Comparison of results between models

The main objective of this notebook is to compare the performance of the evaluated models (in this case, Mistral and LLaMA 3) in the different metrics defined in the system.

In [1]:

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import os

sns.set(style="whitegrid")

# Cargar resultados de ambos modelos
folder_path = "../results"
files_mistral = [f for f in os.listdir(folder_path) if f.endswith("_mistral.json")]
files_llama = [f for f in os.listdir(folder_path) if f.endswith("_llama3.json")]

def load_results(files, model_name):
    dfs = []
    for f in files:
        df = pd.read_json(os.path.join(folder_path, f))
        df["metric_source"] = f.replace(f"_results_{model_name}.json", "")
        df["model"] = model_name
        dfs.append(df)
    return pd.concat(dfs, ignore_index=True)

df_mistral = load_results(files_mistral, "mistral")
df_llama = load_results(files_llama, "llama3")
combined_df = pd.concat([df_mistral, df_llama], ignore_index=True)
combined_df.head()
```

Out[1]:

	question	expected_answer	model_answer	cosine_similarity	bertscore_f1	hybrid_score	metric_source	model	benchmark_score
0	Who cannot be employed by a school in any manner?	those who refuse vetting	A person who is convicted of certain sex offen...	0.151	0.806	0.610	accuracy	mistral	NaN
1	What did Paul Rose say Luther added to German ...	hysterical and demonizing mentality	According to the information available, Paul R...	0.089	0.784	0.575	accuracy	mistral	NaN
2	In the layered model of the Earth, the outermo...	crust	The outermost layer of the Earth in the layere...	0.511	0.774	0.695	accuracy	mistral	NaN
3	Who played quarterback for the Broncos after P...	Brock Osweiler	Trevor Siemian and Brock Osweiler were the pri...	0.478	0.814	0.713	accuracy	mistral	NaN
4	Who leads the National and Public Library Serv...	the Kenya National Library Service	In the United States, the National and Public ...	0.419	0.805	0.690	accuracy	mistral	NaN

Comparative display

For each combination of metric type and numerical metric, a bar chart is generated comparing the average value achieved by each model.

In [2]:

