study

June 29, 2023

1 Language detection showdown

[ ]:
```
import pandas as pd

df_lingua = pd.read_csv('./lingua-poc/detected.csv')
df_langdetect = pd.read_csv('./langdetect-poc/detected.csv')
df_fasttext = pd.read_csv('./fasttext-poc/detected.csv')

def F(x):
    return "{:.3f}".format(x)
```

1.1 Dataset

[ ]:
```
df_lang = df_lingua.groupby(['truth']).count()
df_lang.drop(columns=['detected'])
```

[ ]:

truth	match
ar	536
da	428
de	470
el	365
en	1385
es	819
fr	1014
hi	63
it	698
kn	369
ml	594
nl	546
pt	739
ru	692
sv	676
ta	469
tr	474

1.2 Lingua

- Link: https://github.com/pemistahl/lingua
- Language: Java

[ ]:
```
df1 = df_lingua.groupby(['truth', 'match']).agg('count')
df1['perc'] = df1['detected'] / df_lang['detected'] * 100
df_lingua_agg = df1.reset_index().query('match == "Y"').set_index('truth')
df_lingua_agg
```

[ ]:

truth	match	detected	perc
ar	Y	534	99.626866
da	Y	417	97.429907
de	Y	469	99.787234
el	Y	364	99.726027
en	Y	1375	99.277978
es	Y	794	96.947497
fr	Y	1005	99.112426
hi	Y	63	100.000000
it	Y	684	97.994269
nl	Y	539	98.717949
pt	Y	728	98.511502
ru	Y	688	99.421965
sv	Y	671	99.260355
ta	Y	469	100.000000
tr	Y	469	98.945148

[ ]:
```
df_l1 = df_lingua.query('truth != "kn" and truth != "ml"')
TP = len(df_l1.query('match == "Y"'))
FP = len(df_l1.query('match == "N"'))
FN = len(df_l1.query('detected == "none"'))
TOT = len(df_l1)

print("TP:", TP, "FP:", FP, "FN:", FN, "TOT:", TOT)
print("Accuracy:", F(TP / TOT), "Precision:", F(TP / (TP + FP)), "Recall:",␣
↪F(TP / (TP + FN)))
```

```
TP: 9269 FP: 105 FN: 5 TOT: 9374
Accuracy: 0.989 Precision: 0.989 Recall: 0.999
```

1.3 Langdetect

- Link: https://pypi.org/project/langdetect/
- Language: Python

[ ]:
```
df_langdetect['detected'].fillna('none', inplace = True)

df3 = df_langdetect.groupby(['truth', 'match']).agg('count')
```

```
df3['perc'] = df3['detected'] / df_lang['detected'] * 100
df_langdetect_agg = df3.reset_index().query('match == "Y"').set_index('truth')

df_langdetect_agg
```

[ ]:

truth	match	detected	perc
ar	Y	533	99.440299
da	Y	362	84.579439
de	Y	448	95.319149
el	Y	365	100.000000
en	Y	1331	96.101083
es	Y	758	92.551893
fr	Y	982	96.844181
hi	Y	62	98.412698
it	Y	668	95.702006
kn	Y	369	100.000000
ml	Y	593	99.831650
nl	Y	473	86.630037
pt	Y	709	95.940460
ru	Y	656	94.797688
sv	Y	641	94.822485
ta	Y	469	100.000000
tr	Y	455	95.991561

[ ]:
```
TP = len(df_langdetect.query('match == "Y"'))
FP = len(df_langdetect.query('match == "N"'))
FN = len(df_langdetect.query('detected == "none"'))
TOT = len(df_fasttext)

print("TP:", TP, "FP:", FP, "FN:", FN, "TOT:", len(df_fasttext))

print("Accuracy:", F(TP / TOT), "Precision:", F(TP / (TP + FP)), "Recall:",␣
↪F(TP / (TP + FN)))
```

```
TP: 9874 FP: 463 FN: 5 TOT: 10337
Accuracy: 0.955 Precision: 0.955 Recall: 0.999
```

1.4 Fasttext

- Link: https://fasttext.cc/ + https://github.com/vunb/node-fasttext
- Language: JS

[ ]:
```
df3 = df_fasttext.groupby(['truth', 'match']).agg('count')
del df3['precision']

df3['perc'] = df3['detected'] / df_lang['detected'] * 100
df_fasttext_agg = df3.reset_index().query('match == "Y"').set_index('truth')
```

```
df_fasttext_agg
```

