require human intelligence, such as learning, reasoning, and problem-solving (Russell & Norvig, 2010). In the context of this application, AI, specifically through machine learning (Mitchell, 1997), is used to process natural language and provide corrections and writing suggestions. The Gemini AI API, a large language model (NLP) trained by Google, uses advanced deep learning techniques (LeCun, Bengio, & Hinton, 2015) to perform a variety of NLP tasks, including grammar correction, text generation, and translation. Its ability to understand and processing nuances of human language makes it a powerful tool for improving writing.

2 APIs (Application Programming Interfaces) are sets of rules and specifications that allow different software to communicate and share information (Fielding, 2002). The Gemini AI API provides a RESTful interface, based on the HTTP protocol, so that the Android application can send the text entered by the user and receive the corrections and suggestions generated by the AI. This integration, using HTTP requests (GET and POST), allows the application to benefit from the capabilities of the AI without the need to implement complex NLP algorithms locally.

### 2.3 MOBILE TECHNOLOGIES AND ANDROID STUDIO

The application was developed using the Android platform, the most popular mobile operating system in the world (StatCounter, 2024). The Kotlin programming language (Kotlinlang.org, 2023), chosen for its conciseness, security, and interoperability with Java, was used in Android Studio, the official integrated development environment (IDE) for Android development. Android Studio, based on IntelliJ IDEA, offers tools and resources for creating robust and scalable Android applications, including built-in support for dependency management, debugging tools, and device emulators. The Android SDK framework (Android Developers, 2023) provides the libraries and APIs needed to interact with the operating system and build user interfaces. The choice of Android as the platform aims to ensure the accessibility of the application to a large number of users.

### 3. APPLICATION DESIGN AND DEVELOPMENT

#### 3.1 APPLICATION ARCHITECTURE

The architecture chosen for developing the application was MVVM (Model-View-ViewModel). This architecture offers several advantages for developing Android applications, such as clear separation of responsibilities between components, improved testability, and greater flexibility to deal with changes in the user interface.

- **Model:** The Model represents the data layer of the application. In the context of this project, the Model is responsible for storing and managing the data related to the incident report. This includes the original text entered by the user, the text reviewed and enhanced by AI, and additional suggestions generated by AI based on the system prompt. The Model can use different data structures to represent this information, such as simple Kotlin classes or more complex objects that encapsulate the business logic related to the data.
- **View:** AView represents the user interface of the application, that is, the part with which the user interacts directly. In the images provided, we can see that the application interface was designed with simplicity and usability in mind. The main screen of the application consists of an editable text field where the user enters the incident report, a “Transcribe” button that triggers AI text processing, and an area to display the revised text and AI-generated suggestions. Visual elements such as contrasting colors, intuitive icons, and user-friendly messages are used to make the interface more user-friendly and easy to use.
- **ViewModel:** The ViewModel acts as an intermediary between the View and the Model. It is responsible for processing user actions in the View, such as clicking the “Transcribe” button, and to retrieve the necessary data from the Model or request it from the Gemini AI API. The ViewModel also formats the data received from the API so that it is displayed appropriately in the View. In the context of this project, the ViewModel plays a key role in communicating with the Gemini AI API, sending the report text and the system prompt and receiving the responses from the AI, which are then processed and made available to the View. Using the ViewModel helps to organize the code, separating the presentation logic from the business logic and facilitating the maintenance and testability of the application.

#### 3.2 INTERFACE DESIGN (UI/UX)

The user interface (UI) design and user experience (UX) have been carefully planned to ensure that the application is intuitive and easy to use, even for users with little experience with technology.

**Simplicity and Minimalism:** The application interface was designed following the principles of minimalism, with the aim of avoiding distractions and focusing on the application's main functionality: text correction and enhancement. Unnecessary visual elements were eliminated, and the interface was organized in a clear and concise way, making it easier to navigate and use the application.

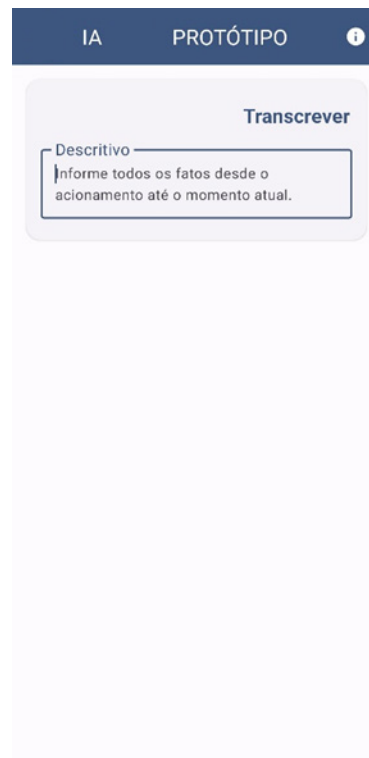
Figure 1. Home screen when opening the application.



