# Belozfi Technical Test - Data Scientist Intern (AI-First)

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Tools: Python (pandas), GPT-4



# Objective

This notebook is part of the technical test for the Data Scientist Intern position at Belozfi.

The goal is to simulate a real growth + Al automation challenge using anonymized TikTok ad data.

# 🧭 Task Overview

- Analyze anonymized TikTok ad performance data
- Design a custom scoring formula to rank creatives
- Match top creatives with their TikTok videos
- Use GPT-4 to generate 3 new creative ideas
- Design an automation pipeline (MCP-style) that runs this weekly



# → Part 1 — Ranking Formula

We design a custom formula to evaluate creative performance. The aim is to balance reach, engagement, and efficiency.

#### **Initial Formula**

We start with this initial scoring idea:

Weights (a, b, c, d) will be tuned based on data exploration and business reasoning.

## Data Exploration & Cleaning

Let's start by loading and inspecting the dataset to understand available fields, detect missing values, and prepare it for analysis.

In [62]: # imports
import pandas as pd
import numpy as np

# load the dataset
df = pd.read\_csv("Anonymized\_Ad\_Performance.csv")
print("Shape:", df.shape)
df.head()

Shape: (13797, 14)

### Out[62]:

Out[62]:		Ad name	Text	By Day	Cost	CPC (destination)	СРМ	Impressions
	0	stunt 2	¡Atención, CDMX! \$5000 YA están escondidos e	2025- 03-13	2471.4888	0.000000	73.202403	33762.4(
	1	Qué harías 4 (target)	¿Qué harías con un préstamo de \$750?	2025- 02-19	2221.1552	3.582971	13.104185	169499.68
	2	Gimnasio	¡Beloz es tu mejor aliado financiero! Tu prime	2025- 02-18	2057.7040	5.085271	17.063264	120592.64
	3	señora gorro rosa	0	2025- 02-23	1661.2992	7.210500	10.377029	160093.92
	4	señora gorro rosa	0	2025- 02-27	1638.4280	8.752286	18.316937	89448.8(
In [2]:	df	.tail()						

		Ad name	Text	By Day	Cost	CPC (destination)	СРМ	Impr		
	13792	stunt 1	¡Atención, CDMX! <b>③</b> Vamos a esconder \$5000 en a	2025- 04-04	0.0000	0.000000	0.000000			
	13793	buen fin 3	Se viene el buen fin!	2025- 02-06	0.0000	0.000000	0.000000			
	13794	labial y comida	Beloz, tu mejor aliado financiero. ¡Solicita t	2025- 01-29	0.0000	0.000000	0.000000			
	13795	verdulero	¿Y tú ya hiciste la despensa? #Beloz	2024- 12-28	0.0000	0.000000	0.000000			
	13796	Total of 13796 results	-	-	656851.6768	4.041796	10.004742	6565		
In [3]:	<pre># We are going to do some common cleaning tasks into the data before starting df['By Day'] = pd.to_datetime(df['By Day'], errors='coerce') df_clean = df.iloc[:-1].copy()  cols_numeric = [     'Cost', 'CPC (destination)', 'CPM', 'Impressions', 'Clicks (destination)     'CTR (destination)', 'Reach', 'Cost per 1,000 people reached',     'Video views at 25%', 'Video views at 50%', 'Conversions' ]  for col in cols_numeric:     df_clean[col] = pd.to_numeric(df_clean[col], errors='coerce')  df_clean = df_clean[     (df_clean['Impressions'] &gt; 0) &amp;      (df_clean['Clicks (destination)'] &gt; 0) ]  df_clean = df_clean[(df_clean['Video views at 25%']<df_clean['video 25%']<="" at="" pre="" views=""></df_clean['video></pre>									
	<pre>df_valid = df_clean.copy() df_valid.describe()</pre>									

