05_analisis_datos

October 27, 2025

[ ]:
```
# Analizar data/processed para validar el corpus y orientar features.
# Entradas: sentences.jsonl por nivel y split.
# Salidas: tablas CSV y figuras en reports/.
```

Imports y config

[1]:
```
from pathlib import Path
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

pd.set_option("display.max_colwidth", 120)
SEED = 42
```

Rutas

[2]:
```
def find_root():
    p = Path.cwd()
    for cand in [p, *p.parents]:
        if (cand / "data" / "processed").exists():
            return cand
    raise FileNotFoundError("No encuentro data/processed.")

ROOT = find_root()
PROC = ROOT / "data" / "processed"
REPORTS = ROOT / "reports"
REPORTS.mkdir(parents=True, exist_ok=True)

NIVELES = ["easy","medium","hard"]
SPLITS = ["train","validation"]
```

Carga de processed

[3]:
```
dfs = []
for level in NIVELES:
    for split in SPLITS:
        p = PROC / level / split / "sentences.jsonl"
        if not p.exists():
            continue
        df = pd.read_json(p, lines=True)
        df["level"] = level
        df["split"] = split
        dfs.append(df)

df = pd.concat(dfs, ignore_index=True)
df["n_tokens"] = df["n_tokens"].astype(int)
df["sent_id"] = df["sent_id"].astype(int)
df["is_boundary"] = df["is_boundary"].astype(bool)
display(df.head())
print("Frases cargadas:", len(df))
```

```
        doc_id  sent_id level  split  \
0  problem-1734        0  easy  train
1  problem-1734        1  easy  train
2  problem-1734        2  easy  train
3  problem-1734        3  easy  train
4  problem-1734        4  easy  train

                                                                                  ␣
 ↪                                text_norm  \
0            i learned this about ukraine a while back and i think it was mila␣
 ↪kunis who said it and i knew about it since
1                                                 it s easy for some to make the␣
 ↪mistake as back then i had no idea either
2                                                             but when ppl see␣
 ↪others say it the respectfully correct them
3  it s an offensive way to refer to ukraine and is an old soviet term and␣
 ↪minimizes the legitimacy of them being a fre…
4                          similar to how ppl correct others when they use the␣
 ↪russian soviet spelling of kyiv and say kiev

  n_tokens  is_boundary
0        24        False
1        17        False
2        11        False
3        30        False
4        18        False

Frases cargadas: 208160
```

Métricas base

[4]:
```
res_base = (
    df.groupby(["level","split"]).agg(
        n_frases=("sent_id","count"),
        med_tokens_frase=("n_tokens","median"),
        p25_tokens=("n_tokens", lambda s: s.quantile(0.25)),
        p75_tokens=("n_tokens", lambda s: s.quantile(0.75)),
    ).reset_index()
)
display(res_base)
res_base.to_csv(REPORTS / "05_base_por_nivel_split.csv", index=False)
```

```
    level       split  n_frases  med_tokens_frase  p25_tokens  p75_tokens
0    easy       train     52701              13.0         7.0        23.0
1    easy  validation     11146              13.0         8.0        23.0
2    hard       train     55515              17.0        10.0        26.0
3    hard  validation     11649              18.0        10.0        26.0
4  medium       train     63386              16.0         9.0        26.0
5  medium  validation     13763              16.0         9.0        26.0
```

Métricas por documento

[5]:
```
por_doc = (
    df.groupby(["level","split","doc_id"]).agg(
        n_frases=("sent_id","count"),
        tokens_doc=("n_tokens","sum"),
        med_tokens_frase=("n_tokens","median"),
    ).reset_index()
)
display(por_doc.head())
por_doc.to_csv(REPORTS / "05_por_documento.csv", index=False)

res_doc = (
    por_doc.groupby(["level","split"]).agg(
        med_frases_doc=("n_frases","median"),
        p25_frases_doc=("n_frases", lambda s: s.quantile(0.25)),
        p75_frases_doc=("n_frases", lambda s: s.quantile(0.75)),
        med_tokens_doc=("tokens_doc","median"),
    ).reset_index()
)
display(res_doc)
res_doc.to_csv(REPORTS / "05_resumen_por_documento.csv", index=False)
```

```
  level  split        doc_id  n_frases  tokens_doc  med_tokens_frase
0  easy  train     problem-1        18         309              15.5
1  easy  train    problem-10        13         169               9.0
2  easy  train   problem-100         7         209              25.0
3  easy  train  problem-1000        18         282              12.0
4  easy  train  problem-1001        17         302              15.0
```

```
    level       split  med_frases_doc  p25_frases_doc  p75_frases_doc  \
0    easy       train            12.0            10.0           15.00
1    easy  validation            12.0            10.0           14.00
2    hard       train            12.0            10.0           16.00
3    hard  validation            12.0            10.0           15.00
4  medium       train            13.0            10.0           16.00
```

```
5  medium  validation            13.0            10.0           16.25

   med_tokens_doc
0           202.0
1           202.0
2           232.0
3           231.0
4           216.0
5           216.0
```

