Implementation of LLM's for the Creation of a Marketing Assistant: "MUSA"

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Abstract

The article presents "MUSA", a solution that uses artificial intelligence and large-scale language models (LLM) in order to help companies create advertising images and slogans automatically and personalized. The proposed solution addresses the situation faced by especially small and medium-sized companies, to develop effective and memorable advertising campaigns due to resource limitations.

After a detailed exploration of available LLM models such as GPT-2, BERT, GPT-3 and AI21 Studio, a careful analysis was carried out on how to effectively integrate these technologies into the proposed solution. In addition, parameters were established to evaluate the quality of the generated content, covering aspects such as the relevance and adaptation of the messages, tonal coherence with the brand, the originality and freshness of the slogans, as well as the ability to capture the desired emotional essence for connect with the audience. By fine-tuning the selected LLMs with specific data from the advertising sector, it is intended that "MUSA" can generate high-quality, efficient promotional content at a lower cost for companies.

Keywords:Generative artificial intelligence, advertising content, language models, efficiency, advertising slogans/catchphrases, personalized training.

1. Introduction

In a world saturated with information, fast interactions and competition, advertising and marketing have been evolving to capture a large amount of attention and generate a recall effect in the minds of potential consumers. Slogans, those short but powerful phrases, play a crucial role in this process. With artificial intelligence now more than established, these advertising and marketing methods have reached new spectrums, little

by little transforming the way in which companies interact daily with their customers, or their audience. Advertising and marketing are currently fundamental pillars for any company that seeks to stand out in the market, it is not enough to put a product or service for sale, what brands seek is to build an emotional connection with the end consumer, generate a memorization effect and increase the number of conversions from audience to customers [1].

Artificial intelligence has revolutionized the way marketing strategies are conceived and executed. Whether it's audience segmentation or personalized advertising interaction, AI allows brands to achieve unimaginable levels of "intimacy," accuracy, and effectiveness. With this in mind, it is necessary for companies to adapt to the new digital era, combining both human and AI creativity, to carry out connections and personalizations to each user efficiently [2].

Large-scale language models (LLMs) represent a significant advance in the field of artificial intelligence and natural language processing. These models are trained on large bodies of text, allowing them the ability to "understand" and generate human language. Its importance lies in the wide application capacity in many domains. From automatic translation to content generation. The application of AI, through LLM, creates highly effective personalized messages, applying audience segmentation and improving the impact of marketing campaigns. Thanks to their ability to make new connections between training data, they are able to suggest highly creative and recursive phrases or slogans, reducing the time that companies invest in these activities [3].
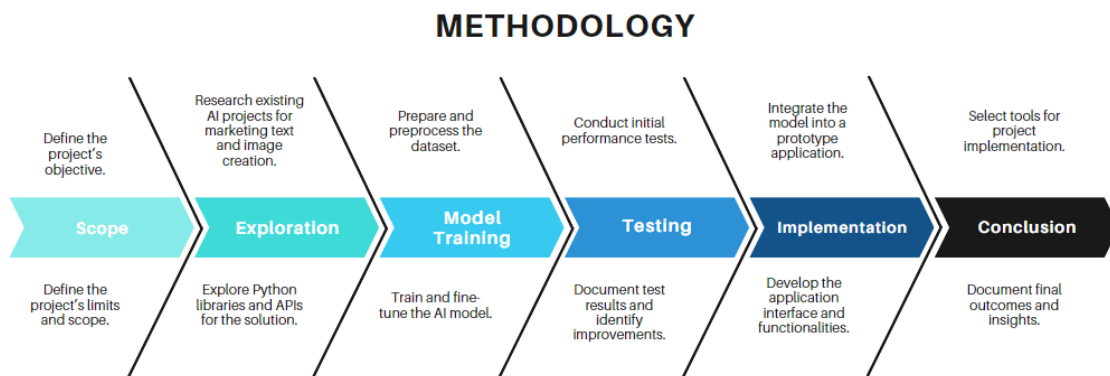
2.   Methodology

Figure 1: Proposed methodology. Source: Authors.

To adequately execute the development of the proposed solution, the methodology seen in Figure 1 was defined. The first step consists of correctly delimiting the scope and limitations present in the exercise of MUSA development. Key limitations include the

quality and accuracy of the generated images, as generating high-quality, realistic images continues to represent a significant challenge for today's artificial intelligence.