	By Day	Cost	CPC (destination)	СРМ	Impressi	
count	5985	5985.000000	5985.000000	5985.000000	5985.000	
mean	2024-11-22 12:25:51.879699456	105.588461	4.725239	13.832314	10849.207	
min	2024-06-23 00:00:00	0.000000	0.000000	0.000000	1.120	
25%	2024-09-23 00:00:00	9.248800	2.640000	8.464369	667.520	
50%	2024-11-25 00:00:00	50.758400	3.712063	13.519302	3338.720	
75%	2025-01-10 00:00:00	129.351200	5.381852	18.276590	15221.920	
max	2025-06-22 00:00:00	2221.155200	625.631111	53.393844	169499.680	
std	NaN	168.268674	12.037602	7.342726	16375.875	

# **Data Cleaning Summary**

Before analyzing creative performance, we applied a series of data cleaning steps to ensure the dataset was reliable and accurate:

- 1. **Converted date strings to datetime objects** using pd.to\_datetime() for consistent time handling.
- 2. **Removed the last row**, which contained total aggregates and no valid ad data.
- 3. **Converted key numeric fields** (e.g., impressions, conversions, CTR) from strings to numeric types using pd.to\_numeric().

#### 4. Filtered out invalid rows:

- Only kept entries where:
  - Impressions > 0
  - Clicks > 0
- This ensured we only analyzed ads that were actually seen and interacted with.

#### 5. Corrected logical inconsistencies:

 Removed rows where Video views at 50% > Video views at 25%, which is not logically possible. This cleaning process gave us a dataset of valid ad performances, suitable for accurate analysis and ranking.

# Scoring Logic & Aggregation

Now that we have a clean dataset with valid entries only, the next step is to analyze performance by computing a custom score for each creative. To do this, we will:

- 1. **Group similar creatives** by Ad name and Text:
  - Some ads were run on multiple days.
  - We'll select the best-performing instance for each creative based on the highest number of conversions.
- 2. **Normalize key performance metrics** using Min-Max scaling:
  - CTR (destination) click-through rate
  - Conversions final goal
  - Video views at 50% viewer retention
  - CPC (destination) cost per click (used as a penalty)
- 3. **Define a scoring formula** to rank creatives: We'll assign weights to each metric to reflect business priorities. The proposed formula is:

```
Score = (0.4 * CTR_ + 0.35 * Conversions + 0.25 * Views 50% - 0.1 * CPC)
```

- 0.40 · CTR Click-Through Rate is the strongest indicator of creative appeal.
   A higher CTR suggests the ad is compelling and captures user attention effectively.
- 0.35 · Conversions Conversion performance reflects tangible outcomes, such as purchases or sign-ups. While slightly less emphasized than CTR in this formula, it's a critical metric of overall success.
- 0.25 · Video views at 50% The proportion of viewers reaching the 50% point in a video speaks to content engagement and creative quality. This weight reflects its supportive but not central role in the score.
- $-0.10 \cdot \text{CPC}$  Cost per Click is included as a penalty to discourage inefficient spend. A higher CPC reduces the overall score to reflect lower costeffectiveness.

*Note:* These weights can be easily adjusted to match specific marketing goals:

- For conversion-driven campaigns, increase the weight of Conversions (b)
- For brand awareness, boost CTR (a) and Views50 norm (c)
- For cost optimization, raise the CPC penalty or highlight cost-efficiency metrics more heavily (d)

4. **Sort the creatives by score** and extract the Top 5 to identify which ads are performing best overall.

This scoring system will help us prioritize high-performing creatives for future campaigns and idea generation.

```
In [101... # grouping by 'Ad name' + 'Text' and staying with the best rows for each ad
         mejores anuncios = df valid.loc[
             df valid.groupby(['Ad name', 'Text', 'By Day'])['Conversions'].idxmax()
         ].copy()
         # Min-Max normalization
         def normalize(col):
             return (col - col.min()) / (col.max() - col.min())
         mejores anuncios['norm ctr'] = normalize(mejores anuncios['CTR (destination)
         mejores anuncios['norm conversions'] = normalize(mejores anuncios['Conversions')
         mejores anuncios['norm views 50'] = normalize(mejores anuncios['Video views
         mejores anuncios['norm cpc'] = normalize(mejores anuncios['CPC (destination)
         a = 0.5 \# CTR
         b = 0.3 # Conversiones
         c = 0.2 # Views al 50%
         d = 0.1 \# CPC (penalized)
         # calculate Score
         mejores anuncios['Score'] = ((
             a * mejores anuncios['norm ctr'] +
             b * mejores anuncios['norm conversions'] +
             c * mejores anuncios['norm views 50'] -
             d * mejores anuncios['norm cpc']
         )
         # --- Paso 5: Ordenar y mostrar Top 5 anuncios
         top5 = mejores anuncios.sort values(by='Score', ascending=False).head(5)
         # --- Paso 6: Mostrar columnas clave
         cols to show = [
             'Ad name', 'Text',
             'CTR (destination)', 'Conversions', 'Video views at 25%','Video views at
         top5[cols to show].head()
```