Source: Prepared by the author.

- **Colors and Typography:** The choice of colors and typography also contributes to the usability of the application. Contrasting colors are used to highlight important elements of the interface, such as the “Transcribe” button. and AI suggestions. The chosen typography is legible and pleasing to the eye, making reading the text more comfortable for the user.

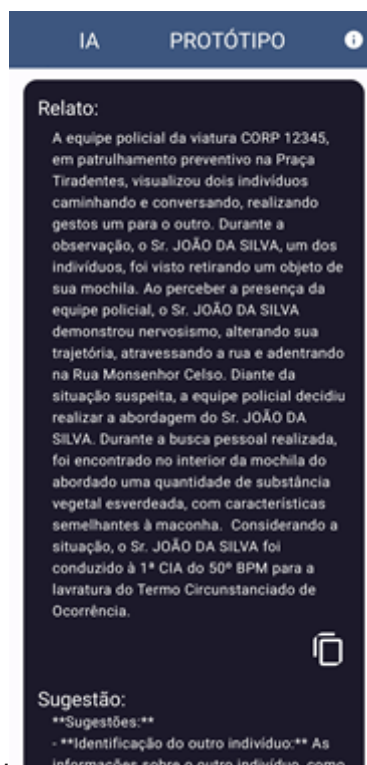
Figure 2. Second screen.



Source: Prepared by the author.

- **Accessibility:** During the development of the interface, accessibility principles were considered to ensure that the application is usable by people with reduced cognitive abilities. For example, font size and color contrast have been adjusted to make it easier to read.

Figure 3. Final result after inserting the text and selecting “Transcribe”.



Source: Prepared by the author.

### 3.3 IMPLEMENTATION OF GEMINI AI API AND SYSTEM PROMPT

The Gemini AI API, developed by Google, was integrated into the application to provide grammar correction and writing improvement suggestions. Communication with the API is carried out through HTTP requests, sending the report text and the system prompt and receiving the AI responses in JSON format.

The system prompt is a crucial part of the implementation, as it defines the role and behavior of the AI. It instructs the AI to behave like an experienced police officer writing police reports, providing not only grammatical corrections but also suggestions and insights that an experienced officer would give to a less experienced colleague.

The system prompt used in this project is as follows:

“You are an AI assistant who specializes in helping police officers improve their police reports. Your job is to analyze the officer’s initial report and provide improved text and additional suggestions, as if you were a police officer with over 20 years of experience writing police reports.

**Instructions for the AI assistant:**

Carefully analyze the police officer's report.

Rewrite the text, ensuring that:

The language should be clear, concise and professional;

The sequence of events is in chronological order;

All important details are retained;

The report structure is logical and easy to follow;

Appropriate technical terms are used where necessary;

The times refer to the correct facts, only informing the time the team was called or moved, if it is explicit in the text;

Provide legal information if you identify any violation of the law in the facts described. After rewriting the text, provide additional suggestions, such as:

Information that may be missing from the report based on what has been reported;

Recommendations on additional evidence to be collected and the correct execution of the chain of custody;

Reminders about relevant legal or administrative procedures.

**Rules for suggestions:**

Suggestions must be presented with a line break and with the summary of the suggestion in bold.

If the applicant is anonymous, do not suggest their identification.

Never suggest filing a formal police report and, under no circumstances, advise the victim to go to a police station to file a police report.

Always create a note for the legal device.

If there is no evidence of the crime, suggest forwarding the report to the “competent police station”.

If a detailed report has been drawn up in the police officer's text, suggest forwarding it to the “competent registry office”.

Do not suggest that the police take fingerprints or perform drug tests.

At the end of the suggestions, provide the following warning: “The suggestions provided by the AI assistant are intended as a guide only and should be used with caution. Actual situations may vary, and officers should always use their own judgment and follow the agency's protocols and procedures.”

