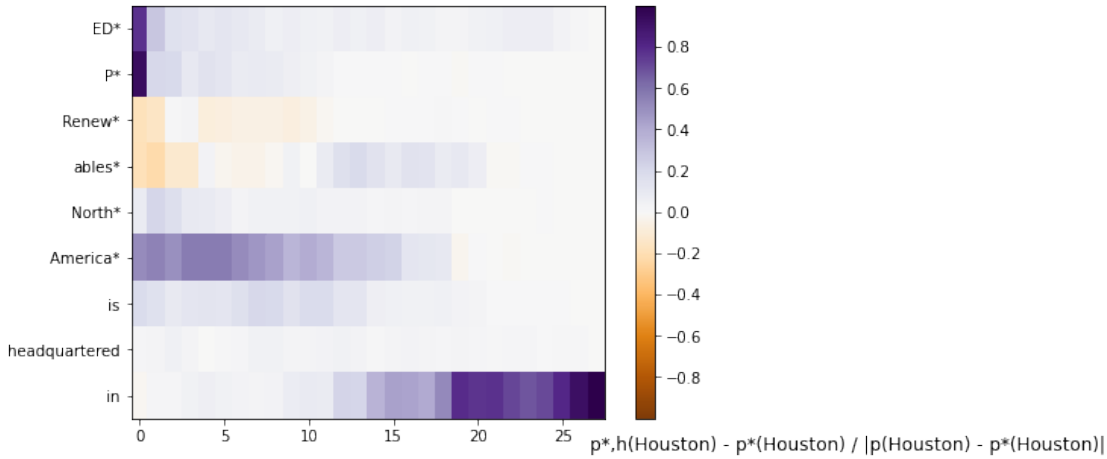
[analysis]_percent_improvement_examples

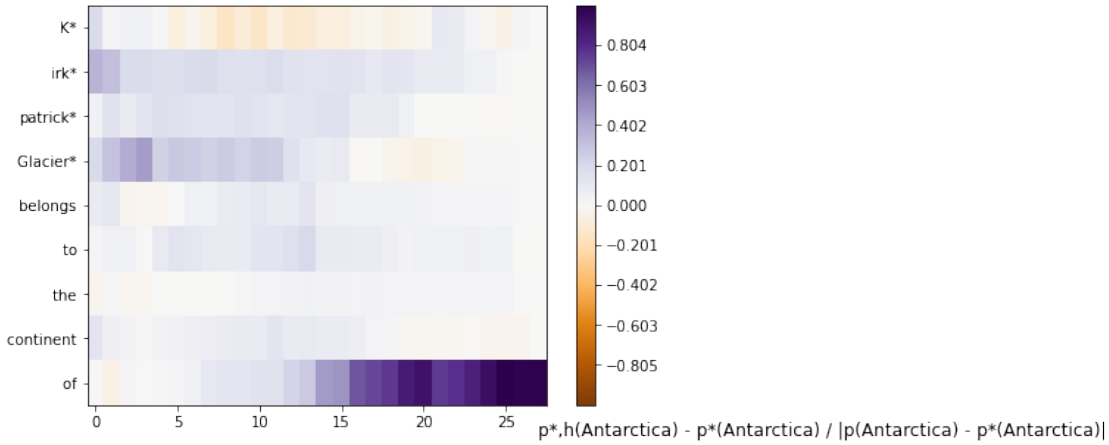
June 27, 2022

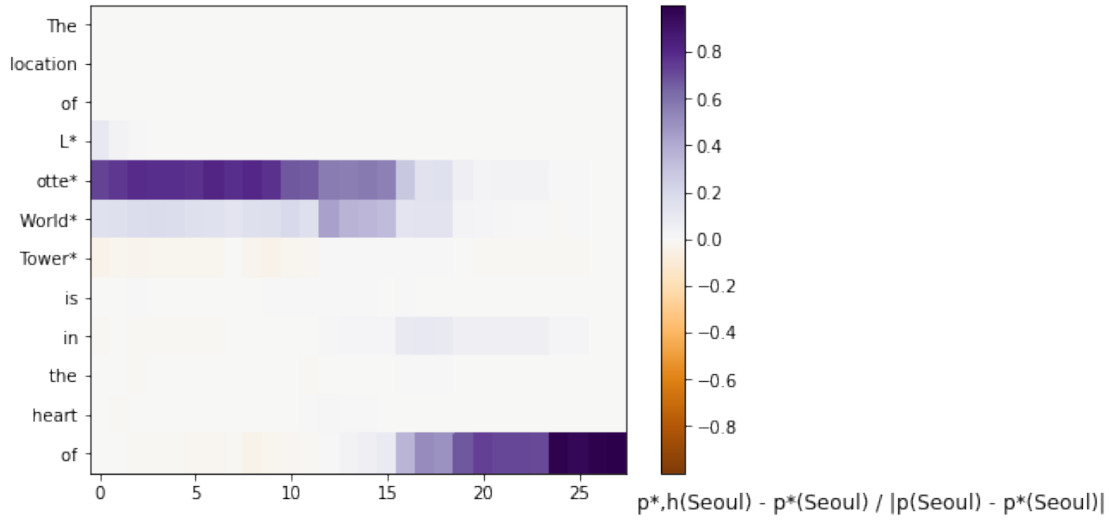
[6]:
```
import torch
import random

import sys
sys.path.append("../../../lib")
import utility
```

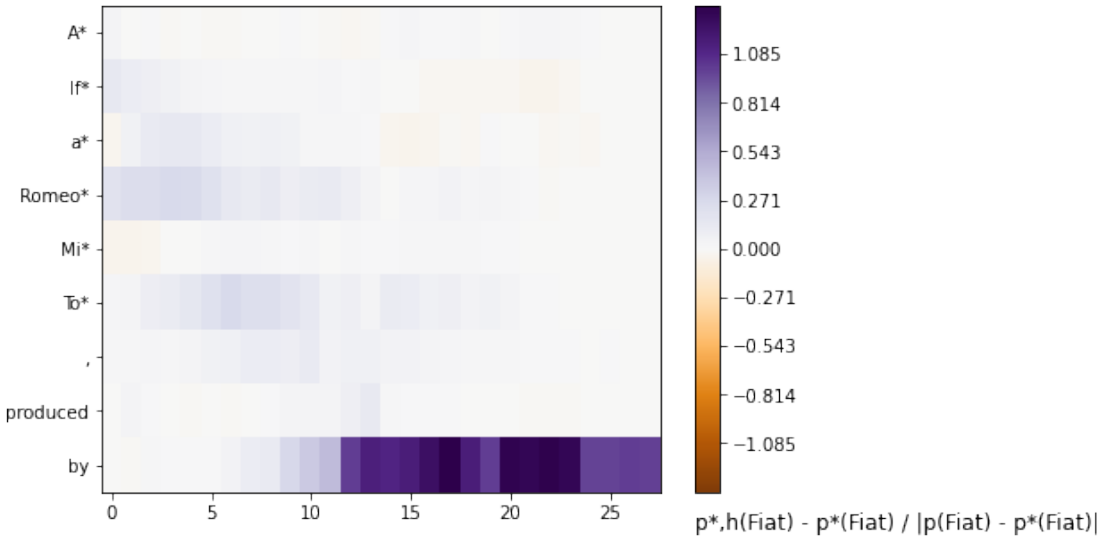
[7]:
```
res = torch.load("../../data/gpt-j/percent_improvement_1000_examples.pt")
res = random.sample(res, 100)
```

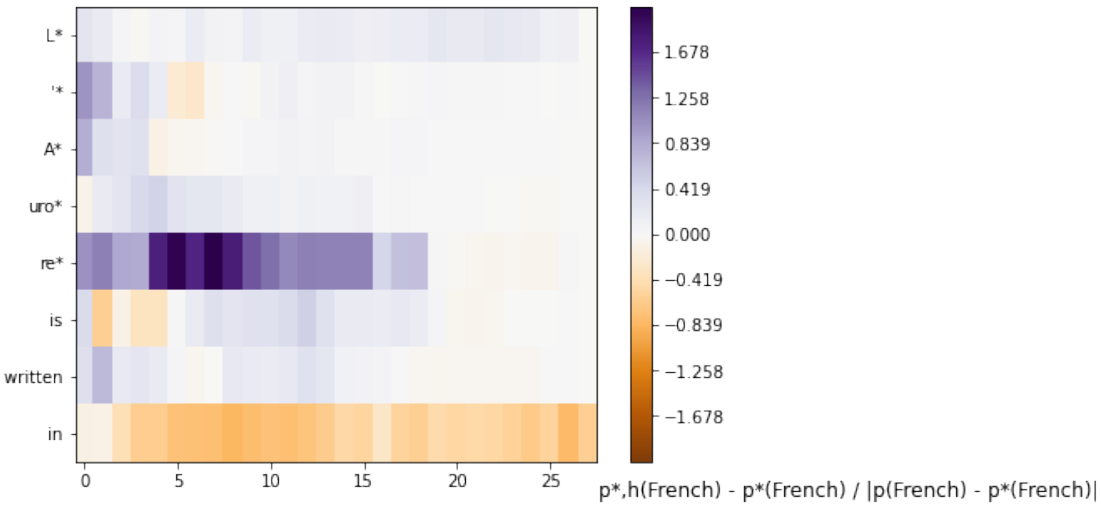
[8]:
```
# no cutoff applied
for prob, access in res:
    text, tkens, num_layers, _, _ = access
    x = num_layers
    y = tkens
    c = 0.001
    bound = max(torch.max(prob).item(), abs(torch.min(prob).item()), c)
    incr = bound / 10000
    token = text.split()[-1]
    title = f"p*,h({token}) - p*({token}) / |p({token}) - p*({token})|"
    color_schema = "PuOr"

    utility.plot_results(prob, x, y, -bound, bound, incr, title, color_schema)
```