	Ad name	Text	CTR (destination)	Conversions	Video views at 25%	Video views at 50%	(de
8580	renta	Siempre puedes contar con Beloz.	0.642857	0.0	0.0	0.00	
8608	consejos financieros	3 consejos financieros que deberías saber a tu	0.642857	0.0	1.1	0.00	
28	labial y comida	Beloz, tu mejor aliado financiero. ¡Solicita t	0.009086	122.4	18431.6	10483.40	
1	Qué harías 4 (target)	¿Qué harías con un préstamo de \$750?	0.003657	108.6	22358.6	9794.55	
2	Gimnasio	¡Beloz es tu mejor aliado financiero! Tu prime	0.003355	74.4	29860.6	12526.95	

# Part 2 — Manual Video Identification

Since the dataset did not include direct TikTok URLs or publication dates, and many video descriptions were reused across different uploads, we manually matched each Top 5 creative to the most likely video on the @belozmx TikTok account.

We used the following criteria:

- Video content: matching visuals, actors, or scenes tied to the ad description.
- **Engagement**: views, likes, and comments as supporting signals.
- **Text matching**: we ensured the video description matches exactly.

Some creative texts were reused in multiple videos across time. In those cases, we selected the most relevant or best-performing match based on qualitative analysis and using the context provided in the field Ad name.

Here are the final matches for the Top 5 ads:

Rank	Ad Name	Video Description (Text)		
1	renta	Siempre puedes contar con Beloz.		
2	consejos financieros	3 consejos financieros que deberías saber a tus 20!	VIOEO /	
3	labial y comida			
4	Qué harías 4 (target)	Video 4		
5 Gimnasio ¡Beloz es tu mejor aliado financiero! Tu primer préstamo de 750 pesos SIN INTERESES		Video 5		

```
In [93]: top5['Video Link'] = [
         'https://www.tiktok.com/@belozmx/video/7419055530246688018',
         'https://www.tiktok.com/@belozmx/video/7429013696837586182',
         'https://www.tiktok.com/@belozmx/video/7345180382960045317',
         'https://www.tiktok.com/@belozmx/video/7307342146946878725',
         'https://www.tiktok.com/@belozmx/video/7341432603033046277'
         1
         0.00
         v=3
         df.loc[df[df['Text']==top5['Text'].iloc[v]]['By Day'].idxmin(), ['Ad name',
         df[(df['Text']==top5['Text'].iloc[v])&(df['Ad name']==top5['Ad name'].iloc[v]
         df clean[(df clean['Text']==top5['Text'].iloc[v])].sort values(by='By Day')
         top5['Text'].iloc[v]
         df[(df['Text']=='3 consejos financieros que deberías saber a tus 20! ') & (c
         top5['Text'].iloc[4]
         top5[['Ad name','Text','Video Link','Score']]
```

	Ad name	Text	Video Link	
8580	renta	Siempre puedes contar con Beloz.	https://www.tiktok.com/@belozmx/video/74190555	0.4
8608	consejos financieros	3 consejos financieros que deberías saber a tu	https://www.tiktok.com/@belozmx/video/74290136	0.4
28	labial y comida	Beloz, tu mejor aliado financiero. ¡Solicita t	https://www.tiktok.com/@belozmx/video/73451803	0.4
1	Qué harías 4 (target)	¿Qué harías con un préstamo de \$750?	https://www.tiktok.com/@belozmx/video/73073421	0.4
2	Gimnasio	¡Beloz es tu mejor aliado	https://www.tiktok.com/@belozmx/video/73414326	0.3

# PART 3 — TikTok Creative Generation Using LLMs

In this section, we leverage insights from the top-performing TikTok creatives identified in Parts 1 and 2 to generate three new video ideas using a Large Language Model (LLM). The goal is to maintain Beloz's tone and creative direction, while proposing new engaging content formats that could perform well on the platform.