Another fundamental limitation is the need for human supervision and the crucial role that the user plays in the production of the texts. While the tool can generate ideas and initial content, human review and oversight will likely be required to ensure the quality, relevance and appropriateness of the generated content in relation to the brand, tone and target audience.

In terms of scope, MUSA has the potential to provide an optimal solution for creating complete advertising campaigns, including slogans, text and images. The above is valuable for small and medium-sized businesses that face resource and budget limitations when hiring marketing and advertising services.

Both Phase 1 and Phase 2 described in Figure 1 were addressed in the initial project proposal document. If you wish to know more about the background related to the topic and the technologies chosen for development, readers can refer to that document.

In order to follow the proposed methodology, we move on to phase 3 defined as training of the selected model, firstly the preparation and processing of the dataset used for training was carried out, then the aspects will be broken down in more detail. to take into account in this phase and the activities carried out to guarantee the integrity of the data to be used.

2.1 Training parameters

In the research conducted on code generation, two tests were identified: HumanEval and ClassEval, which are benchmarks used to evaluate the performance of large language models (LLMs) in code generation tasks.

2.1.1 How to make a good slogan?

Taking into account the objective set out in section 2 on the operation and purpose of MUSA, it is important to know what aspects to take into account when designing a slogan. Below are listed all the characteristics that make a slogan a Eye-catching and creative text.

- **Brevity and Concision**: A good slogan should be short and easy to remember. Ideally it should be between 3 and 7 words.

- **Clarity and Simplicity**: The message must be clear and direct. If possible, it is recommended to avoid the use of complicated words or jargon that the target audience may not understand.

- **Emotion**: A good slogan seeks to awaken a specific emotion in the target audience, such as happiness, confidence, excitement or nostalgia.

- **Differentiation**: You must highlight what makes the product or service unique compared to the competition.

- **Memorability**: A properly designed slogan is catchy and easy to remember. You can use rhymes or word games. Implicit call to action: It can suggest a desired action or behavior in the target audience.

Creating a slogan requires a proper understanding of several key elements. A study from Harvard University ensures that human memory retains short and repetitive phrases better, highlighting the importance of brevity and conciseness (Harvard Business Review, 2017). In addition to this, clarity in the message is essential to avoid misunderstandings and ensure that the target audience understands the message effortlessly.

By applying these principles to training models like GPT-2, you can ensure that the slogans generated are not only creative, but also strategically aligned with the company's marketing objectives. This ensures greater effectiveness and coherence in brand communication, thus strengthening the relationship with the consumer and enhancing the perception of the product or service in the market.

2.2 Fine Tuning

2.2.1 Training data format

To structure the data set to be used within the training, it is necessary to include the elements present in the prompt defined above. Taking this into account, the appropriate format within the .csv file to be used corresponds to the following:

- Company name

- Audience segment

- Emotion

- Description of the product or service

- Slogan

The slogan provided within the training data must meet the characteristics that differentiate a good slogan. The selected format ensures that the model learns to create relevant and effective slogans, aligned with the unique characteristics of the product or service and the emotional expectations of the target audience.

	empresa	segmento	emocion	descripcion	eslogan
2	empresa	segmento	emocion	descripcion	eslogan
3	EcoClean	Familias conscientes del medio ambiente	Felicidad	Un detergente ecológico que limpia profundamente sin dañar el medio ambien	Limpieza verde, brillo perfecto
4	SnapTech	Jóvenes adultos amantes de la tecnología	Emoción	Un smartphone con una batería de larga duración y cámara de alta resolución	Captura tus mejores momentos, todo el día
5	GreenFit	Deportistas y entusiastas del fitness	Motivación	Una línea de ropa deportiva hecha con materiales reciclados	Rendimiento sostenible, estilo inigualable
6	CalmMind	Personas con estrés y problemas de sueño	Relajación	Una aplicación de meditación que te ayuda a relajarte y dormir mejor	Encuentra tu calma interior, cada noche
7	FairCoffee	Amantes del café y consumidores éticos	Satisfacción	Un café orgánico de comercio justo cultivado en las montañas de Colombia	Sabor auténtico, responsabilidad social
8	EcoDrive	Conductores interesados en tecnologías sostenible	Innovación	Un coche eléctrico con una autonomía de 500 km y carga rápida	Movilidad sin límites, cero emisiones
9	PureHair	Personas con cabello seco y dañado	Cuidado	Un champú natural sin sulfatos para cabello seco y dañado	Revitaliza tu cabello, naturalmente sano
10	SmartHealth	Personas activas y tecnológicas	Energía	Un reloj inteligente que monitorea tu salud y actividad física	Tecnología en tu muñeca, bienestar en tu vida
11	ErgoWork	Profesionales de oficina	Confort	Una silla ergonómica diseñada para largas horas de trabajo en la oficina	Comodidad que dura, productividad que crece
12	StreamZone	Amantes del cine y la televisión	Diversión	Un servicio de streaming con una amplia selección de películas y series	Entretenimiento sin fin, a tu alcance
13	BioBlend	Consumidores conscientes de la salud	Salud	Un suplemento natural hecho con superalimentos orgánicos	Nutrición natural para una vida saludable
14	SolarWave	Hogares y negocios ecológicos	Esperanza	Paneles solares de alta eficiencia para energía renovable	Energía limpia para un futuro brillante