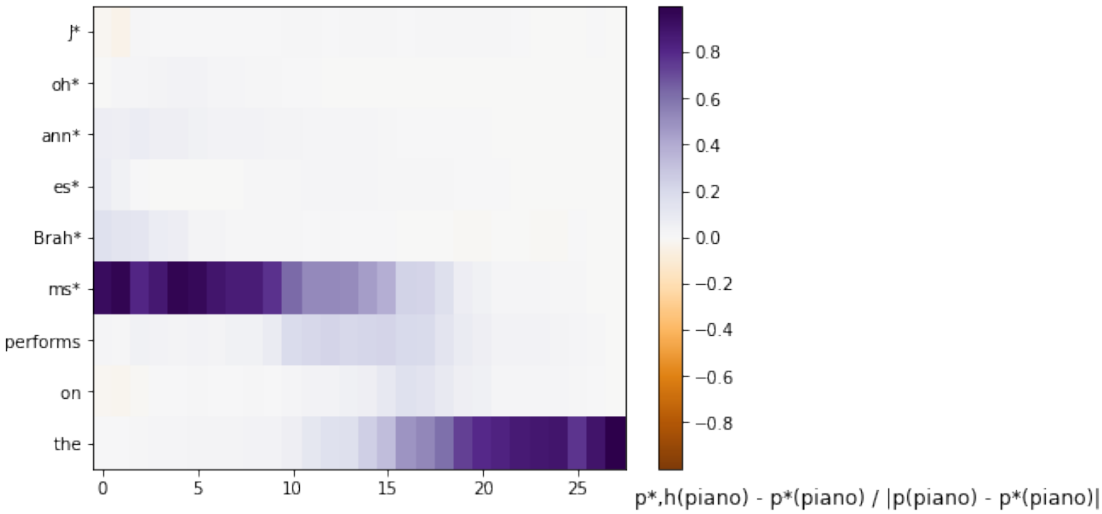


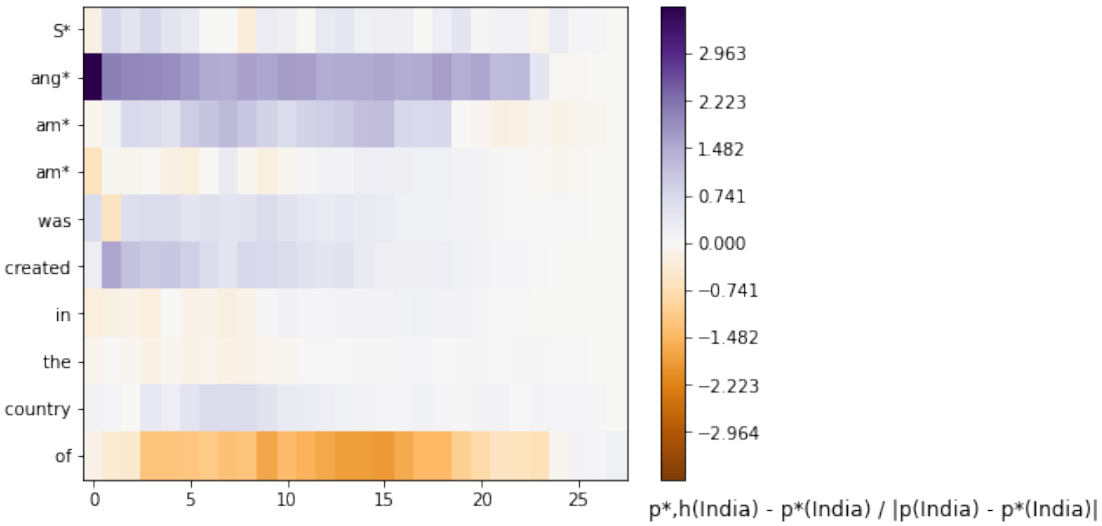

K*
irk*
patrick*
Glacier*
belongs
to
the
continent
of
0
5
10
15
20
25
0.804
0.603
0.402
0.201
0.000
−0.201
−0.402
−0.603
−0.805
p*,h(Antarctica) - p*(Antarctica) / |p(Antarctica) - p*(Antarctica)|

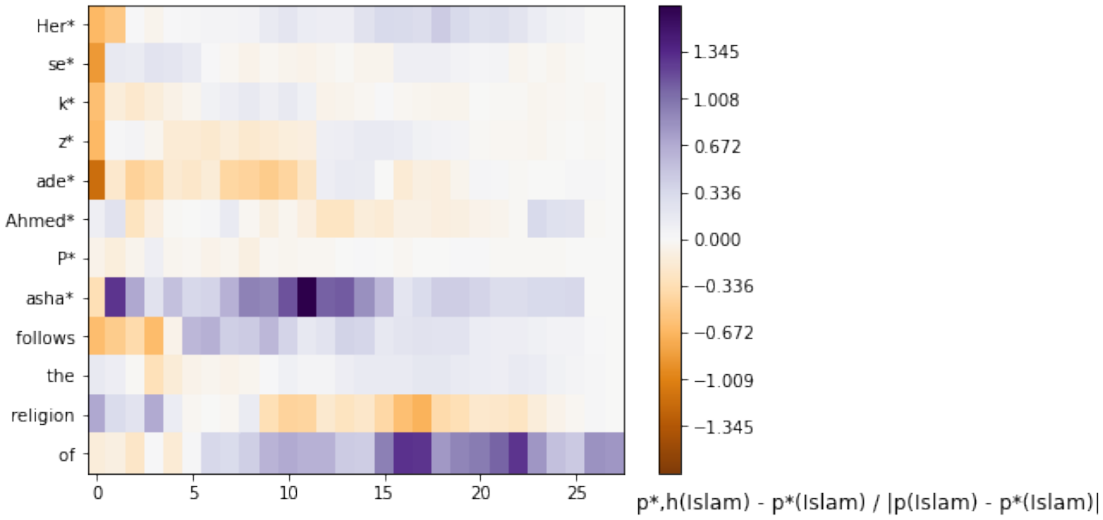

The
location
of
L*
otte*
World*
Tower*
is
in
the
heart
of
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Seoul) - p*(Seoul) / |p(Seoul) - p*(Seoul)|

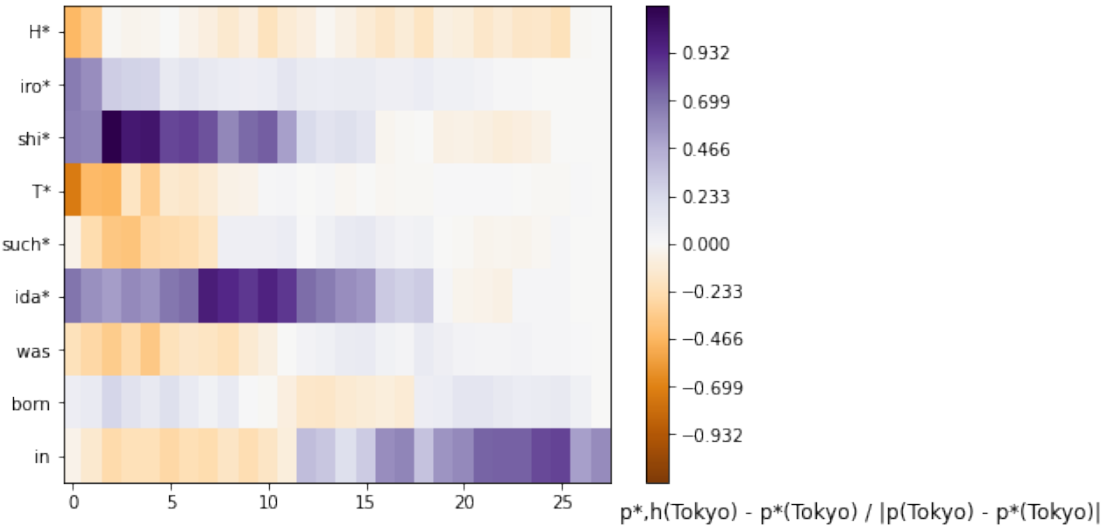

A*
If*
a*
Romeo*
Mi*
To*
,
produced
by
0
5
10
15
20
25
1.085
0.814
0.543
0.271
0.000
−0.271
−0.543
−0.814
−1.085
p*,h(Fiat) - p*(Fiat) / |p(Fiat) - p*(Fiat)|