Fronteras

[6]:
```python
tiene_fronteras = bool(df["is_boundary"].any())
print("Hay fronteras anotadas:", tiene_fronteras)

if tiene_fronteras:
    por_doc_b = (
        df.groupby(["level","split","doc_id"]).agg(
            n_fr=("sent_id","count"),
            n_b=("is_boundary","sum"),
        ).reset_index()
    )
    por_doc_b["densidad_frontera"] = por_doc_b["n_b"] / por_doc_b["n_fr"].
  ↪replace(0, np.nan)
    res_b = por_doc_b.groupby(["level","split"]).agg(
        med_dens=("densidad_frontera","median")
    ).reset_index()
    display(res_b)
    por_doc_b.to_csv(REPORTS / "05_fronteras_por_documento.csv", index=False)
    res_b.to_csv(REPORTS / "05_fronteras_resumen.csv", index=False)
```

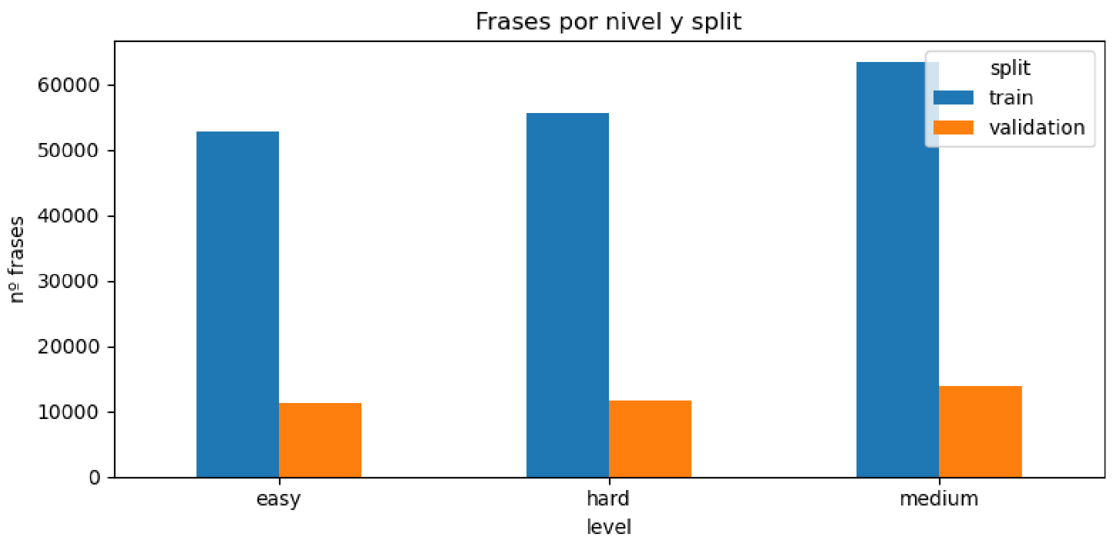
```
Hay fronteras anotadas: False
```

EXPLICACION

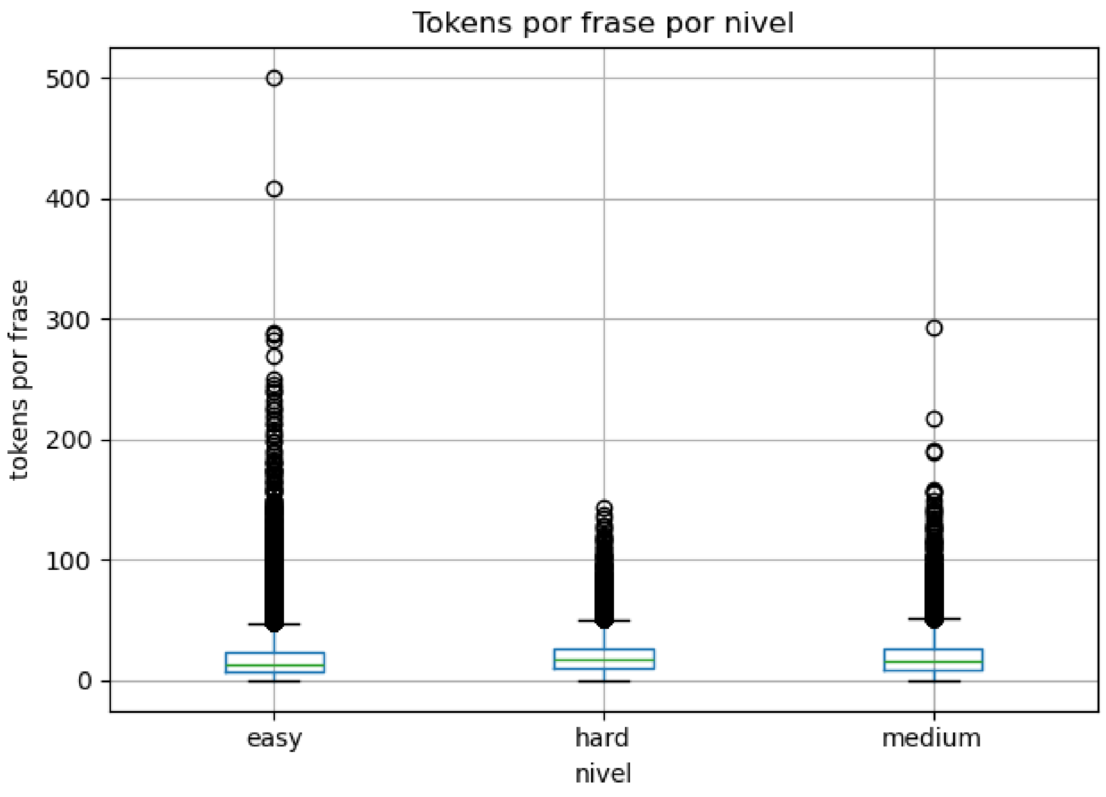
Plots

[7]:
```python
# 8.1 Frases por nivel y split
cnt = df.groupby(["level","split"])["sent_id"].count().
  ↪reset_index(name="n_frases")
pv = cnt.pivot(index="level", columns="split", values="n_frases").fillna(0)
ax = pv.plot(kind="bar", rot=0, figsize=(8,4))
ax.set_ylabel("nº frases")
ax.set_title("Frases por nivel y split")
plt.tight_layout()
plt.savefig(REPORTS / "05_frases_por_nivel_split.png", dpi=150)
plt.show()

# 8.2 Boxplot tokens por frase
plt.figure(figsize=(8,4))