**Objective:**

Your goal is to produce a thorough, accurate, and professional report based on decades of experience writing police reports, using the officer's account as a basis. Divide the final content into two parts: report and suggestion.

This is the police officer's report.”

The incident report text entered by the user is added to the end of the prompt before being sent to the API.

### 3.4 DATA FLOW

The diagram below illustrates the flow of information between the user, the application, and the Gemini AI API, including the role of the system prompt:

[User] --> Enter text --> [Application (ViewModel)] --> Add System Prompt to text --> Send text + prompt to Gemini AI API --> [Gemini AI API (processes prompt and text)] --> Returns revised report and suggestions (JSON) --> [Application (ViewModel)] --> Processes JSON (report and suggestions), updates View --> [User] --> Review the suggestions and the report, being able to copy the revised text using a button.

The system prompt ensures that the AI understands the context of the request and provides responses appropriate to the specific context of police report writing.

### 3.5 MAIN FEATURES

The application offers the following main functionalities:

- Grammar Correction: The application automatically identifies and corrects grammatical errors, common errors, such as agreement, regency, spelling and punctuation errors, making the text clearer and more professional.
- Writing Improvement Suggestions: Based on the system prompt, AI provides suggestions to improve the style and clarity of writing, going beyond grammatical correction. Suggestions may include replacing words with more appropriate synonyms, restructuring sentences to improve flow, adding relevant details, and organizing the text in a logical and chronological sequence.
- Intuitive Interface: The interface design, as described above, prioritizes simplicity, clarity and ease of use, making the application accessible to users with different levels of technology experience.
- Integration with specialized AI for the police context: The use of system prompt enables AI to provide relevant and context-specific responses and suggestions for writing police reports, making the app a valuable tool for police officers in their daily work.

## 4. RESULTS AND DISCUSSION

To evaluate the application's performance, tests were carried out with different reports of occurrences. real stories, written by police officers. The reports were submitted to the application, and the results were analyzed in terms of the quality of the revised text and the relevance of the suggestions generated by the AI.

The following criteria were used in the evaluation:

- Grammatical Correction: Assessment of the application's ability to identify and correct grammatical and spelling errors. graphics and scoring.
- Clarity and Conciseness: Assessment of the application's ability to make the text clearer, more objective and concise, eliminating redundancies and ambiguities.
- Organization and Structure: Assessment of the application's ability to organize the text in a logical and chronological manner. logic, facilitating the reading and understanding of facts.
- Language Adequacy: Assessment of the application's ability to use language appropriate to the context of a police report, avoiding jargon and informal terms.
- Suggestion Relevance: Assessing the relevance and usefulness of additional suggestions generated by AI, such as missing information, legal procedures, and evidence collection.

## 4.1 EXAMPLES OF USE

### 4.1.1 Example 1

Original Text:

"As requested by Copom, the team went to Super Mercado Compre Mais to check on a theft situation. At the location, in contact with the market security guard, Mr. JOAO DA SILVA, he reported that today at approximately 5:29 pm, PEDRO DOS SANTOS went to the market, attacked a customer and left with a bottle of whiskey, and when the market security tried to approach him, he broke the bottle in front of the supermarket and fled, according to bulletin number 2024/12345, who soon returned to the location and was approaching customers in front of the establishment, being then restrained by the security guard. Given the facts, PEDRO DOS SANTOS was sent to the police station. civil police station for clarification."

Enhanced Text (app generated):

In response to a request from Copom, the police team went to the Compre Mais Supermarket to investigate a theft. At the location, they contacted Mr. João da Silva, an employee of the establishment, who reported that, at approximately 5:29 p.m. today, the individual identified as Pedro dos Santos, after physically assaulting a customer, stole a bottle of whiskey from inside the supermarket. Then, when approached by the security guard, Pedro broke the bottle in front of the establishment and fled, as recorded in Police Report No. 2024/12345. Pedro later returned to the location and began approaching customers in front of the supermarket, at which point he was restrained by the security guard. Given the facts, Pedro dos Santos was taken to the Civil Police Station. for the necessary clarifications.

Suggestions (generated by the app):

- Identification of the victim: Ask Mr. João da Silva for the details of the client attacked by Pedro dos Santos, including full name, address and contact telephone number, so that a police report can be filed to record the attack.
- Evidence collection: Police Report No. 2024/12345, registered by the supermarket security team, must be attached to this Report.
- Legal provision: Art. 155, § 2, item II, of the Penal Code (qualified theft).
- Forwarding: Given Pedro dos Santos' conduct, this Report should be forwarded to the competent Civil Police Station.
- Warning: Suggestions provided by the AI assistant are only a guide and should be used with caution. Actual situations may vary, and officers should always use their own judgment. and follow corporate protocols and procedures.