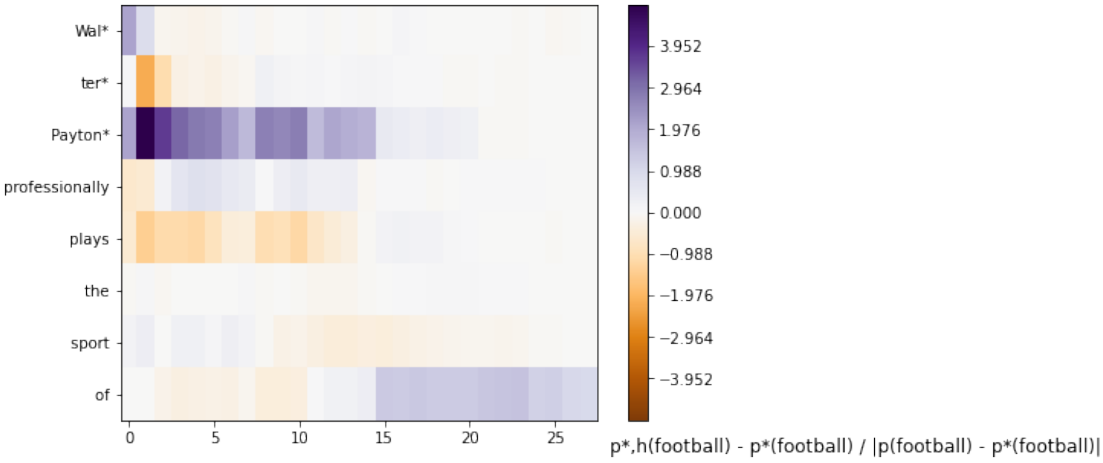

L*
'*
A*
uro*
re*
is
written
in
0
5
10
15
20
25
1.678
1.258
0.839
0.419
0.000
−0.419
−0.839
−1.258
−1.678
p*,h(French) - p*(French) / |p(French) - p*(French)|

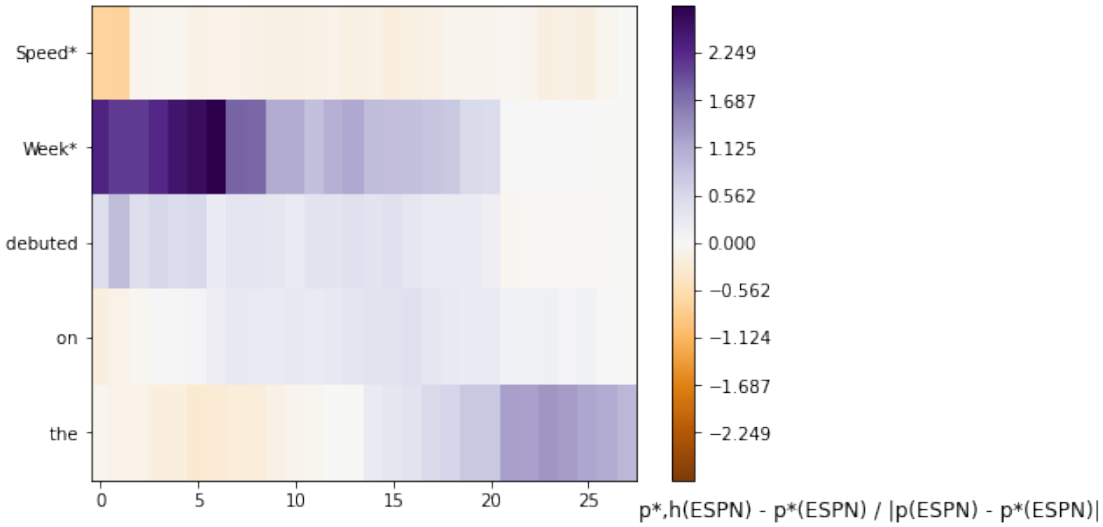

J*
oh*
ann*
es*
Brah*
ms*
performs
on
the
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(piano) - p*(piano) / |p(piano) - p*(piano)|

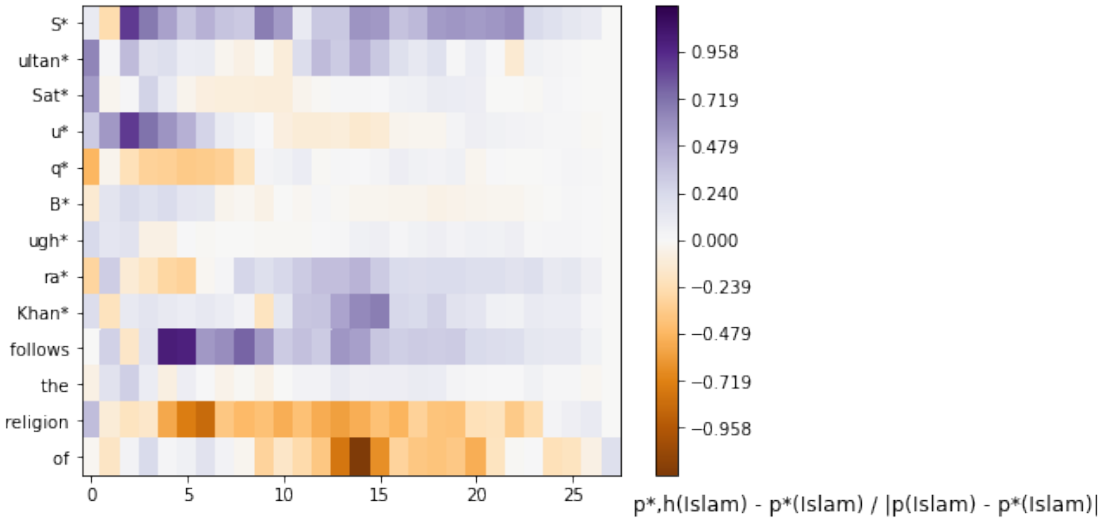

S*
ang*
am*
am*
was
created
in
the
country
of
0
5
10
15
20
25
2.963
2.223
1.482
0.741
0.000
−0.741
−1.482
−2.223
−2.964
p*,h(India) - p*(India) / |p(India) - p*(India)|

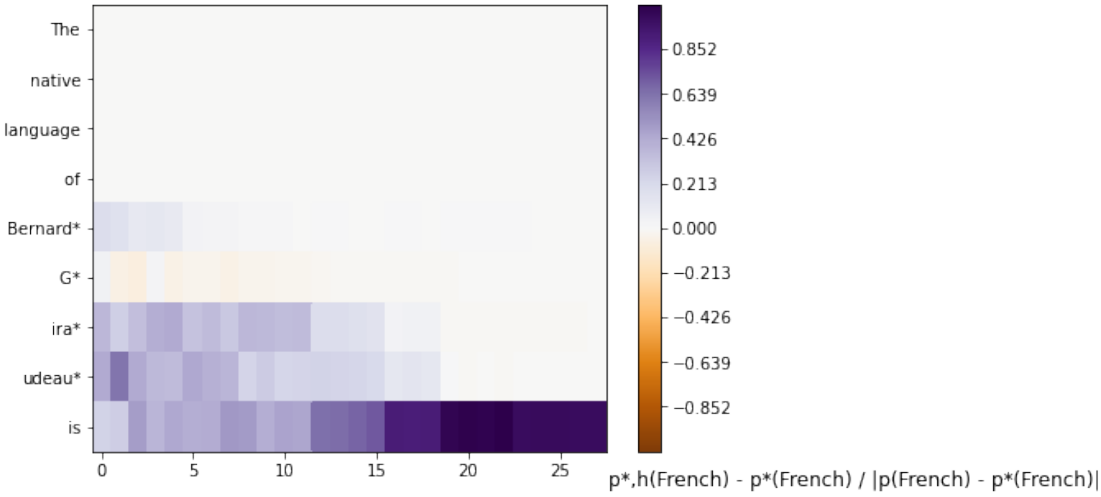

Her*
se*
k*
z*
ade*
Ahmed*
P*
asha*
follows
the
religion
of
0
5
10
15
20
25
1.345
1.008
0.672
0.336
0.000
−0.336
−0.672
−1.009
−1.345
p*,h(Islam) - p*(Islam) / |p(Islam) - p*(Islam)|

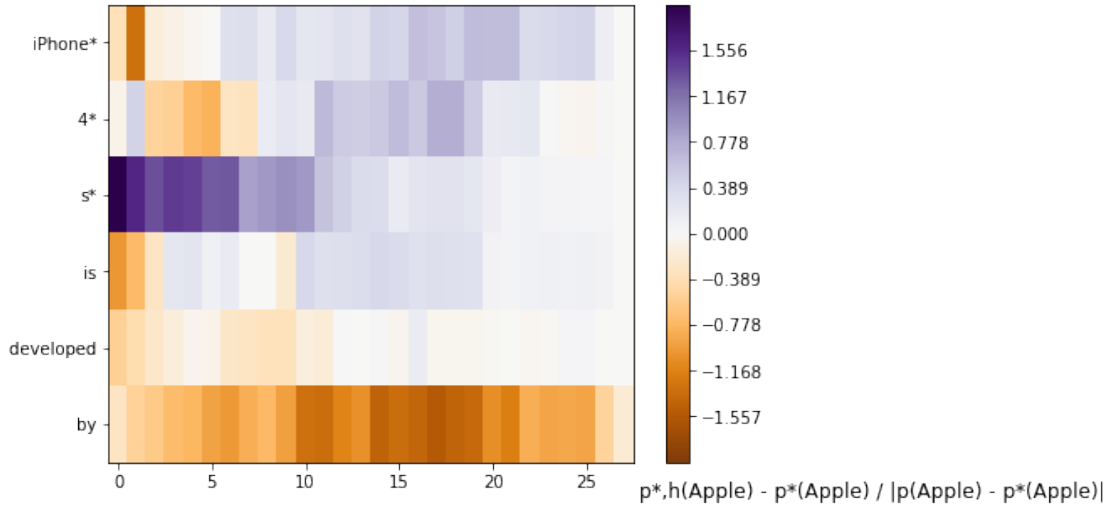

H*
iro*
shi*
T*
such*
ida*
was
born
in
0
5
10
15
20
25
0.932
0.699
0.466
0.233
0.000
−0.233
−0.466
−0.699
−0.932
p*,h(Tokyo) - p*(Tokyo) / |p(Tokyo) - p*(Tokyo)|