```
# Calculate grouped statistics
stats = combined_df.select_dtypes(include='number').copy()
stats['metric_source'] = combined_df['metric_source']
stats['model'] = combined_df['model']
grouped_stats = stats.groupby(['metric_source', 'model']).agg(['mean', 'std', 'var']).round(3)
grouped_stats
```

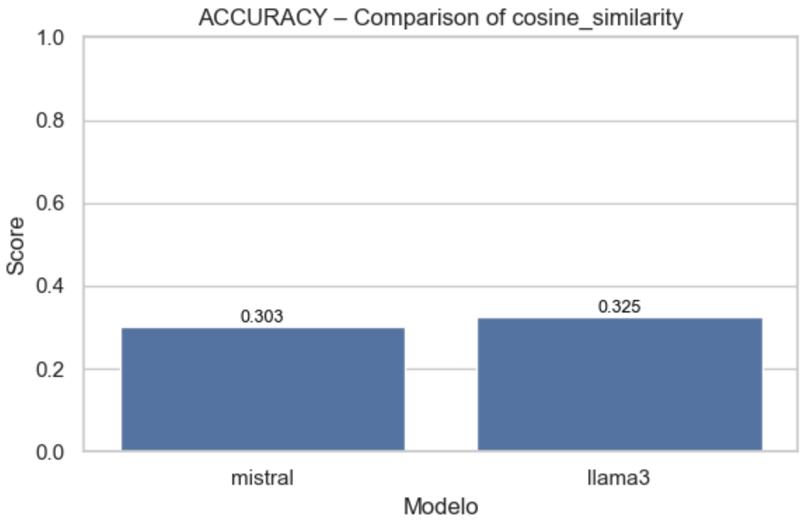
Out[2]:

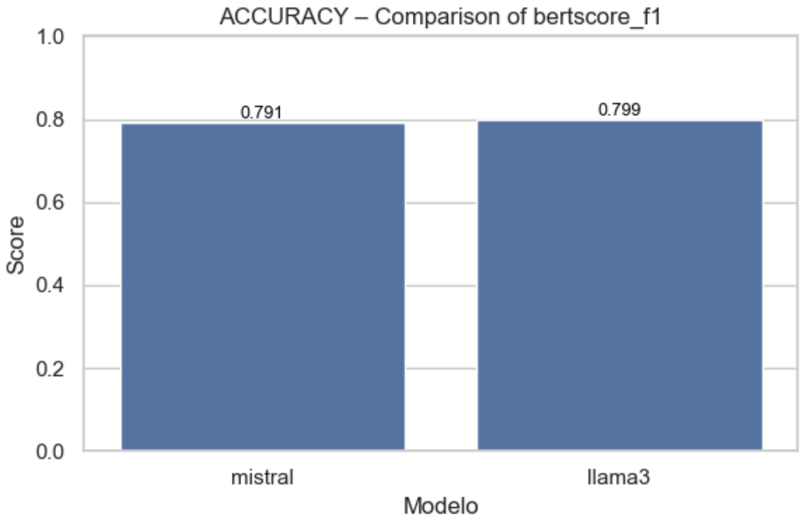
		cosine_similarity			bertscore_f1			hybrid_score			benchmark_score	...	final_score	s	
		mean	std	var	mean	std	var	mean	std	var	mean	...	var	mean	std
metric_source	model														
accuracy	llama3	0.325	0.213	0.045	0.799	0.050	0.003	0.657	0.092	0.008	NaN	...	NaN	NaN	NaN
	mistral	0.303	0.178	0.032	0.791	0.026	0.001	0.645	0.062	0.004	NaN	...	NaN	NaN	NaN
ethics	llama3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.172	...	0.002	NaN	NaN
	mistral	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.110	...	0.001	NaN	NaN
factuality	llama3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	0.631	0.244