[ ]:

truth	match	detected	perc
ar	Y	532	99.253731
da	Y	386	90.186916
de	Y	465	98.936170
el	Y	365	100.000000
en	Y	1381	99.711191
es	Y	809	98.778999
fr	Y	1009	99.506903
hi	Y	63	100.000000
it	Y	689	98.710602
kn	Y	369	100.000000
ml	Y	594	100.000000
nl	Y	529	96.886447
pt	Y	728	98.511502
ru	Y	689	99.566474
sv	Y	655	96.893491
ta	Y	469	100.000000
tr	Y	470	99.156118

[ ]:
```
TP = len(df_fasttext.query('match == "Y"'))
FP = len(df_fasttext.query('match == "N"'))
FN = len(df_fasttext.query('detected == "none"'))
TOT = len(df_fasttext)

print("TP:", TP, "FP:", FP, "FN:", FN, "TOT:", len(df_fasttext))

print("Accuracy:", F(TP / TOT), "Precision:", F(TP / (TP + FP)), "Recall:",␣
 ↪F(TP / (TP + FN)))
```

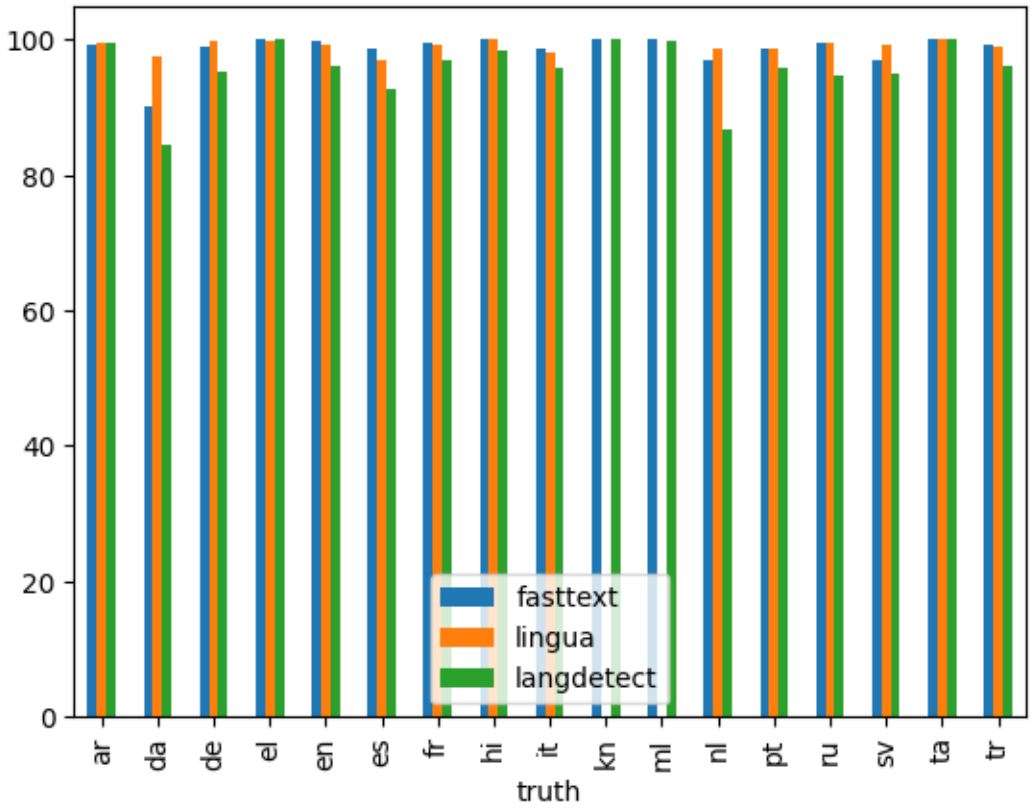
```
TP: 10202 FP: 135 FN: 0 TOT: 10337
Accuracy: 0.987 Precision: 0.987 Recall: 1.000
```

1.5 Accuracy comparison

[ ]:
```
df_all = df_lang.copy()
df_all['lingua'] = df_lingua_agg['perc']
df_all['fasttext'] = df_fasttext_agg['perc']
df_all['langdetect'] = df_langdetect_agg['perc']

df_all.plot.bar(y=['fasttext', 'lingua', 'langdetect'])
```

[ ]:
```
<Axes: xlabel='truth'>
```


100
80
60
40
20
0
fasttext
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langdetect
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el
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es
fr
hi
it
kn
ml
nl
pt
ru
sv
ta
tr
truth