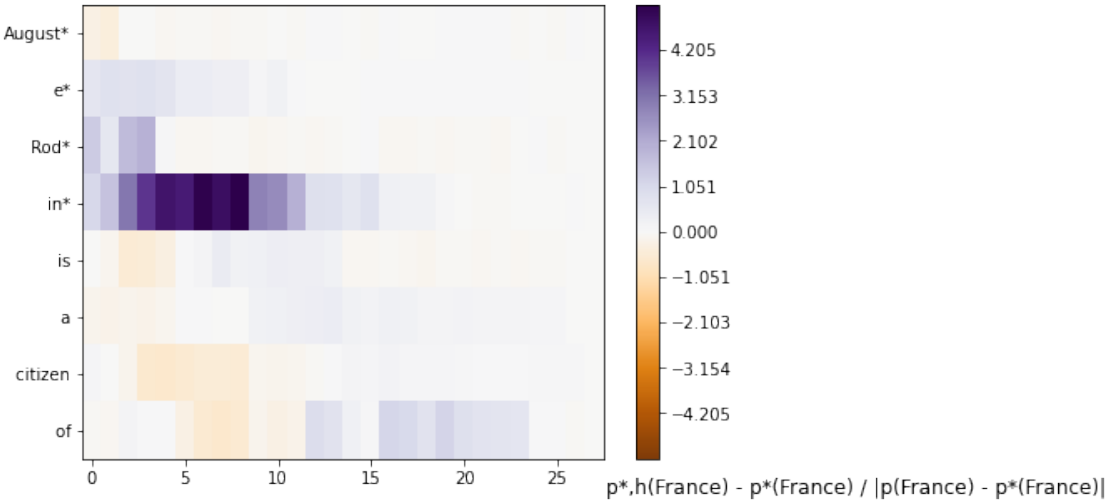

Wal*
ter*
Payton*
professionally
plays
the
sport
of
0
5
10
15
20
25
3.952
2.964
1.976
0.988
0.000
−0.988
−1.976
−2.964
−3.952
p*,h(football) - p*(football) / |p(football) - p*(football)|

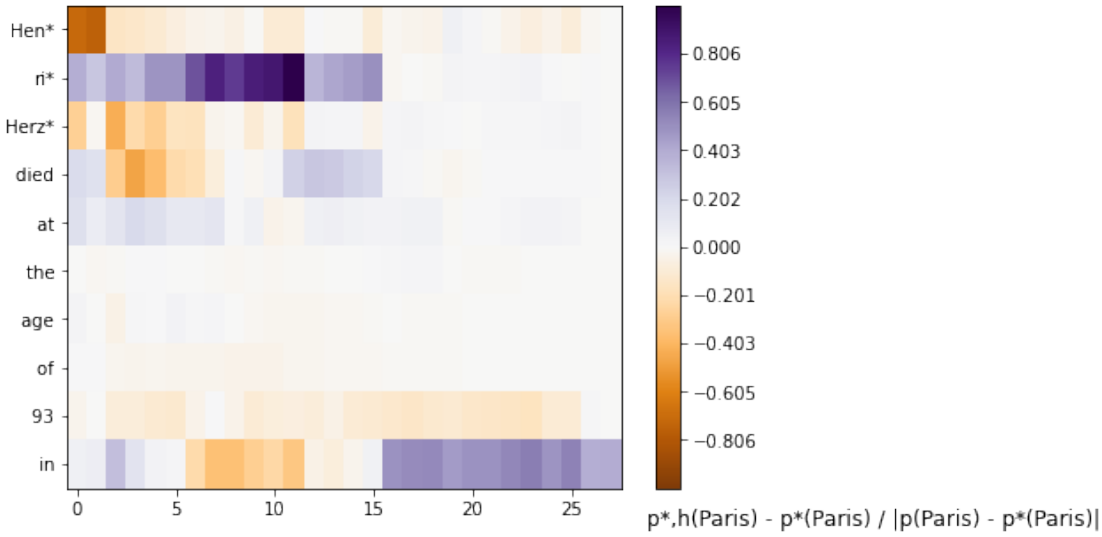

Speed*
Week*
debuted
on
the
0
5
10
15
20
25
2.249
1.687
1.125
0.562
0.000
−0.562
−1.124
−1.687
−2.249
p*,h(ESPN) - p*(ESPN) / |p(ESPN) - p*(ESPN)|

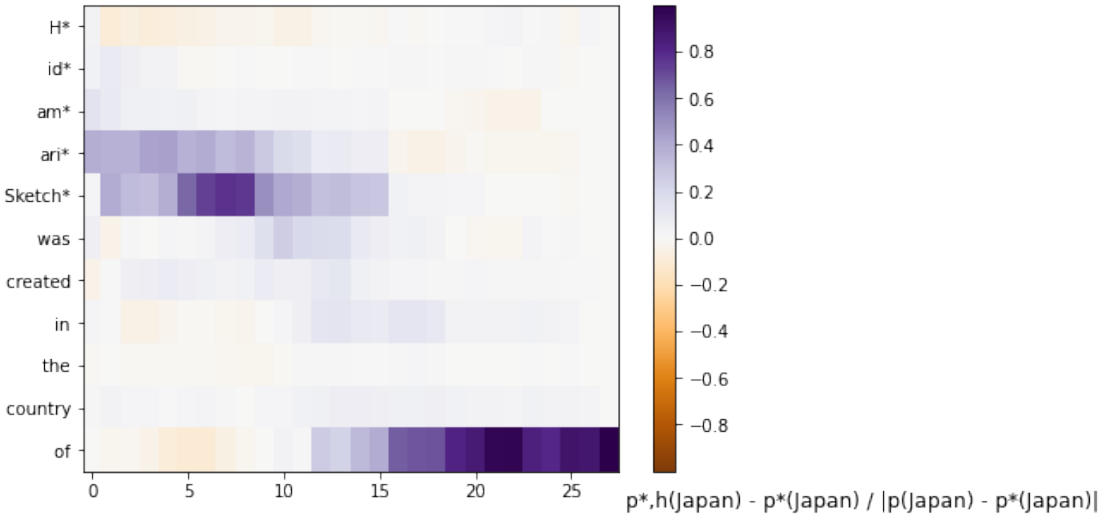

S*
ultan*
Sat*
u*
q*
B*
ugh*
ra*
Khan*
follows
the
religion
of
0
5
10
15
20
25
0.958
0.719
0.479
0.240
0.000
−0.239
−0.479
−0.719
−0.958
p*,h(Islam) - p*(Islam) / |p(Islam) - p*(Islam)|

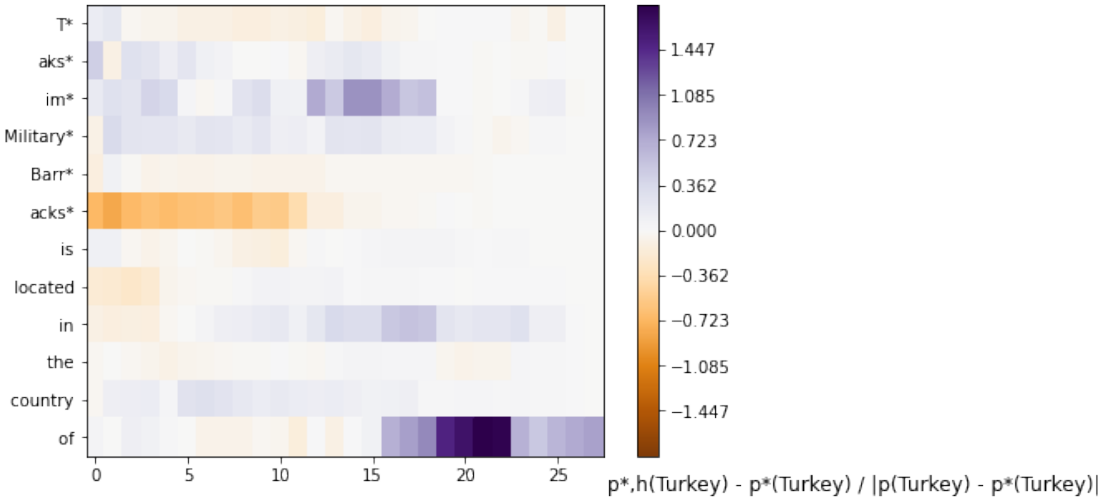

The
native
language
of
Bernard*
G*
ira*
udeau*
is
0
5
10
15
20
25
0.852
0.639
0.426
0.213
0.000
−0.213
−0.426
−0.639
−0.852
p*,h(French) - p*(French) / |p(French) - p*(French)|