We use GPT-4 (via ChatGPT, June 2025) to assist in ideation, combining prompt engineering with structured formatting logic to ensure the output is actionable and platform-relevant.

### Model Used

#### GPT-4

Out[93]:

(ChatGPT, June 2025 version, accessed via OpenAI)

financiero! Tu prime...

# Formatting Logic

Each TikTok idea was structured into the following components for clarity and consistency:

- **? Title**: A creative hook or engaging question
- **@ Outline**: A brief description of the scene or narrative
- **Trend or Meme**: A current TikTok trend or cultural reference used for relevance
- **[7] Caption**: The proposed video caption to support engagement and reach

## Prompt used:

You are a creative strategist for a TikTok ad campaign in Mexico.

The product is Beloz: a digital lending app for micro-business owners. It offers fast, interest-free first loans (MX\$750) and builds user loyalty with benefits on renewals. The tone is casual, agile, and culturally relevant.

Here are 5 successful creative formats the brand has used:

- 1. Storytelling: a young woman forgets to pay rent, solves it with Beloz (punchline: "¡así de Beloz!")
- 2. Educational: "3 financial tips for your 20s", with notebook visuals and direct-to-camera style.
- 3. Street vox pop: women asked what they'd buy with 750 pesos (lipstick, snacks, blouses) + corrido tumbado outro.
- 4. Small business vox pop: merchant shares what he'd buy for his job.
- 5. Gym setting: what would you buy with 750 pesos? (Headphones)

Now, based on these references, generate **3 new TikTok ad ideas** for @belozmx:

- Include: hook, script outline, relevant meme or trend (if applicable), and text caption.
- Each idea should be short, creative, and feasible to record casually in real-life settings.
- The tone should be light, fun, and relatable for young adults or microentrepreneurs in Mexico.

### Ideas:

```
In [3]: from IPython.display import Image, display
display(Image(filename='ideal.png'))
```

display(Image(filename='idea2.png'))
display(Image(filename='idea3.png'))

### P Idea 1: ¿Cuánto vale tu tiempo?

#### **Outline:**

A young woman is seen hand-washing clothes, frustrated.

Voiceover: "¿Y si te dijera que con 750 pesos podrías comprar una lavadora?"

She receives a Beloz loan on her phone, buys a washing machine, and smiles. Final line:

"¡Así de veloz... digo, Beloz!"

#### Meme/Trend:

Before & After format with "Mission Accomplished" audio or transition effect.

#### Caption:

💸 Con Beloz, inviertes en lo que realmente importa: tu tiempo.

#AsíDeBeloz #FinanzasParaTodos #DtC

### 💡 Idea 2: 3 Gastos Chiquitos que Mejorarían Tu Negocio

#### **Outline:**

A young entrepreneur shows 3 purchases made with a Beloz loan:

- 1. Ring light
- 2. Branded stickers
- Comfy chair for her nail salonSays: "No necesitas millones. Solo 750 y Beloz."

#### Meme/Trend:

"3 cosas que nadie te dice..." with light TikTok tutorial music

#### Caption:

A veces lo que necesitas no es más trabajo, sino más comodidad.

#MicroNegocios #PréstamoBeloz #HazQuePase

#### 💡 Idea 3: El Test de los 750 Pesos

#### Outline:

Street interviews: "¿Qué comprarías con 750 pesos SIN intereses?" Answers range from job tools to clothes to course enrollment. Ends with Beloz outro and jingle.

### Meme/Trend:

Vox pop style with the trending audio: "¿Y tú qué harías?"

