

AI applied to the toll offence's collection



Nivi®



Introduction

The adoption of Large Language Models (LLM) acts as an innovative frontier to optimize the debt collection processes, and in particular the ones of the toll offences.

This brief presentation explores the technical applications of the LLMs, highlighting the modalities in which they're integrated, their advantages and related challenges.



Summary

The technical applications of LLMs that we will explore in this presentation pertain to the following areas:

1. License Plate and Nationality Recognition
2. User Engagement
3. Synchronous vs. Asynchronous Use
4. Reconciliation of Collections



License Plate and Nationality Recognition

Artificial vision algorithms, supported by Deep Learning techniques, enable automatic license plate recognition (ALPR), using convolutional neural networks (CNN) to process the images and extract the information that are relevant for the process, even when facing optics and geometric distortions that are unknown to Nivi and differentiated based on the type of cameras employed. Starting from the identification of the license plate in the image, the parallel use of a series of algorithms permits the acquiring of a multitude of information that, when weighted, allows for a correct recognition of the Nationality of a vehicle.



License Plate and Nationality Recognition

Nivi possesses a vast dataset of photographic evidences which allows an effective training activities to be performed, even in low-light conditions or at high speeds. To execute this activity, Nivi used tens of millions of photographic evidences coming from several Italian and international Motorway Concession Holders equipped with different technological systems.



User Engagement

The use of LLMs to generate personalized interactions with Users is based on natural language processing (NLP) techniques, capable of adapting the tone and communication style to the recipient's characteristics, increasing engagement probabilities. Retrieval-Augmented Generation (RAG) is indeed the process of optimizing an LLM's output, referring to an authoritative knowledge base outside the training data sources before generating a response.



User Engagement

LLMs must be trained on specific company's datasets to further improve the communication effectiveness. The dataset of interactions with motorist that Nivi possesses (about 832.000 interactions occurred over the last 5 years) is rich and constitutes an important asset in training the Model, with some significant distinctions between the synchronous and asynchronous use of the Model itself.



Synchronous vs. Asynchronous Use

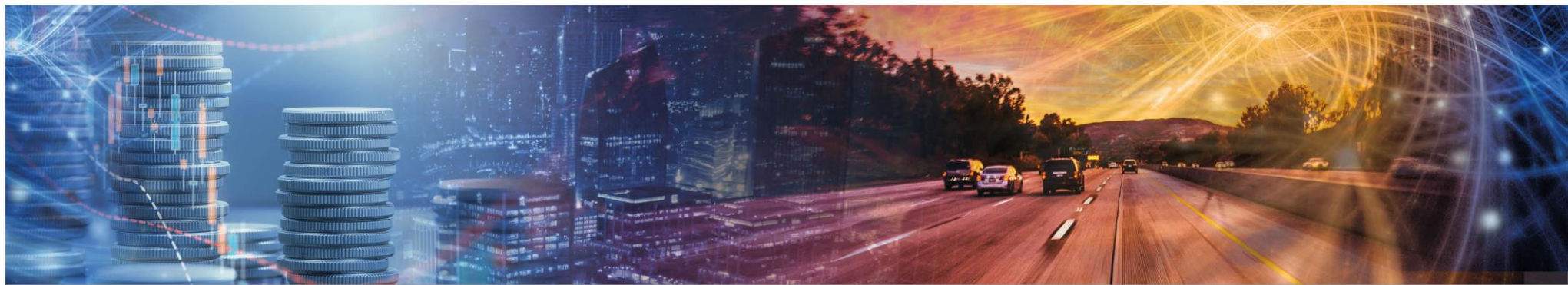
Asynchronous use of LLMs allows for a greater flexibility when it comes to managing communications, optimizing the timing and personalizing the messages without the pressure coming from providing answers in real-time. Asynchronous use is therefore particularly suitable for managing interactions with motorists via email.

On the other hand, the synchronous use, i.e. via live chatbots, poses significant challenges related to the immediate comprehension of the context and of the linguistic ambiguities, especially when it comes down to the possibility of experiencing “hallucinations” and incorrect data transmission.

The choice between synchronous and asynchronous use depends on specific objectives and on the nature of the interactions with the motorists. Generally, synchronous use is recommended just for providing general information, while the asynchronous channel should handle more complex and specific interactions.

Reconciliation of Collections

The AI contributes to simplifying the reconciliation of the cashed amounts through the use of algorithms employed for pattern matching and to make the accounting document's reading and interpretation automated, thus capable of identifying discrepancies and reducing the verification times. Nivi employs a series of cascading compensation rules that, using these technologies, ensures the reconciliation through consecutive cross-checks. The result is an improved accuracy in the reporting processes, a drastic reduction of unreconciled payments and a contraction of the reconciliation times given the decrease of the manual activities.



Conclusions

Integrating LLMs into the debt collection processes, especially concerning the collection of the motorway's toll offences, offers significant advantages in terms of efficiency, customization, and accuracy of activities. However, its effectiveness depends on the quality of training administered to the Models and on the ability to integrate AI solutions into existing IT infrastructures.

The continuous evolution of AI technologies requires constant commitment in the research and development fields in order to keep the applications constantly updated and at the cutting-edge. Nivi is committed to pursuing these objectives and improving the levels of service offered to its Clients through the adoption of the emerging AI technologies.



In summary

The benefits of the technical applications of large language models are as follows:

- ① Accuracy and speed in the process of acquiring and processing tolls collection information.
- ② High performance even in the presence of massive sets of heterogeneous data.
- ③ Prompt response to users and completeness of the provided information.
- ④ Minimization of errors in the reconciliation phase of collections.



Thank you



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