```

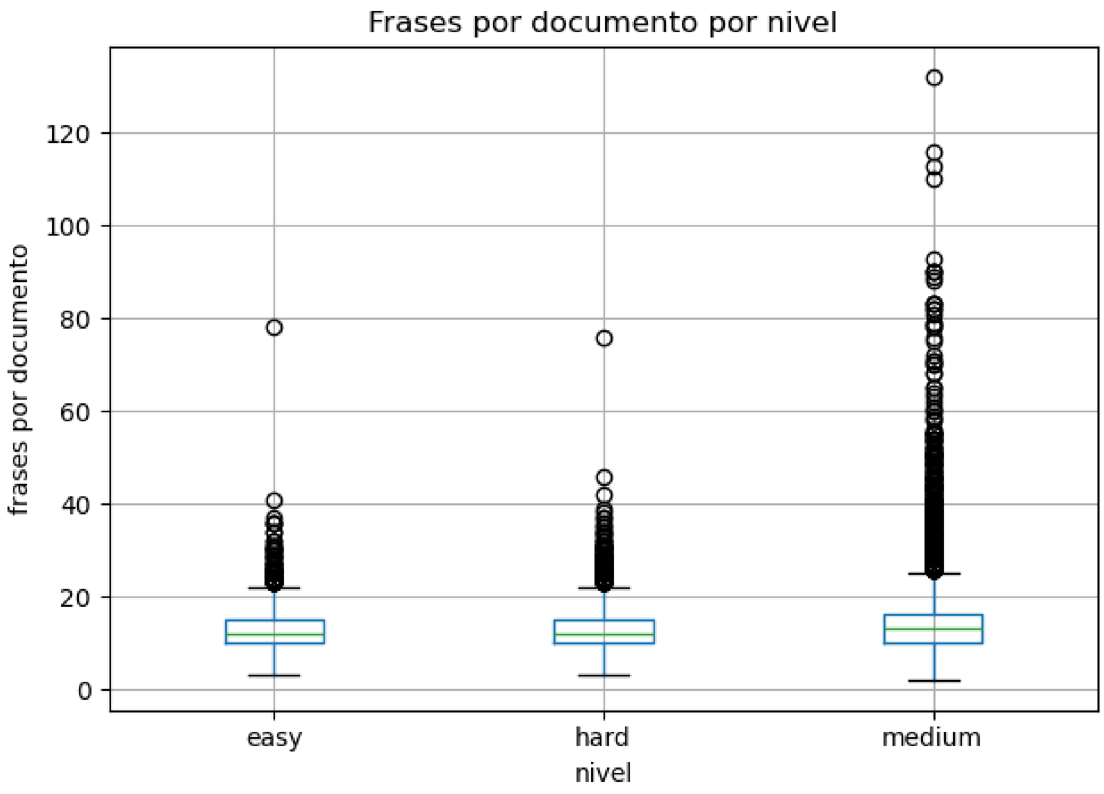
```python
df.boxplot(column="n_tokens", by="level")
plt.suptitle("")
plt.title("Tokens por frase por nivel")
plt.xlabel("nivel")
plt.ylabel("tokens por frase")
plt.tight_layout()
plt.savefig(REPORTS / "05_box_tokens_por_frase.png", dpi=150)
plt.show()

# 8.3 Boxplot frases por documento
plt.figure(figsize=(8,4))
por_doc.boxplot(column="n_frases", by="level")
plt.suptitle("")
plt.title("Frases por documento por nivel")
plt.xlabel("nivel")
plt.ylabel("frases por documento")
plt.tight_layout()
plt.savefig(REPORTS / "05_box_frases_por_documento.png", dpi=150)
plt.show()

# 8.4 Histograma tokens por frase
plt.figure(figsize=(7,4))
df["n_tokens"].hist(bins=50)
plt.xlabel("tokens por frase")
plt.ylabel("frecuencia")
plt.title("Distribución de tokens por frase")
plt.tight_layout()
plt.savefig(REPORTS / "05_hist_tokens_por_frase.png", dpi=150)
plt.show()

# 8.5 Densidad de fronteras si aplica
if tiene_fronteras:
    plt.figure(figsize=(7,4))
    por_doc_b["densidad_frontera"].dropna().hist(bins=40)
    plt.xlabel("fronteras / frases")
    plt.ylabel("frecuencia")
    plt.title("Densidad de fronteras por documento")
    plt.tight_layout()
    plt.savefig(REPORTS / "05_hist_densidad_fronteras.png", dpi=150)
    plt.show()
```

