A Case Study on Crime Reporting using Large Language Models

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***Abstract*—Nowadays, workflows in judiciary systems are undergoing rapid transformation, stimulated by the technological opportunities offered by Generative AI solutions, including Large Language Models (LLMs). These technologies offer promising tools for addressing the inefficiencies and accessibility challenges inherent in traditional judicial workflows, which have long resisted digital modernization. By automating repetitive and time-intensive tasks such as text summarization and document analysis, LLMs can assist humans, thus enhancing operational effectiveness. This paper presents an exploratory study conducted in the scope of a collaboration between researchers and IT experts from the University of Brescia and the Prosecutor General's Office at the Court of Appeal of Brescia. The study examines potentials and limitations of the integration of LLMs within a representative judicial crime reporting workflow, as a support tool for domain experts. The findings of the exploratory study pave the way to demonstrate the practical utility of LLMs in streamlining judicial activities, to offer insights into their capabilities, and to highlight the challenges associated with their adoption for real-world applications.**

***Index Terms*—Generative AI, Large Language Models, Prompt Engineering, Prompt Templates, Digital Justice**

I. Introduction

In today's judicial landscape, technological transformation is rapidly accelerating, driven by advancements in Generative AI (GenAI), particularly Large Language Models (LLMs) [2], [4], [3]. LLMs offer transformative potential for tasks such as text summarization, document analysis, and complex information processing, helping streamline workflows and allowing legal professionals to focus on decision-making.

Despite the compelling promise to bridge this technological gap, the practical implementation of AI-driven solutions in the legal sector still poses non-trivial challenges, and calls for proper exploratory studies, to tackle the specificity of each application context. This paper presents a study, conducted in the scope of a collaboration between researchers and IT experts from the University of Brescia and the Prosecutor General's Office at the Court of Appeal of Brescia. The study explores LLM integration into a representative judicial workflow—crime reporting—through the implementation of a LLM-enhanced version of the crime reporting workflow.

Unlike most GenAI projects in the judicial domain, often focused on isolated tasks like anonymization or legal prediction [1], this work investigates how LLMs can support workflow re-engineering via prompt engineering, a cost-effective strategy to leverage domain-specific knowledge.

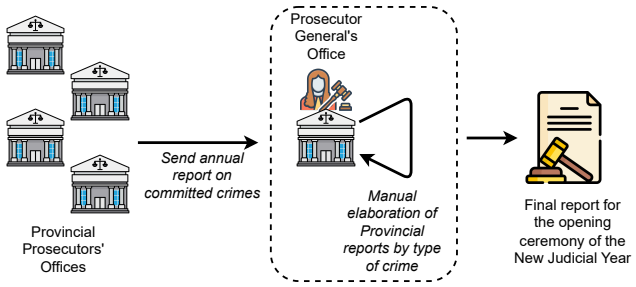

Fig. 1: Current crime reporting workflow involving the Prosecutor General's Office and different Prosecution Offices at the Court of Appeal of Brescia.

Though rooted in the Brescia context, the proposed approach offers broader applicability to similar judicial settings. It also supports smart city strategies, promoting more efficient, AI-enhanced e-Government services.

II. The Crime Reporting Workflow Case Study

The case study presented in this paper focuses on one of the workflows involving four Provincial Prosecutors' Offices and the Prosecutor General's Office at the Court of Appeal of Brescia. The reference workflow in its *as-is* form is depicted in Figure 1 and it is described in the following. Four Provincial Prosecutors' Offices (located in the Lombardy region provinces of Brescia, Bergamo, Cremona and Mantua) have to periodically report (on a yearly basis) to the Prosecutor General's Office at the Court of Appeal of Brescia the status of the crimes committed during the last year. Such crimes are categorised by their *type*, determining 16 different typologies of crimes (e.g., organized crime, terrorism, voluntary homicide). For each type of crime, a single Provincial Prosecutor's Office has to produce a report containing all the relevant information of the major crimes committed during the last year, along with statistics (e.g., number of trials and committed felonies). These reports are then sent to the Prosecutor General's Office, where a team of domain experts manually elaborates these reports to produce a single, final report that will be part of the proceedings of the opening ceremony of the New Judicial Year. Beyond inaugurating the annual activities of the Court of Appeal of Brescia, this ceremony is typically attended by key judicial figures, who deliver speeches addressing the judiciary's achievements, challenges, and future directions.