Analysis:

In this example, the app has made significant grammatical and stylistic corrections, making the text clearer, more concise, and more professional. Additional suggestions, such as victim identification and data collection,



vas, are pertinent and relevant to the investigation of the case. The indication of the legal device demonstrates the AI's ability to identify the legal aspects related to the facts narrated.

#### 4.1.2 Example 2

##### Original Text:

TEAM CALLED VIA COPOM TO RESPOND TO AN INCIDENT OF NON-COMPLIANCE WITH A COURT DECISION GRANTING URGENT PROTECTIVE MEASURES. AT THE SITE, THE APPLICANT REPORTS THAT HER EX-LIVING PARTNER JOAO DA SILVA, WHO HAS A PROTECTIVE MEASURE IN ACCORDANCE WITH PROCESS 1234567890, TO HER DISFAVOR, WAS DRIVING THE VEHICLE CHEV/ONIX 10TAT HB (ABC1234) AROUND THE BLOCK OF THE APPLICANT'S RESIDENCE, A FACT WHICH WAS FILMED BY HER AND WAS INSERTED IN THIS BULLETIN. WHEN ASSISTING MARIA DA SILVA (CLAIMANT), THE TEAM SAW A VEHICLE WITH THE SAME CHARACTERISTICS AND TRIED TO APPROACH IT, BUT WITHOUT SUCCESS. AFTER IDENTIFYING THE PARTIES, THE TEAM WENT TO JOAO'S RESIDENCE TO VERIFY IF HE WAS AT HIS RESIDENCE. AT HIS RESIDENCE, THE ONIX VEHICLE WAS VERIFIED IN THE GARAGE, IMMEDIATELY AFTER JOAO ASSISTED THE TEAM WHO, AFTER EXPLAINING THE ENTIRE SITUATION, REPORTED THAT HE WAS NOT AWARE OF THE ABOVE-MENTIONED PROTECTIVE MEASURE. IT WAS FURTHER VERIFIED VIA SESPE/ INTRANET (MP- PROTECTIVE MEASURES) THAT HE WAS NOT REALLY NOTIFIED. GIVEN THE FACTS, THE TEAM NOTIFIED HIM OF THE EXISTENCE OF THE PROTECTIVE MEASURE THAT IS IN FORCE AGAINST JOAO DA SILVA. HE WAS THEN ADVISED TO FOLLOW THE DETERMINATIONS OF THE COURT ORDER. AFTER

WAS RELEASED AT THE SITE. THE INCIDENT WAS REGISTERED BY THE COP

##### Enhanced Text (app generated):

The police team was called by COPOM to respond to a report of non-compliance with a court order granting urgent protective measures. At the scene, the applicant, Maria da Silva, reported that her ex-partner, João da Silva, who has a protective measure against him, according to process number 1234567890, was driving the Chevrolet Onix vehicle, license plate ABC1234, around the block where the applicant's residence was located. The applicant reported having filmed the incident, and the video was attached to this report. During the response, the team saw a vehicle with the same characteristics and attempted to approach it, without success. After identifying the parties, the team went to João da Silva's residence to check if he was there. At the residence, the Onix vehicle was found in the garage, and João da Silva responded to the team. After explaining the situation, João da Silva reported that he was not aware of the protective measure. The team, through the SESPE/Intranet system (MP - Protective Measures), confirmed that he had not been notified of the measure. In view of the facts, the team notified João da Silva of the existence of the protective measure in force against him, advising him to follow the determinations of the court order. After being notified, João da Silva was released on site.

##### Suggestions (generated by the app):

Suggestion: Check whether the applicant has a copy of the court decision that granted the urgent protective measures.

Suggestion: Attach the footage taken by the applicant to the report as proof of non-compliance with the protective measure.

Suggestion: Forward the report to the competent police station for analysis and possible opening of a police investigation.

Legal Device: Article 24-A of Law No. 11,340/2006 (Maria da Penha Law).

Warning: Suggestions provided by the AI assistant are intended as a guide only and should be used with caution. Actual situations may vary, and officers should always use their own judgment and follow police protocols and procedures.