Figure 2: Organized Dataset. Source: Authors.

In Figure 2 it is possible to show the 5 fields required to define the training parameters with some examples that contain the information necessary to adequately train the model.

2.2.2 Training data

The ideal amount of training data can vary depending on factors such as the complexity of the model, the diversity of the data and the quality of the expected results, which is why it is important to keep some general considerations in mind:

- **Data Diversity**: It is important to have a good representation of different companies, audience segments, emotions and types of products or services. This in order to capture the variability of language and public preferences.

- **Amount of Data**: To implement a GPT-2 model it is recommended to have at least thousands of training examples, to provide enough variety and context so that the model can generalize well and produce creative and relevant slogans.

- **Data Quality**: It is of utmost importance to ensure that the training data is of high quality and correctly labeled. Taglines should be well-written, relevant to the context, and representative of the brand and product.

While there is no exact number that will work in all cases, having a significant amount of training data along with adequate diversity and data quality helps maximize the effectiveness of model training and the quality of the generated taglines. For this specific case and the execution of initial tests, a number of 2,000 training data will be taken that will allow the generation of slogans that meet the requirements defined above.

```python
import pandas as pd

# Step 1: Load the CSV file with utf-8 encoding and flexible delimiter
file_path = 'newDataV2.csv'
df = pd.read_csv(file_path, encoding='utf-8', on_bad_lines='skip', sep=None, engine='python')

# Step 2: Check for missing values and fill or drop them if necessary
df.fillna('', inplace=True)  # Fill missing values with empty strings for simplicity

# Step 3: Define a function to create labeled text
# byLugos
def create_labeled_text(row):
    return f"Company: {row['empresa']} Segment: {row['segmento']} Emotion: {row['emocion']} Description: {row['descripcion']} Slogan: {row['eslogan']}

# Step 4: Apply the function to create a new column with labeled text
df['labeled_text'] = df.apply(create_labeled_text, axis=1)

# Step 5: Save the labeled text to a .txt file
txt_file_path = 'EntrenoNum4.txt'
df['labeled_text'].to_csv(txt_file_path, index=False, header=False)

# Step 6: Display the saved file path
print(txt_file_path)
```

Figure 3: Csv format. Source: Authors.

Figure 3 shows the Python script that uses the pandas library to read a CSV file called 'newDataV2.csv', to handle any missing values by replacing them with empty strings, and then process the data to create labeled text for each row.The create_labeled_text function generates a text string by combining multiple columns (company, segment, emotion, description, and tagline) from each row with descriptive labels. This labeled text is saved

in a new column of the DataFrame called 'labeled_text'. Finally, the content of this column is exported to a text file named 'EntrenoNum4.txt', excluding the index and header, and the path of the generated file is printed for confirmation.

3. Results and Discussion

In the artificial intelligence project, the GPT-2 model was trained using a data set created specifically for this purpose. First, the transformer library was used to import and configure the tokenizer and the medium-sized GPT-2 pretrained model. The training data set was then prepared from a labeled text file, dividing it into blocks of fixed size to be processed by the model.

Training arguments were configured, setting several key parameters such as the number of training epochs, batch size, frequency of saving and evaluating the model, as well as the use of advanced techniques such as mixed precision training and the application of weight decay to prevent overfitting. The model was subsequently trained using these settings, and at the end of the training process, both the model and the trained tokenizer were saved for future use.