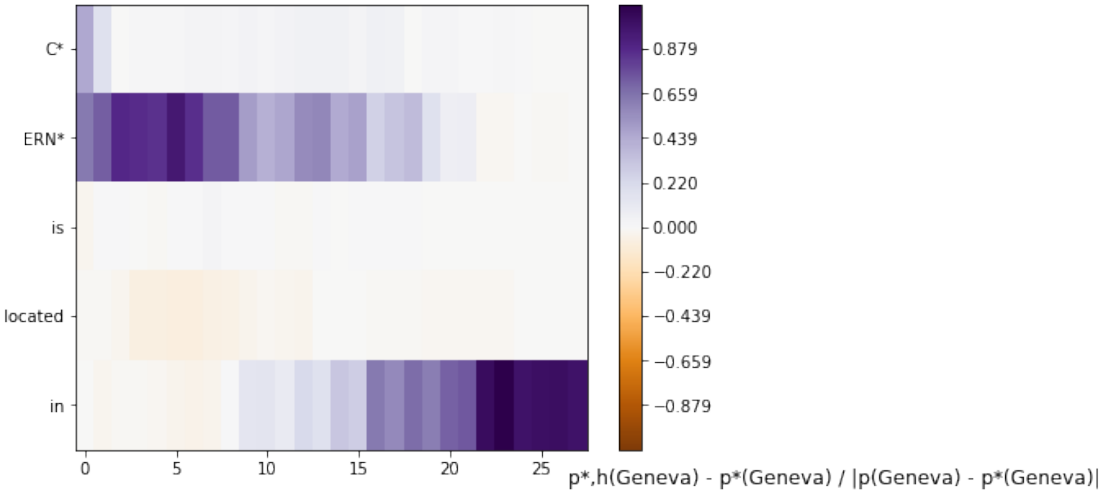

iPhone*
4*
s*
is
developed
by
0
5
10
15
20
25
1.556
1.167
0.778
0.389
0.000
−0.389
−0.778
−1.168
−1.557
p*,h(Apple) - p*(Apple) / |p(Apple) - p*(Apple)|

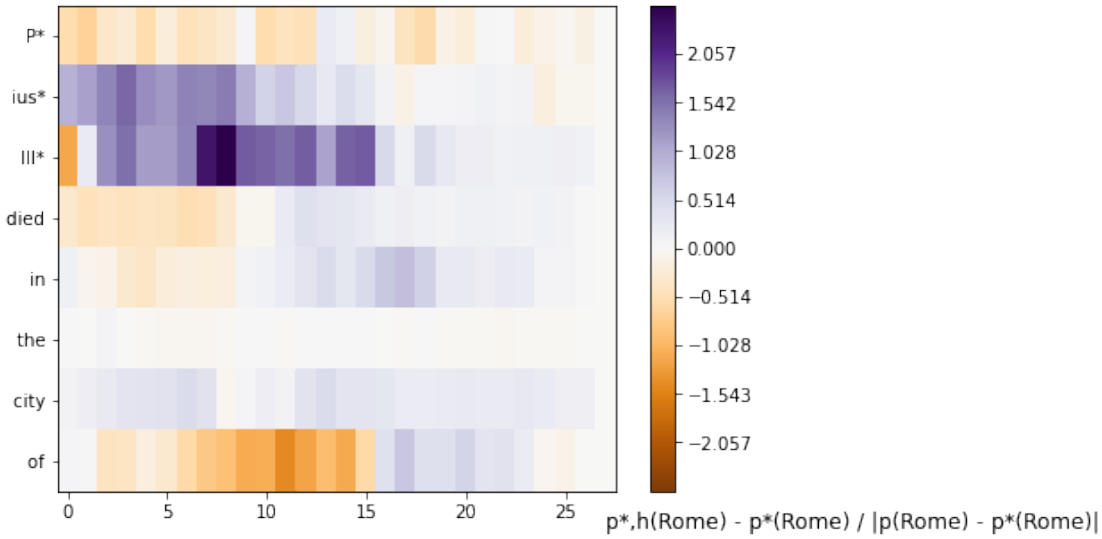

August*
e*
Rod*
in*
is
a
citizen
of
0
5
10
15
20
25
4.205
3.153
2.102
1.051
0.000
−1.051
−2.103
−3.154
−4.205
p*,h(France) - p*(France) / |p(France) - p*(France)|

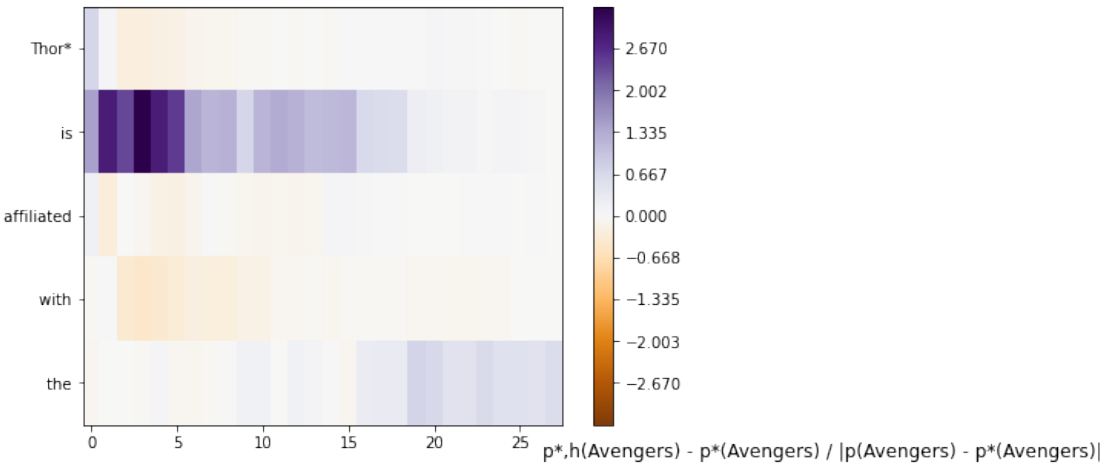

Hen*
ri*
Herz*
died
at
the
age
of
93
in
0
5
10
15
20
25
0.806
0.605
0.403
0.202
0.000
−0.201
−0.403
−0.605
−0.806
p*,h(Paris) - p*(Paris) / |p(Paris) - p*(Paris)|

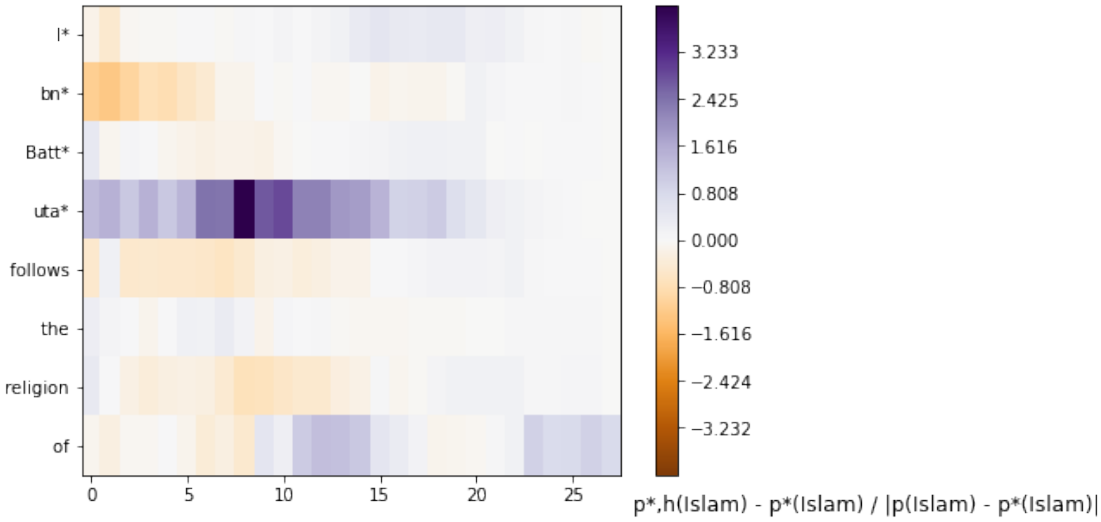

H*
id*
am*
ari*
Sketch*
was
created
in
the
country
of
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Japan) - p*(Japan) / |p(Japan) - p*(Japan)|

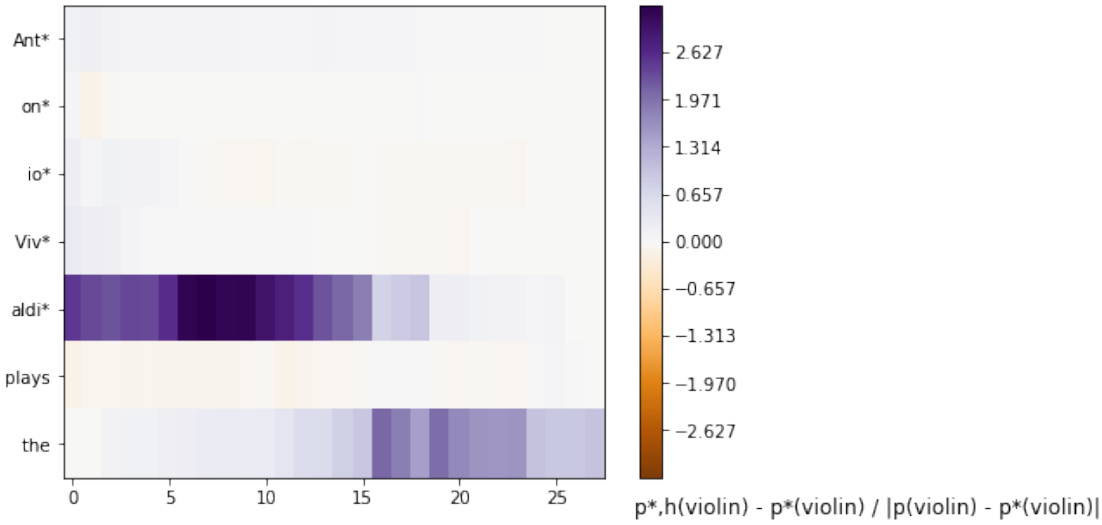

T*
aks*
im*
Military*
Barr*
acks*
is
located
in
the
country
of
0
5
10
15
20
25
1.447
1.085
0.723
0.362
0.000
−0.362
−0.723
−1.085
−1.447
p*,h(Turkey) - p*(Turkey) / |p(Turkey) - p*(Turkey)|