##### Analysis:

In this example, the application organized the text more clearly and chronologically, making it easier to understand the sequence of events. In addition, the application corrected grammatical errors, such as the lack of consonance.

verbal agreement, and standardized the writing of names and abbreviations. Additional suggestions, such as checking the existence of a copy of the court decision and attaching the footage to the report, are pertinent and demonstrate the AI's ability to identify information relevant to the investigation.

### 4.1.3 Example 3

#### Original Text:

Corp team 12345 was carrying out the PB in Tiradentes Square, when they saw an individual walking, talking and gesturing to another individual who was next to him, at the moment in which the team observed Mr. JOAO DA SILVA taking an object from his backpack, and at the moment in which he saw the team he appeared nervous and changed his route, crossing the street and turning onto Monsenhor Celso Street. The team decided to approach to investigate the situation, in the personal search, it was found in the pocket of Mr. JOAO DA SILVA's backpack, a quantity of a substance similar to marijuana. The team forwarded Mr. JOAO DA SILVA to the 1st Company of the 50th BPM for the preparation of a Circumstantial Term.

#### Enhanced Text (app generated):

Police team Corp 12345, on preventive patrol in Praça Tiradentes, saw two individuals walking, talking and gesturing to each other. During the observation, it was noted that Mr. João da Silva removed an object from his backpack, showing signs of nervousness upon noticing the presence of the police team. The individual then changed his route, crossing the street and turning onto Rua Monsenhor Celso. Given the suspicious situation, the team approached Mr. João da Silva for questioning. During the personal search, a quantity of a substance similar to marijuana was found in the pocket of the approached individual's backpack. Mr. João da Silva was taken to the 1st Company of the 50th Military Police Battalion to draw up a Circumstantial Report.

#### Suggestions (generated by the app):

- Full identification of the second individual: It is important to identify the second individual with whom Mr. João da Silva was talking, including details such as full name, ID, CPF and address. This information may be relevant to the investigation.
- Detailed description of the object: Describe the object removed from the backpack, including size, color, material and any details that may help with identification, for example, whether it was a cell phone, wallet, box, etc.
- Weight of the seized drug: Report the weight of the substance similar to marijuana seized, using a precision scale for this measurement.
- Exact location of seizure: Specify the exact location where the drug was found in Mr. João da Silva's backpack.
- Forwarding to the competent registry office: The Detailed Term, once drawn up, must be forwarded to the competent registry office for registration and legal monitoring.

Warning: Suggestions provided by the AI assistant are intended as a guide only and should be used with caution. Actual situations may vary, and officers should always use their own judgment and follow police protocols and procedures.

#### Analysis:

In this example, the application corrected spelling errors and improved the fluidity of the text. It also replaced the acronym "PB" with a similar term that was better understood by the receiver: "preventive patrolling". "tivo", making it easier to read and understand. The additional suggestions, such as the identification of the second individual and the detailed description of the object, demonstrate the AI's ability to identify information that could be relevant to the investigation but was not mentioned in the original report. The suggestion to forward to the competent registry office is in accordance with the applicable legal procedures and defined in *prompt*.

## 4.2 ANALYSIS OF RESULTS

The tests carried out demonstrated that the application is capable of correcting grammatical and stylistic errors. The additional suggestions generated by AI, such as missing information, legal procedures and evidence collection, also proved to be relevant and useful for police practice.

THE *system prompt* plays a key role in the quality of the AI's responses. By instructing the AI to behave like an experienced police officer, the *prompt* directs the AI to provide suggestions and *insights* that go beyond grammatical correctness, contributing to the quality and completeness of the police report.

### 4.3 LIMITATIONS

Despite the promising results, the application has some limitations:

- **Dependence on the Quality of the Original Text:** The quality of the revised text and the generated suggestions by AI depends on the quality of the original text entered by the user. Texts that are too confusing or contain incomplete information can make it difficult for AI to process.
- **Limited Semantic Understanding Ability:** AI still has limitations in understanding the deep semantics of text, which can result in inappropriate suggestions or a failure to identify important nuances in the story.
- **Need for Human Review:** Despite the capabilities of AI, human review is still essential to ensure the accuracy and appropriateness of the final text. The application should be seen as an aid, not a replacement for the expertise of the police officer.
- **Potential AI Bias:** Language models like the Gemini AI API are trained on large datasets, which can contain implicit biases. It is important to be aware of this potential and ensure that the application is used critically and consciously, avoiding the perpetuation of biases and prejudices.