The following flowchart illustrates the main stages of the GPT-2 model training process, from preparing the dataset to saving the trained model. Each stage is essential to ensure successful training and a high-quality model.This diagram is part of phase 3 of the project.
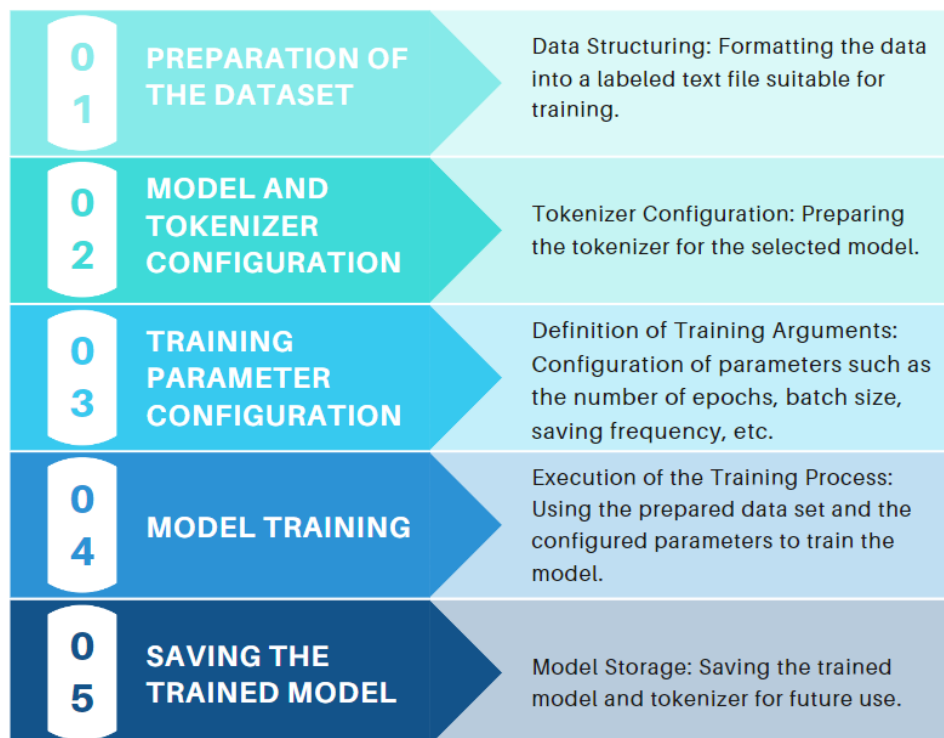

Figure 4: Training Flowchart. Source: Authors.

3.1 Testing

After model training, the saved model and tokenizer were loaded. A function was defined to generate text using the trained model, applying advanced sampling techniques such as repetition penalty and core sampling to control creativity and avoid unnecessary repetitions.

Initially, tests were conducted to evaluate the ability of the trained GPT-2 model to generate relevant and coherent texts. In this phase, several text examples were generated, as shown in Figure 5. Although the results were promising, the need to separate the slogans from the generated content was identified to improve the clarity and usefulness of the results.

```
C.\USEFS\DYLUY\AppData\LULaL\MiLFUSUFL\WindowSApps\pyLHON3.11.EXE   C.\USEFS\DYLUY\UNEDFIVE\ESLFILOFIU\UPIL MATEU\SEMESTRE 9\INTELIGENCIA\2DU 30\PRU
Texto generado 1:
Empresa EcoClean Segmento Familias Emoción Felicidad Descripción Un detergente ecológico ética Eslogan: Tu hogar de manera natural
EcoFitness Gear Seats Seating Empresas Naturales Emocionantes de fitness Descubre el medio ambiente Esoterica: Entrena de forma responsable
"Energía Emprendedora Señorita Empresa: Seguridad de la energía Describey la seguridad y energización Esfuerte con un energia energiza tus activos
Fashionista Seamantes Emojis Emoji Emotions
```

Figure 5: Test train output result. Source: Authors.

To achieve this, a slogan extraction process was implemented using regular expressions. This process allowed the slogans to be isolated effectively, facilitating their subsequent processing.In order to improve the quality and creativity of the generated taglines, an external API (Deepinfra) was integrated to refine and optimize the extracted taglines. The Figure 6 shows a comparison between the initially generated slogans and the slogans improved through the API, evidencing a significant improvement in the quality and appropriateness of the slogans after additional processing.

Eslogan Original: felicitacion en cada sorbo.
Eslogan Mejorados:

- "Limpia tu hogar, pero también tu corazón"
- "La felicidad en cada brazada"
- "Haz que el lavado sea un placer"
- "Un fresco final, una felicidad igual"

Figure 6: Comparison generated slogans. Source: Authors.