### Caption:

5 personas, 1 préstamo. Tú, ¿qué harías con 750? #SinIntereses #BelozChallenge #VoxPop

# PART 4 – Weekly Automation Agent Design (MCP-style)

We design an Al-powered automation agent that replicates this creative analysis pipeline every week. The system should:

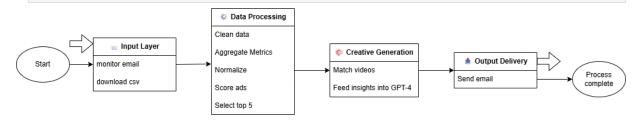
- Fetch the latest TikTok performance report via email.
- Clean, process, and score creatives.
- Identify top-performing ads and match them to existing videos.
- Use an LLM (GPT-4) to generate 3 new creative ideas.
- Email the final ideas automatically to the design team.

# System Workflow

- 1. **Email Monitoring**: Listen for incoming emails with subject "Weekly TikTok Report - {date}".
- 2. CSV Download: Extract and store the attached TikTok performance CSV.
- 3. Data Cleaning:
  - Remove total summary row.
  - Convert columns to numeric values.
  - Filter out invalid or empty records.
- 4. Aggregate Data: Group by Ad name + Text + By Day and compute averages for core metrics.
- 5. Normalize Columns: Apply Min-Max normalization to CTR, Conversions, Views, and CPC.

- 6. **Score Calculation**: Compute a performance score using a custom weighted formula.
- 7. **Top 5 Leaderboard**: Select the top 5 ranked creatives.
- 8. **Match TikToks**: Use the Text field to find matching videos from @belozmx.
- 9. **LLM Integration**: Feed insights into GPT-4 to generate 3 new TikTok ideas.
- 10. **Email Dispatch**: Send an executive-style email with the 3 proposals to alejandro@amiloz.com.

### In [6]: display(Image(filename='flowchart.png'))



# Sample Email Output (Sent by the Automation Agent)

**To:** alejandro@amiloz.mx

Subject: @ New TikTok Creative Proposals - Weekly Al Report

Hola equipo de diseño,

Esta semana, el sistema automatizado de análisis creativo ha procesado el nuevo reporte de rendimiento de TikTok y ha generado 3 ideas originales utilizando un modelo de lenguaje avanzado (GPT-4), basadas en los videos con mejor desempeño.

A continuación, las propuestas creativas:

### 1. 💰 "¿Qué harías con \$750 en 30 minutos?"

Un formato estilo vox pop en la calle, preguntando a transeúntes cómo aprovecharían un préstamo instantáneo sin intereses.

Tendencia: formatos de entrevista rápida + hashtag #AsiDeVeloz

## 

Un video estilo selfie, donde una joven comparte tips financieros útiles que culminan con usar Beloz como salvavidas.

Tendencia: educación financiera + corte casual

★ Caption: "Esto me hubiera gustado saber a los 20... #FinTips #BelozAliado"

### 3. 🧃 "¿Crédito para vender más?"

Comerciante explica cómo usó un préstamo para reabastecer mercancía y crecer su negocio. Grabado en su local.

Tendencia: contenido de emprendedores reales

★ Caption: "Lo que nadie te dice de emprender con poco capital. 
#HistoriasBeloz"

#### Referencias más efectivas (Top 5 esta semana):

- 1. Siempre puedes contar con Beloz
- 2. 3 consejos financieros que deberías saber a tus 20
- 3. Tu crédito de \$750 sin interés
- 4. ¿Qué harías con un préstamo de \$750?
- 5. ¡Beloz es tu mejor aliado financiero!

Saludos,

Beloz Al Creative Agent 🤖

# Bonus Analysis – Max vs. Mean Aggregation Methods

In our main analysis, we ranked each TikTok creative by selecting **the best-performing day** for each ad, based on the highest number of conversions. However, to ensure robustness and explore alternative evaluation criteria, we conducted a **secondary scoring strategy**: using the **mean performance across all available dates** for each ad.