### 4.4 APPLICATION COSTS AND COMPARISON WITH OTHER APIS

Using natural language processing (NLP) APIs, such as Gemini AI, to correct grammar and generate suggestions for improving texts implies costs related to token consumption. This section analyzes the estimated costs for using the Gemini 1.5 Flash API, considering the pricing policy and the estimated token consumption per request. In addition, it compares these costs with other popular APIs, such as OpenAI and Anthropic, and discusses the possibility of using a large language model (NLP) on your own servers as an alternative to reduce costs and increase control over data.

The Gemini 1.5 Flash API has two pricing modalities: \$0.075 per million tokens for prompts up to 128,000 tokens and \$0.15 per million tokens for larger prompts (Google AI, 2024). Considering that the prompt system and the story text will probably not exceed 128,000 tokens, the cost will be \$0.075 per million tokens. Each use of the application is estimated to consume about 2,000 tokens (1,000 for the prompt and 1,000 for the answer), resulting in an estimated cost of \$0.00015 per use, or \$0.15 for every 1 million uses.

Google also offers a free tier for the Gemini API, with limits of 15 requests per minute, 1 million tokens per minute, and 1,500 requests per day (Google AI, 2024). Within these limits, usage is free, but the data can be used for AI training.

In comparison, OpenAI's GPT-4o-mini API, commonly used for NLP tasks, costs \$0.15 per 1 million tokens for the prompt and \$0.60 per 1 million tokens for the answer (OpenAI, 2024). Considering the estimated consumption of 2 thousand tokens per use, the cost with OpenAI's API would be \$0.00075 per use, approximately 5 times higher than the cost with the Gemini API.

Anthropic's Claude-3.5 API, another popular option for NLP, has a cost of \$3.00 per million tokens for the prompt and \$15.00 per million tokens for the answer (Anthropic, 2024). Considering the estimated consumption, the cost with the Claude-3.5 API would be approximately \$0.018 per use, about 3 times lower than the cost with the Gemini API. However, it is important to consider that the Claude-3.5 API has a significantly higher cost for long prompts, which may be relevant in some use cases.

Choosing the most suitable API for your project depends on several factors, such as the available budget, the expected usage volume, the complexity of the NLP tasks, and the specific needs of the application. The Gemini API offers a good balance between cost and performance, with an attractive free tier

for early stage projects.

One alternative to reducing the costs of NLP APIs and having greater control over the data is to use an NLP on your own servers. This approach allows you to host and run the model on your own infrastructure, eliminating the need for external providers and offering greater flexibility in customizing and fine-tuning the model to the specific needs of your application.

**Pros:**

- Long-term cost reduction: Eliminates recurring costs with external APIs, especially for applications with high volume of uses.
- Greater control over data: User data is not sent to external servers, which increases privacy and information security.
- Customization and fine-tuning: Allows you to adapt the model to the specific needs of the application, training it with its own data and adjusting its parameters to optimize performance on specific tasks.
- Availability and scalability: Allows you to control the availability and scalability of the service, adjusting the infrastructure according to demand.

**Cons:**

- Initial infrastructure cost: Requires initial investment in servers and computing resources. Own windows require technical expertise and can be complex.
- Model Update: Keep the model updated with the latest versions and with the latest more data recent times can be a challenge.

The decision to use a NLP on own servers must be carefully evaluated, considering the infrastructure costs, the complexity of deployment and maintenance, the application performance requirements, and the needs for privacy, security, and customization.

## 5. CONCLUSION

This article presents the development of an Android application that uses the Gemini AI API to assist police officers in preparing incident reports, providing grammatical correction and suggestions for writing improvements. The application, based on the MVVM architecture and with an interface design focused on simplicity and usability, aims to improve the clarity, conciseness, and professionalism of reports, contributing to the efficiency of police work.

The test results demonstrated the app's effectiveness in correcting grammatical and stylistic errors, as well as the relevance of the AI-generated suggestions, which go beyond grammar to cover aspects relevant to police practice, such as missing information, legal procedures and evidence collection. *system prompt*, which instructs the AI to behave like a seasoned police officer, plays a crucial role in the quality and relevance of the suggestions. The comparative cost analysis demonstrated that the Gemini API offers a good balance between cost-effectiveness, with an attractive free tier for early-stage projects and competitive costs compared to other popular APIs such as OpenAI and Anthropic. The possibility of running NLPs on own servers was discussed as an alternative to reduce costs in the long term and increase control over the data, although it presents challenges in terms of infrastructure and maintenance.