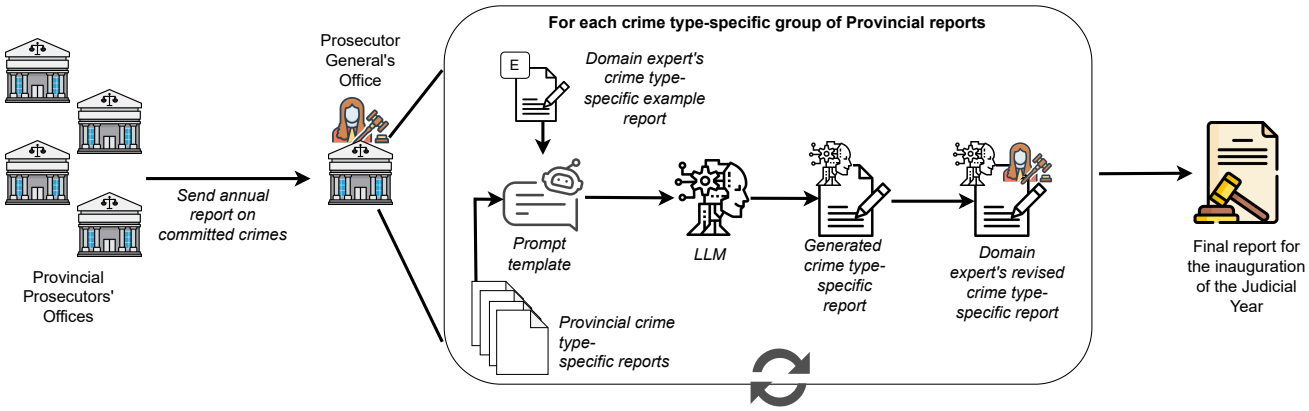

Fig. 2: LLM-enhanced crime reporting workflow, wherein a LLM is employed to streamline the Prosecutor General's Office text summarisation and revision activity.

The study explores four Empirical Research Questions:

ERQ1 *How can LLMs support report preprocessing and harmonization?*

ERQ2 *What strategies (e.g., prompt engineering) can ensure legal-standard outputs?*

ERQ3 *How can non-technical experts interact with LLMs?*

ERQ4 *Can LLMs mimic the style of legal experts to enrich final reports?*

III. LLM-enhanced Crime Reporting Workflow

The proposed *to-be* workflow for the Prosecutor General's Office is depicted in Figure 2. Specifically, the part of the *as-is* workflow that was previously entirely manually curated by the Prosecutor General's Office undergoes re-engineering by IT experts with the integration of a LLM (bounding box in Figure 2). As a result, the *to-be* workflow would be articulated over a series of steps, supervised by domain experts from the Prosecutor General's Office, and executed downstream from the collection of all the Provincial reports. Specifically, for each crime type, the following two macro-steps are repeated.

1) The LLM is provided with two inputs: (a) the group of four reports from the Provincial Prosecutors' Offices; (b) an example of a final report written by domain experts from the Prosecutor General's Office, based on the crime type under processing (e.g., extracted from the proceedings of a past Judicial Year). Inputs (a) and (b) are fed into the LLM through appropriate *prompt templates*, which have been designed to better guide the LLM in generating the desired output. Notably, input (b) is supplied to the LLM with the aim of instructing it to imitate the writing style of the domain experts from the Prosecutor General's Office (including wording, sentence structure, and so forth).
2) The LLM-generated text is checked by domain experts from the Prosecutor General's Office. After checking and reviewing (if necessary), the text is incorporated into the final report for the proceedings of the New Judicial Year. During this step, domain experts may also supplement the LLM output with additional information not directly specified in the Provincial reports (for instance, to ensure compliance with new laws and regulations enacted after the collection of reports from the Provincial Offices). The aforementioned strategy resembles the validation step of the so-called *human-in-the-loop* vision, where the human feedback (in the form of checking and revising the LLM-generated text, if necessary) has a pivotal role within the to-be workflow.

IV. Concluding Remarks

This study demonstrates how LLMs can support judicial workflows by reducing manual effort and enabling more efficient report generation. Prompt engineering proved to be an effective strategy for domain adaptation. While challenges remain in terms of legal validity and user interaction, the findings support further integration of LLMs in judicial systems with similar needs. A preliminary evaluation of LLM outputs is being performed using standard text comparison techniques (ROUGE, cosine similarity, writing style analysis).

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References

[1] Devis Bianchini, Carlo Bono, Alessandro Campi, Cinzia Cappiello, Stefano Ceri, Francesca De Luzi, Massimo Mecella, Barbara Pernici, and Pierluigi Plebani. Challenges in ai-supported process analysis in the italian judicial system: what after digitalization? *Digital Government: Research and Practice*, 5(1):1–10, 2024.

[2] Francesco Contini. Unboxing generative ai for the legal professions: functions, impacts and governance. In *IJCA*, volume 15, page 1. HeinOnline, 2024.

[3] Jinqi Lai, Wensheng Gan, Jiayang Wu, Zhenlian Qi, and S Yu Philip. Large language models in law: A survey. *AI Open*, 2024.

[4] Bogdan Padiu, Radu Iacob, Traian Rebedea, and Mihai Dascalu. To what extent have llms reshaped the legal domain so far? a scoping literature review. *Information*, 15(11):662, 2024.