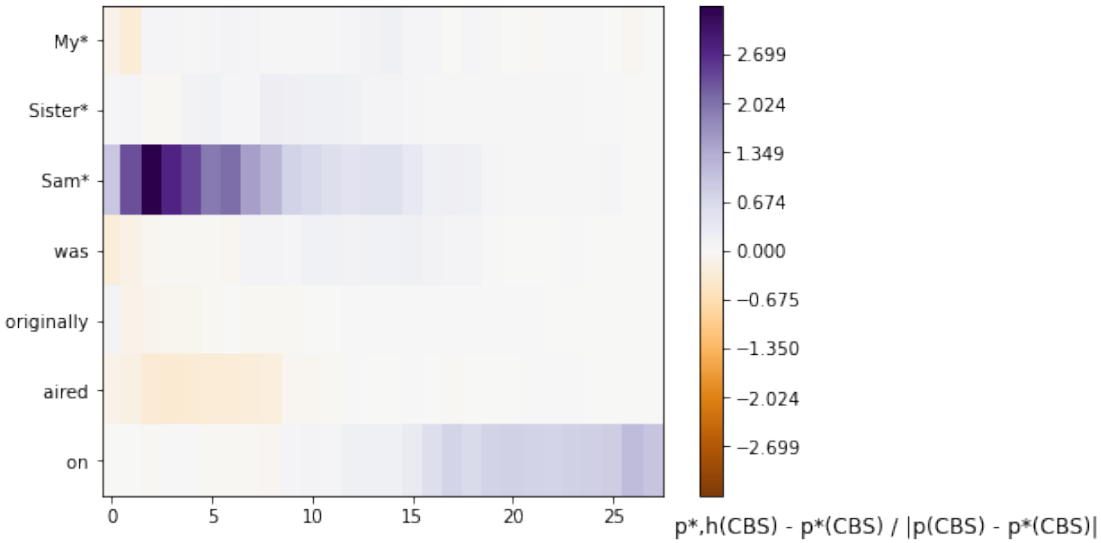

C*
ERN*
is
located
in
0
5
10
15
20
25
0.879
0.659
0.439
0.220
0.000
−0.220
−0.439
−0.659
−0.879
p*,h(Geneva) - p*(Geneva) / |p(Geneva) - p*(Geneva)|

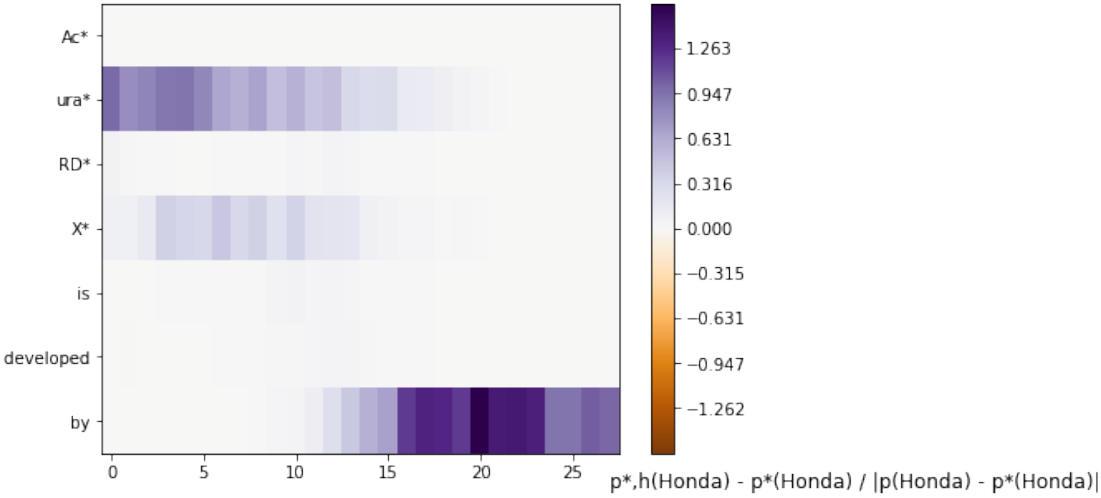

p*
ius*
III*
died
in
the
city
of
0
5
10
15
20
25
2.057
1.542
1.028
0.514
0.000
−0.514
−1.028
−1.543
−2.057
p*,h(Rome) - p*(Rome) / |p(Rome) - p*(Rome)|

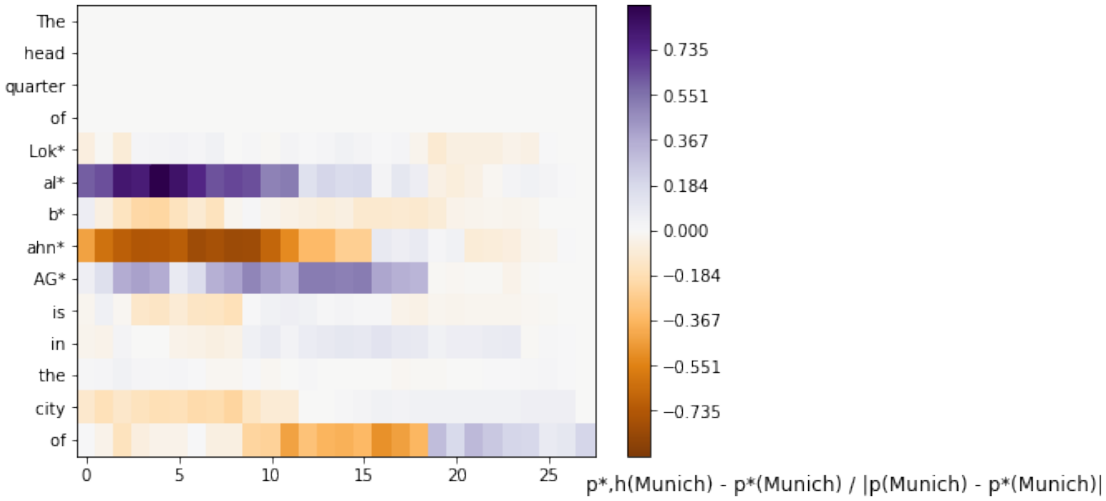

Thor*
is
affiliated
with
the
0
5
10
15
20
25
2.670
2.002
1.335
0.667
0.000
−0.668
−1.335
−2.003
−2.670
p*,h(Avengers) - p*(Avengers) / |p(Avengers) - p*(Avengers)|

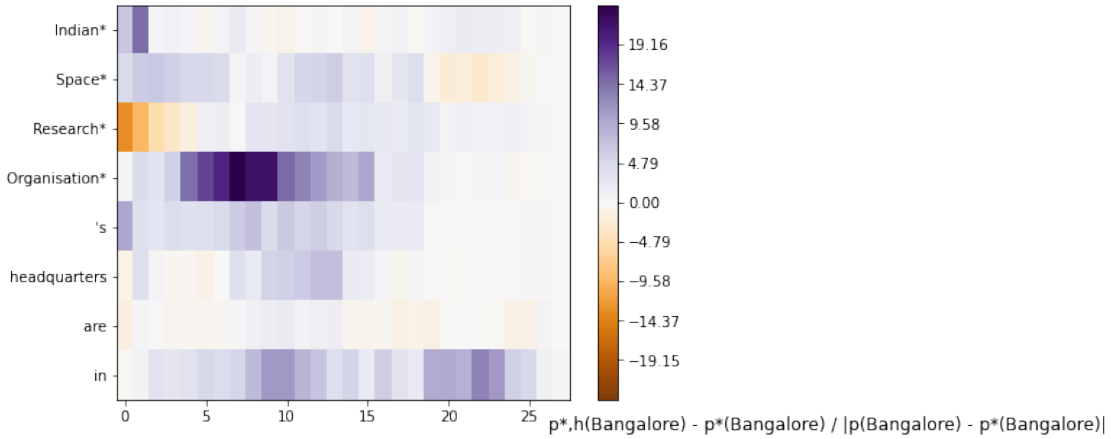

I*
bn*
Batt*
uta*
follows
the
religion
of
0
5
10
15
20
25
3.233
2.425
1.616
0.808
0.000
−0.808
−1.616
−2.424
−3.232
p*,h(Islam) - p*(Islam) / |p(Islam) - p*(Islam)|