The app, despite its limitations, such as the dependence on the quality of the original text and the need for human review, presents itself as a promising tool to assist police officers in writing more accurate, complete and professional reports. Integrating AI into a mobile app makes this accessible and practical technology for police officers in their daily work, contributing to the improvement of co-written communication and for the efficiency of police investigations.

Using this application can bring several benefits to police practice:

- Improved quality of reports: Clearer, more concise and well-written reports facilitate understanding. are facts and contribute to the efficiency of investigations.
- Reduced reporting time: AI-powered grammar correction and suggestions speed up the writing process, allowing officers to spend more time on other important tasks.
- Language standardization: The application helps to standardize the language used in reports,

facilitating communication and analysis of information.

- **Continuous learning:** The real-time feedback provided by the app allows officers to learn from AI suggestions and improve your writing skills.

To improve the application and expand its functionalities, the following directions for future work are suggested:

- **Integration with other platforms:** Integrate the application with other systems used by the police, such as databases and incident management systems.
- **Expanding AI functionality:** Implement new features such as plagiarism detection, sentiment analysis, and automatic summary generation.
- **Performance evaluation with real users:** Conduct usability tests with police officers in real situations to evaluate the impact of the application on daily work and collect feedback for improvements.
- **Explore the feasibility and development of domain-specific NLP models for law enforcement:** Train models with data specific to the public safety area to improve the accuracy and relevance of suggestions.
- **Deeper analysis of the costs and benefits of using NLPs on your own servers:** Compare different models and architectures to identify the solution that best suits your application needs.

## REFERANDNCIES

ANTHROPIC.**Claude Pricing**.2024. Available at: <https://www.anthropic.com/pricing>. Accessed on: October 28, 2024.

ANDROID DEVELOPERS.**Android SDK**.2023. Available at: <https://developer.android.com/tools/releases/platforms?hl=pt-br>. Accessed on October 28, 2024.

CAMBRIA, E.; WHITE, B. Jumping NLP curves: A review of natural language processing research.**IEEE Computational Intelligence Magazine**, v. 9, n. 2, p. 48-57, 2014.

CHOWDHURY, GG Natural language processing.**Annual Review of Information Science and Technology**, v. 50, no. 1, p. 555-601, 2016.

FIELDING, RT**Architectural styles and the design of network-based software architectures**. Doctoral dissertation, University of California, Irvine, 2000.

GOOGLE AI.**Gemini Pricing**.2024. Available at: [https://ai.google.dev/pricing#1\\_5flash](https://ai.google.dev/pricing#1_5flash). Accessed on: October 28, 2024.

JURAFSKY, D.; MARTIN, J.H.**Speech and language processing**.3rd ed. Pearson, 2020. KOTLINLANG.ORG.**Kotlin Programming Language**.2023. Available at: <https://kotlinlang.org/>. Accessed on: October 28, 2024.

LECUN, Y.; BENGIO, Y.; HINTON, G. Deep learning.**Nature**, v. 521, n. 7553, p. 436-444, 2015. MITCHELL, TM **Machine Learning**.New York: McGraw-Hill Science/Engineering/Math, 1997. NUR FITRIA, T. "Grammarly"

as AI-powered English Writing Assistant: Students' Alternative for English Writing.**Metathesis: Journal of English Language, Literature, and Teaching**, v. 5, p. 65-78, 2021. OPENAI.**GPT-3.5 Pricing**.2023.

Available at: <https://openai.com/api/pricing/>. Accessed on: October 28, 2024. RADFORD, A. et al. Language models are unsupervised multitask learners.**OpenAI Blog**, v. 1, n. 8, p. 9, 2019.

RUSSELL, S.J.; NORVIG, P.**Artificial intelligence: a modern approach**.3rd ed. Upper Saddle River: Pearson, 2010.

STATCOUNTER.**Mobile Operating System Market Share Worldwide**.2024. Available at: <https://gs.statcounter.com/os-market-share/mobile/worldwide>. Accessed on: October 28, 2024.

YOANDITA; HASNAH, Y.**Quillbot As An Alternative Writing Tool: Examining Its Uses On The Academic Writing Performance Of Efl Learners**.Esteem Journal of English Education Study Programme, vol. 7, no. 2, p. 401-412, 2024.