3.2 Implementation

In Phase 4 of the project, a web application prototype was deployed using Flask to demonstrate the functionality of the trained GPT-2 model, along with improved tagline generation and custom advertising image creation. The app allows users to enter details about a company and generate relevant slogans and images in an automated manner.

- **User interface**: The web application presents a form where users can enter the company name, market segment, the emotion they want to evoke, and a description of the product or service.

- **Text Generation with GPT-2**: When submitting the form, the application uses the pre-trained GPT-2 model to generate text based on the information provided by the user. This text includes an automatically generated tagline.

- **Improved Slogans with the Deepinfra API**: The slogan generated by the GPT-2 model is enhanced using the Deepinfra API, which generates four enhanced slogan options using advanced natural language processing techniques.

- **Image Generation with Vertex AI**: Using Google Cloud Vertex AI and the ImageGenerationModel, the app generates four advertising images based on the information provided by the user and the enhanced tagline. These images are personalized to reflect the desired message and emotion.

- **Results presentation**: The improved slogans and generated images are presented to the user in the web interface. This allows the user to view the different slogan options and select the image that best suits their needs.

The Figure 7 reflects the result of the interface designed for entering the parameters necessary for generating the slogan, as well as additional information about MUSA and a brief explanation of the proper use of the tool.

Figure 7: MUSA Interface. Source: Authors.

The Figure 8 shows an example of the results obtained after entering information about the company EcoClean, with a focus on families, whose feeling is happiness and as a description of the product there is "An ecological detergent." As evident, 5 slogans are generated, one is the one generated by the trained model and the other 4 are those that have been improved from the initial one, as well as 4 images that represent the identity of the brand and can be used in production. product advertising.
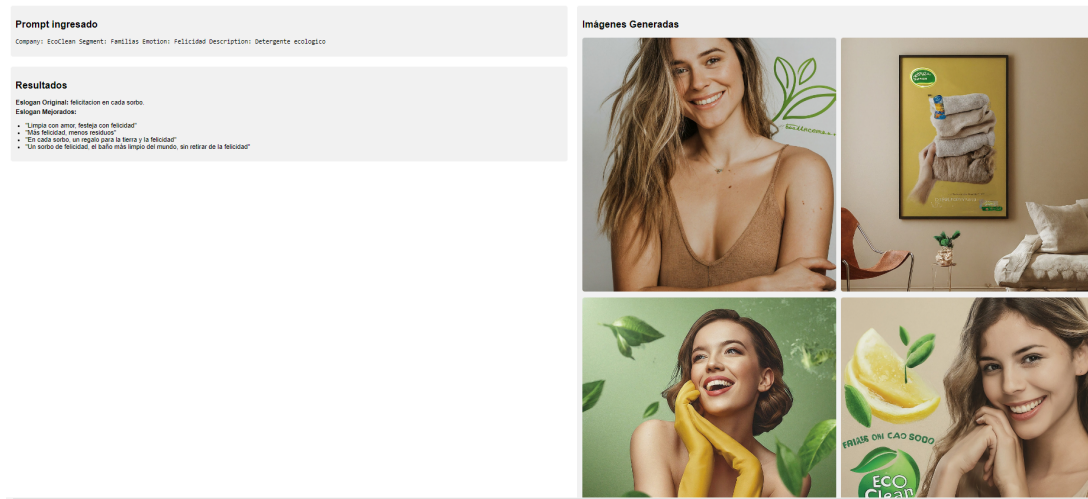
Figure 8: Final result of MUSA. Source: Authors.

4. Conclusions

This project has demonstrated the feasibility and effectiveness of using advanced language models such as GPT-2 to generate creative and relevant content in the field of marketing and advertising. From the initial phase of building and cleaning the dataset to training the model, each stage was crucial to ensure accurate and useful results. The training process, carefully configured with specific parameters, allowed the model to be optimized for the needs of the project. The tests carried out validated the model's ability to generate coherent and creative slogans based on the information provided, showing solid and consistent performance.

The web application prototype implementation successfully integrated several advanced technologies, including the Deepinfra API for tagline enhancement and Google Cloud Vertex AI for advertising image generation. The app not only generates high-quality textual and visual content but also facilitates user interaction by presenting multiple options of enhanced taglines and various generated images. This comprehensive, multifaceted approach not only highlights the power and flexibility of current language and vision models, but also underscores the importance of careful and well-planned implementation to maximize the value and applicability of AI solutions in real-world environments.

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