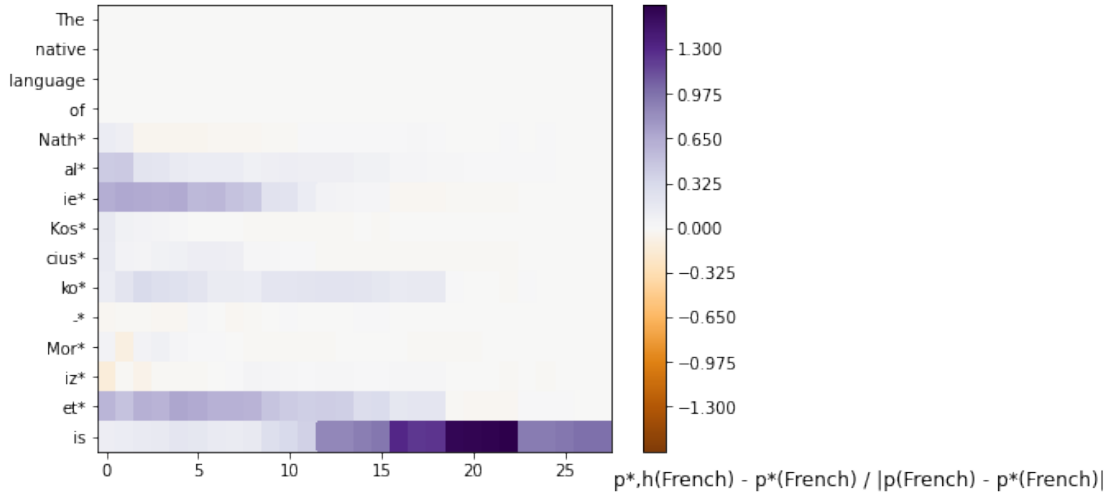

Ant*
on*
io*
Viv*
aldi*
plays
the
0
5
10
15
20
25
2.627
1.971
1.314
0.657
0.000
−0.657
−1.313
−1.970
−2.627
p*,h(violin) - p*(violin) / |p(violin) - p*(violin)|

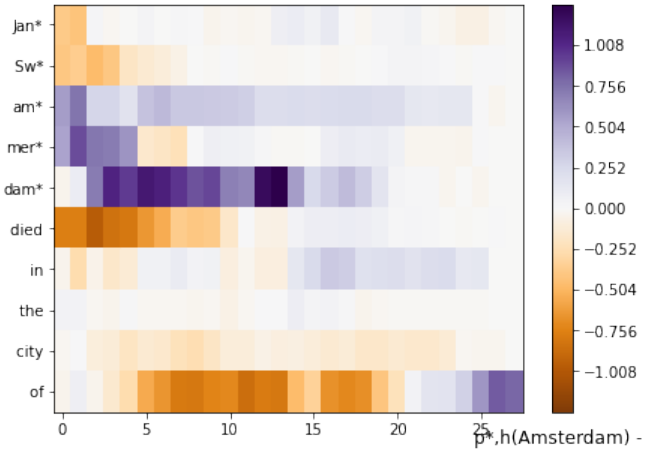

My*
Sister*
Sam*
was
originally
aired
on
0
5
10
15
20
25
2.699
2.024
1.349
0.674
0.000
−0.675
−1.350
−2.024
−2.699
p*,h(CBS) - p*(CBS) / |p(CBS) - p*(CBS)|


Ac*
ura*
RD*
X*
is
developed
by
0
5
10
15
20
25
1.263
0.947
0.631
0.316
0.000
−0.315
−0.631
−0.947
−1.262
p*,h(Honda) - p*(Honda) / |p(Honda) - p*(Honda)|

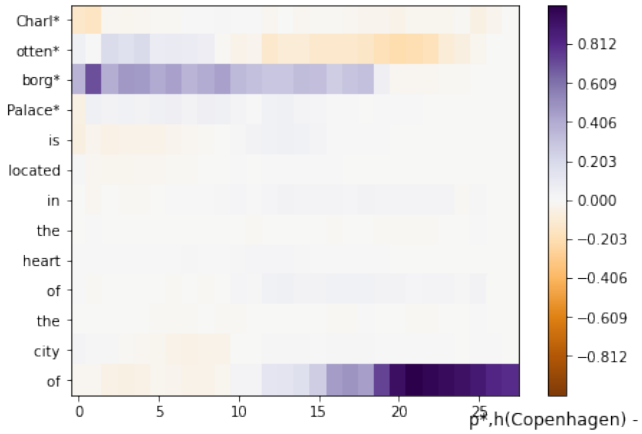

The
head
quarter
of
Lok*
al*
b*
ahn*
AG*
is
in
the
city
of
0
5
10
15
20
25
0.735
0.551
0.367
0.184
0.000
−0.184
−0.367
−0.551
−0.735
p*,h(Munich) - p*(Munich) / |p(Munich) - p*(Munich)|


Indian*
Space*
Research*
Organisation*
's
headquarters
are
in
0
5
10
15
20
25
19.16
14.37
9.58
4.79
0.00
−4.79
−9.58
−14.37
−19.15
p*,h(Bangalore) - p*(Bangalore) / |p(Bangalore) - p*(Bangalore)|

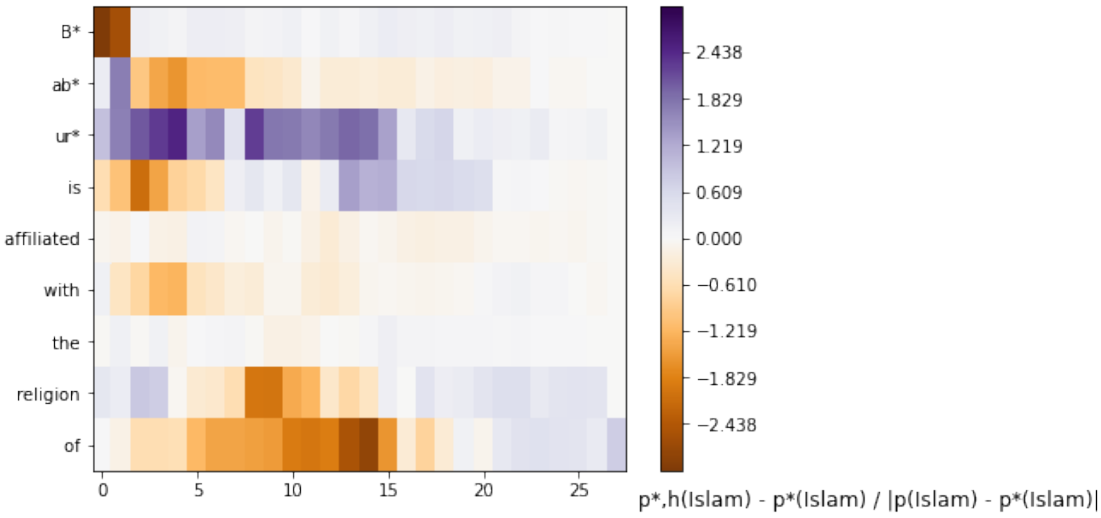

The
native
language
of
Nath*
al*
ie*
Kos*
cius*
ko*
.*
Mor*
iz*
et*
is
0
5
10
15
20
25
1.300
0.975
0.650
0.325
0.000
−0.325
−0.650
−0.975
−1.300
p*,h(French) - p*(French) / |p(French) - p*(French)|