# Method 1: Max-Based Scoring (Primary)

We grouped the dataset by Ad name and Text, and selected **the row with the highest number of conversions** per creative. This approach prioritizes the best possible scenario for each ad, highlighting its **peak performance** potential.

#### Pros:

- Ideal to detect what each ad is *capable of* under the best conditions.
- Useful when the focus is on discovering standout content.

#### Cons:

- Ignores underperformance or inconsistency.
- May overrepresent one-off success.

# ★ Method 2: Mean-Based Scoring (Bonus)

Here, we grouped the same creatives and calculated the **average** of each scoring metric across all available days:

- CTR (destination)
- Conversions
- Views at 50%
- CPC (destination)

We then applied the same normalization and weighting formula as before.

#### Pros:

- Reflects **overall consistency** of performance.
- Better for understanding general behavior over time.

#### Cons:

- May dilute the strength of ads that performed extremely well on certain days.
- Sensitive to outliers or periods of low traffic.

Both methods have valid use cases depending on the goal:

- If your goal is **creative discovery** and iteration, *max-based* scoring highlights top-performing ideas worth replicating or evolving.
- If your focus is **long-term campaign stability**, *mean-based* scoring reveals which creatives maintain reliable performance over time.

In this challenge, we kept the max-based method as the primary approach, but we include this mean-based version as an additional insight to showcase analytical depth and flexibility.

```
In [105... grouped_mean = mejores_anuncios.copy()
    grouped_mean = df_valid.groupby(['Ad name', 'Text']).agg({
        'CTR (destination)': 'mean',
        'Video views at 50%': 'mean',
        'CPC (destination)': 'mean'
}).reset_index()

def normalize(col):
    return (col - col.min()) / (col.max() - col.min())
```

```
grouped mean['norm ctr'] = normalize(grouped mean['CTR (destination)'])
grouped mean['norm conversions'] = normalize(grouped mean['Conversions'])
grouped mean['norm views 50'] = normalize(grouped mean['Video views at 50%']
grouped_mean['norm_cpc'] = normalize(grouped_mean['CPC (destination)']) # F
a = 0.5 \# CTR
b = 0.3 # Conversions
c = 0.2 # Views at 50%
d = 0.1 # CPC (penalización)
grouped mean['Score'] = (
   a * grouped mean['norm ctr'] +
   b * grouped mean['norm conversions'] +
   c * grouped mean['norm views 50'] -
   d * grouped mean['norm cpc']
top5 avg = grouped mean.sort values(by='Score', ascending=False).head(5)
cols to show = [
    'Ad name', 'Text', 'CTR (destination)', 'Conversions',
    'Video views at 50%', 'CPC (destination)', 'Score'
]
top5 avg[cols to show]
```

C (destinatio	Video views at 50%	Conversions	CTR (destination)	Text	Ad name	
2.2501	8.444286	0.771429	0.047649	Siempre puedes contar con Beloz.	renta	95
12.5521	4.600000	0.037500	0.046390	3 consejos financieros que deberías saber a tu	consejos financieros	68
2.2789	397.555000	35.940000	0.007469	Pediste un préstamos pero estás en buró? #fin	Ad name2025- 06-11 14:05:27	4
0.6477	0.000000	0.000000	0.035714	Todo lo que puedes llevarte por \$750! #BelozPl	compra joyas	61
3.4866	2374.994301	28.579275	0.004217	Beloz, tu mejor aliado financiero. ¡Solicita t	labial y comida	83

After applying both aggregation methods — one based on each ad's **best daily performance** and another based on its **average metrics across all available days** — we observed that **3 out of the original Top 5 creatives** still appear in the new Top 5 generated using mean-based scoring.

These recurring creatives demonstrate not only **high peak performance**, but also **strong and consistent performance over time**. Their continued presence in both rankings validates them as **reliably engaging** and **effective**, not just one-time successes. This overlap suggests that these ads are **excellent templates** for generating new creative ideas or iterations.

Using both scoring methods gives a **more complete picture** of ad performance:

- The **Max approach** helps us spot standout creative concepts.
- The **Mean approach** ensures those concepts are not outliers but actually

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