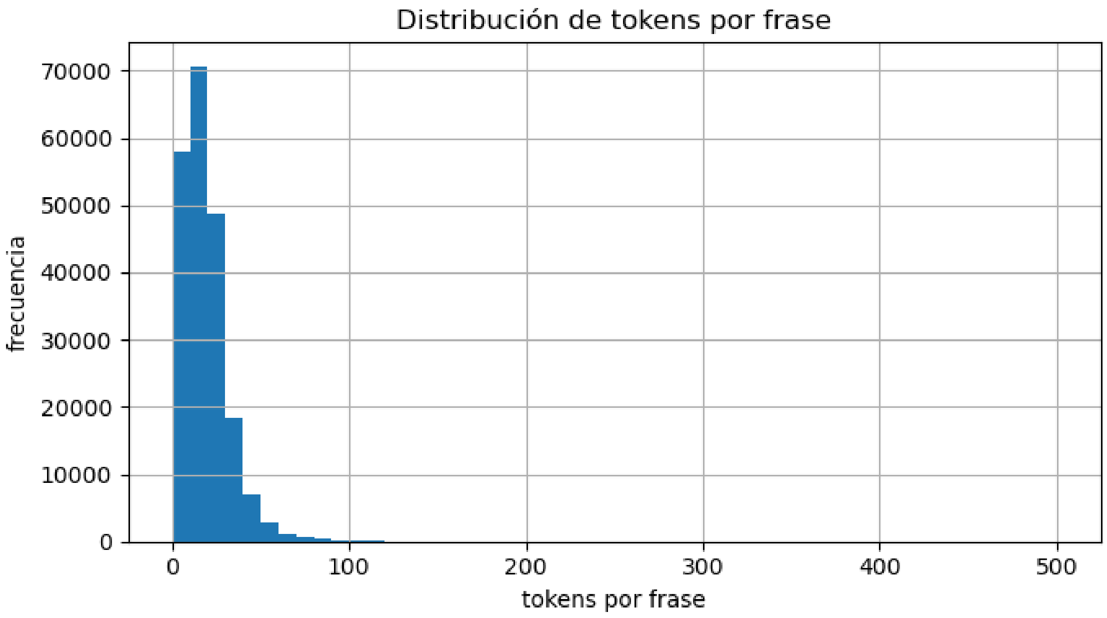

Frases por nivel y split
nº frases
60000
50000
40000
30000
20000
10000
0
split
train
validation
easy
hard
medium
level

```
<Figure size 800x400 with 0 Axes>
```


Tokens por frase por nivel
tokens por frase
500
400
300
200
100
0
easy
hard
medium
nivel

```
<Figure size 800x400 with 0 Axes>
```


Frases por documento por nivel
frases por documento
0
20
40
60
80
100
120
easy
hard
medium
nivel


Distribución de tokens por frase
frecuencia
0
10000
20000
30000
40000
50000
60000
70000
0
100
200
300
400
500
tokens por frase