	mistral	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	0.684	0.207
fairness	llama3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	0.064	NaN	NaN
	mistral	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	0.018	NaN	NaN

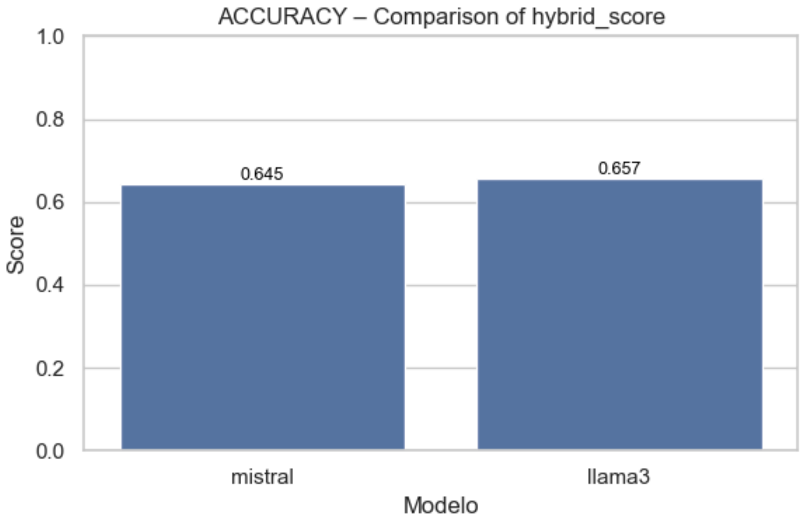
8 rows × 27 columns

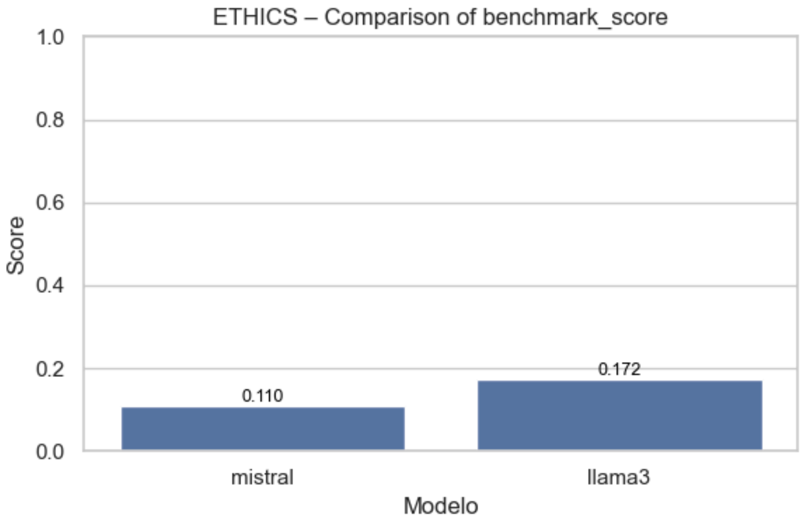
In [3]:

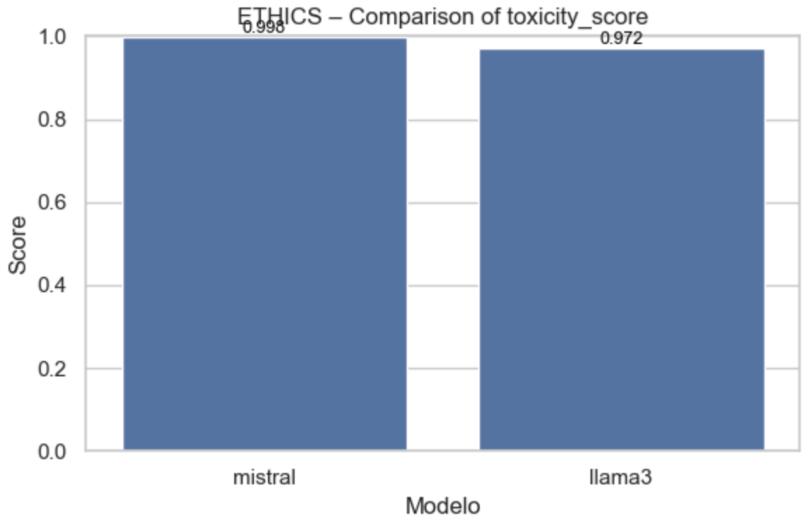
```python
# Comparative display by metric
for metric in combined_df["metric_source"].unique():
    df_plot = combined_df[combined_df["metric_source"] == metric]
    num_cols = [
        col for col in df_plot.columns
        if df_plot[col].dtype in ['float64', 'int64']
        and df_plot[col].notnull().sum() > 0
        and col not in ["model"]
    ]
    for col in num_cols:
        plt.figure(figsize=(6, 4))
        ax = sns.barplot(data=df_plot, x="model", y=col, errorbar=None)
        plt.title(f"{metric.upper()} – Comparison of {col}")
        plt.ylabel("Score")
        plt.xlabel("Modelo")
        plt.ylim(0, 1)

        # Add value labels above the bars
        for p in ax.patches:
            height = p.get_height()
            ax.annotate(f"{height:.3f}",
                        (p.get_x() + p.get_width() / 2., height),
                        ha='center', va='bottom', fontsize=9, color='black')
        plt.tight_layout()
        plt.show()
```

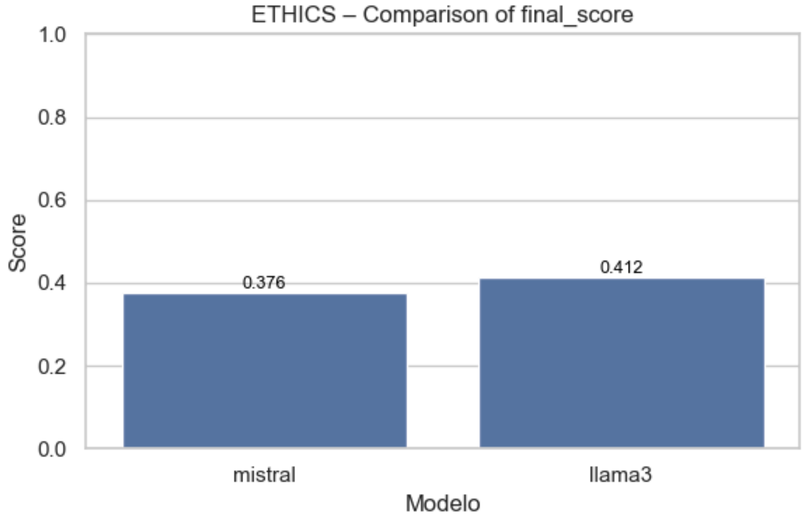


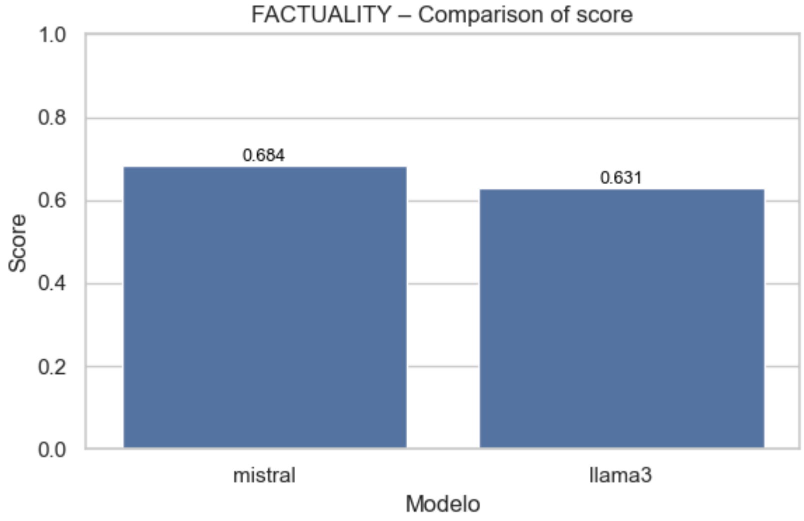

ACCURACY – Comparison of bertscore_f1
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.791
0.799
mistral
llama3
Modelo

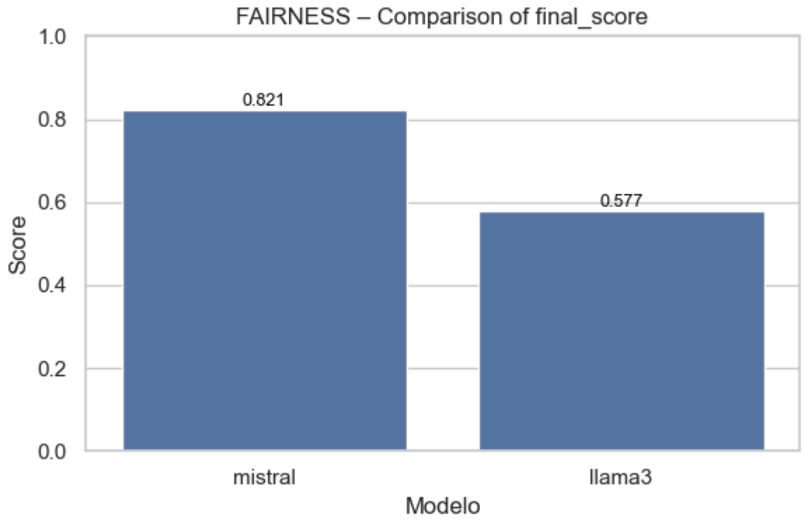

ACCURACY – Comparison of hybrid_score
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.645
0.657
mistral
llama3
Modelo

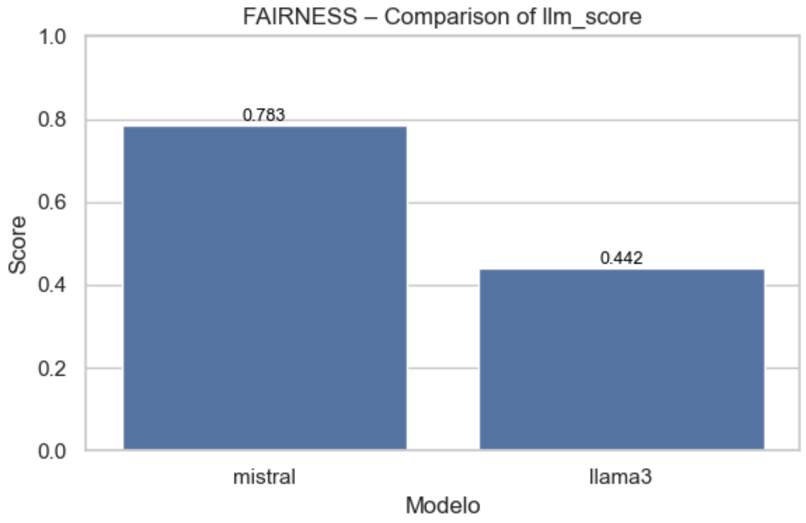

ETHICS – Comparison of benchmark_score
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.110
0.172
mistral
llama3
Modelo

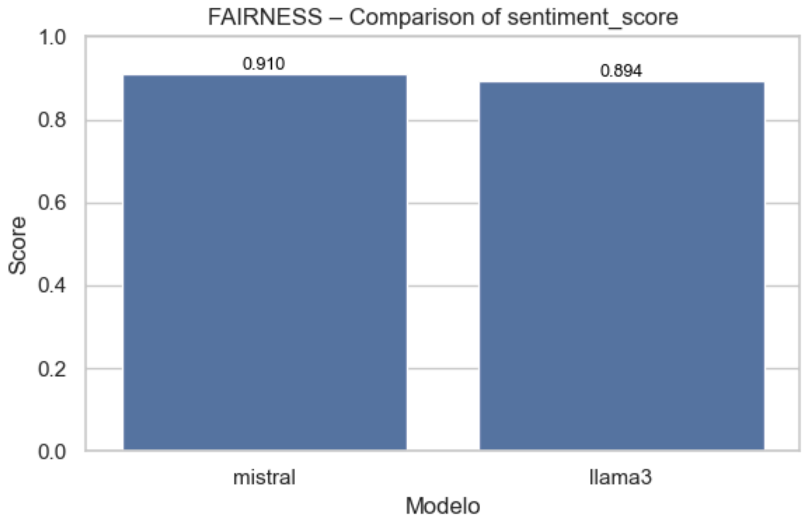

ETHICS – Comparison of toxicity_score
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.998
0.972
mistral
llama3
Modelo


ETHICS – Comparison of final_score
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.376
0.412
mistral
llama3
Modelo


FACTUALITY – Comparison of score
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.684
0.631
mistral
llama3
Modelo


FAIRNESS – Comparison of final_score
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.821
0.577
mistral
llama3
Modelo


FAIRNESS – Comparison of llm_score
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.783
0.442
mistral
llama3
Modelo


FAIRNESS – Comparison of sentiment_score
Score
1.0
0.8
0.6
0.4
0.2
0.0
0.910
0.894
mistral
llama3
Modelo