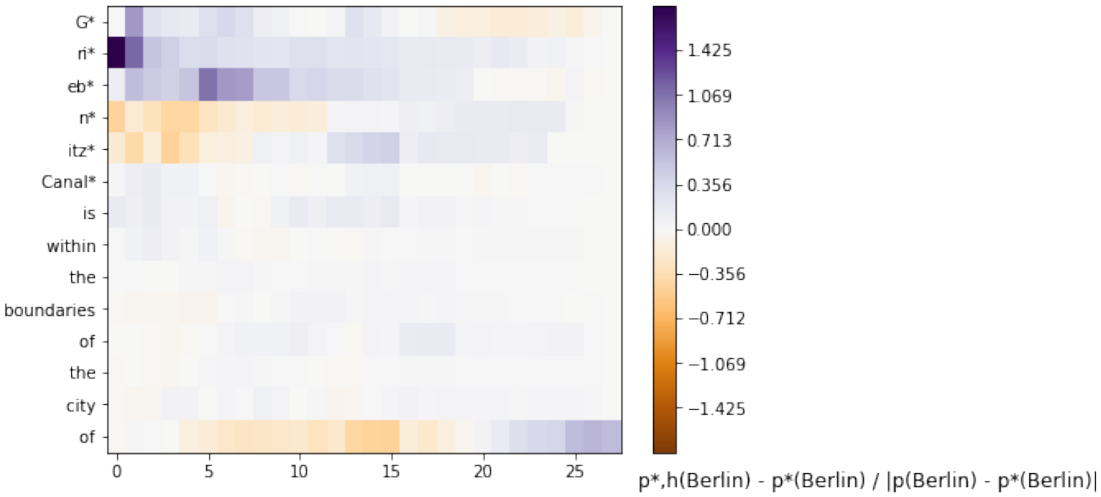


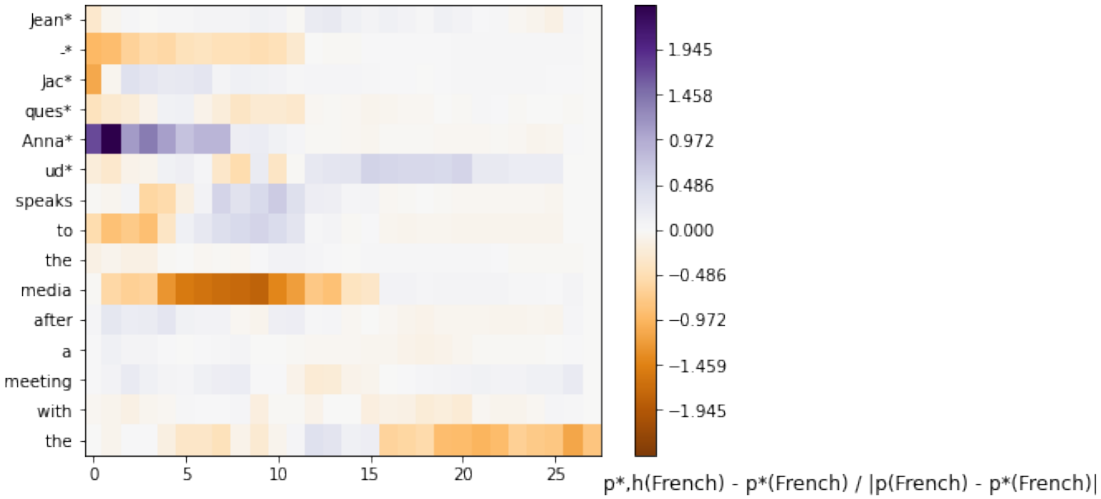
p*,h(Amsterdam) - p*(Amsterdam) / |p(Amsterdam) - p*(Amsterdam)|

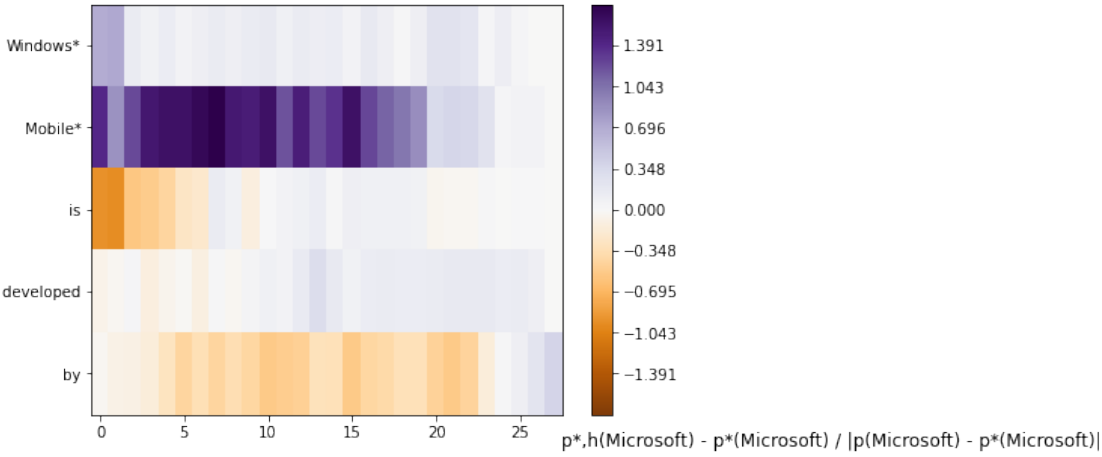


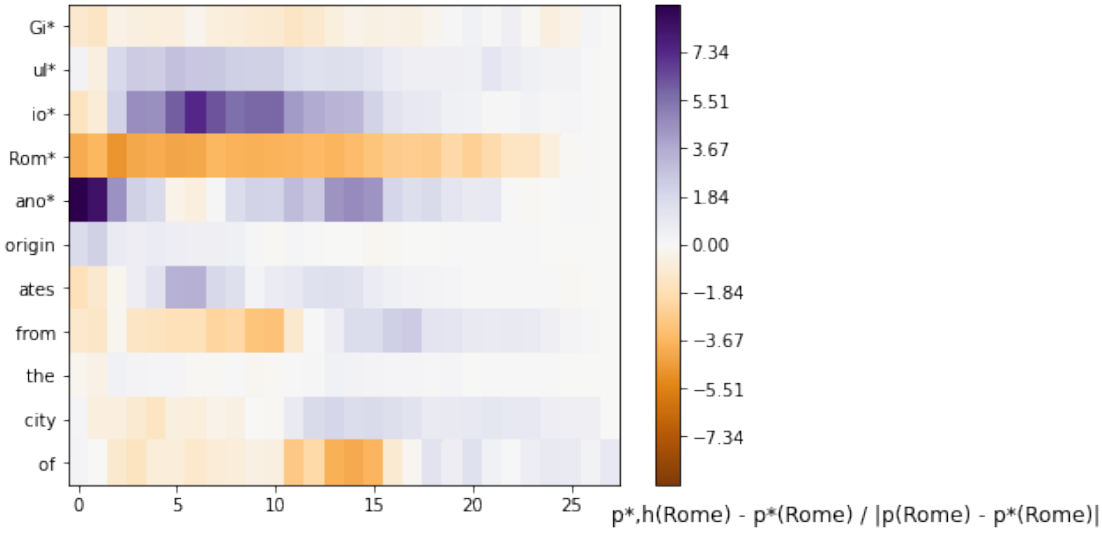
p*,h(Copenhagen) - p*(Copenhagen) / |p(Copenhagen) - p*(Copenhagen)|

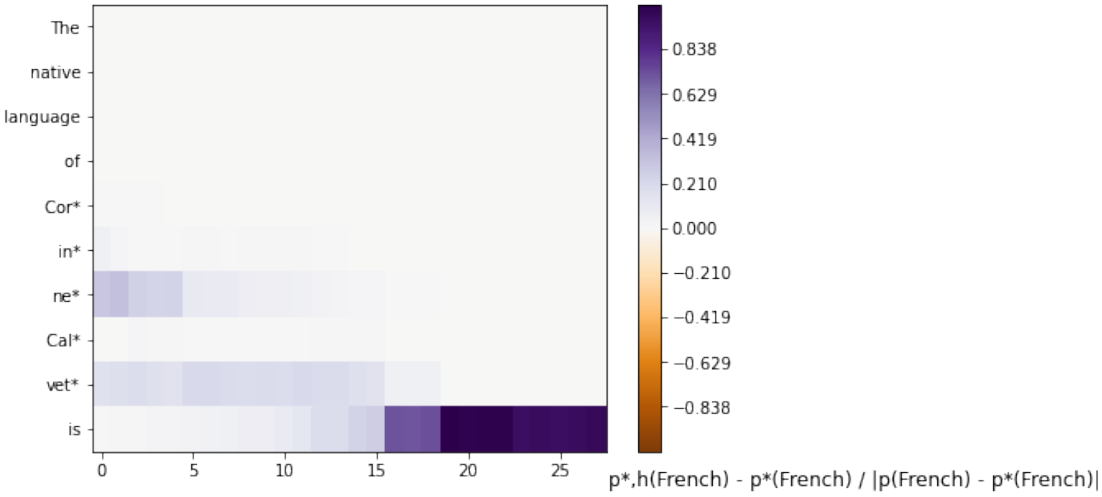

B*
ab*
ur*
is
affiliated
with
the
religion
of
0
5
10
15
20
25
2.438
1.829
1.219
0.609
0.000
−0.610
−1.219
−1.829
−2.438
p*,h(Islam) - p*(Islam) / |p(Islam) - p*(Islam)|

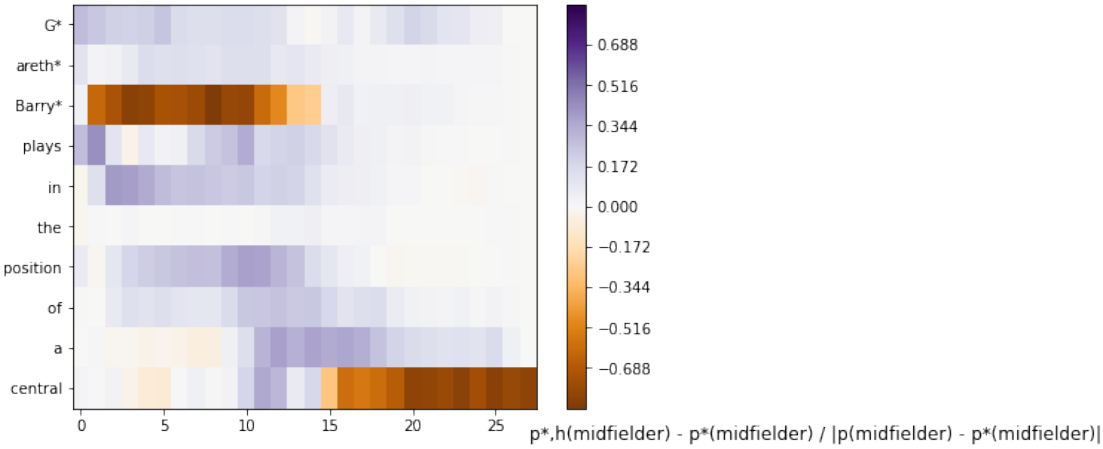

G*
ri*
eb*
n*
itz*
Canal*
is
within
the
boundaries
of
the
city
of
0
5
10
15
20
25
1.425
1.069
0.713
0.356
0.000
−0.356
−0.712
−1.069
−1.425
p*,h(Berlin) - p*(Berlin) / |p(Berlin) - p*(Berlin)|

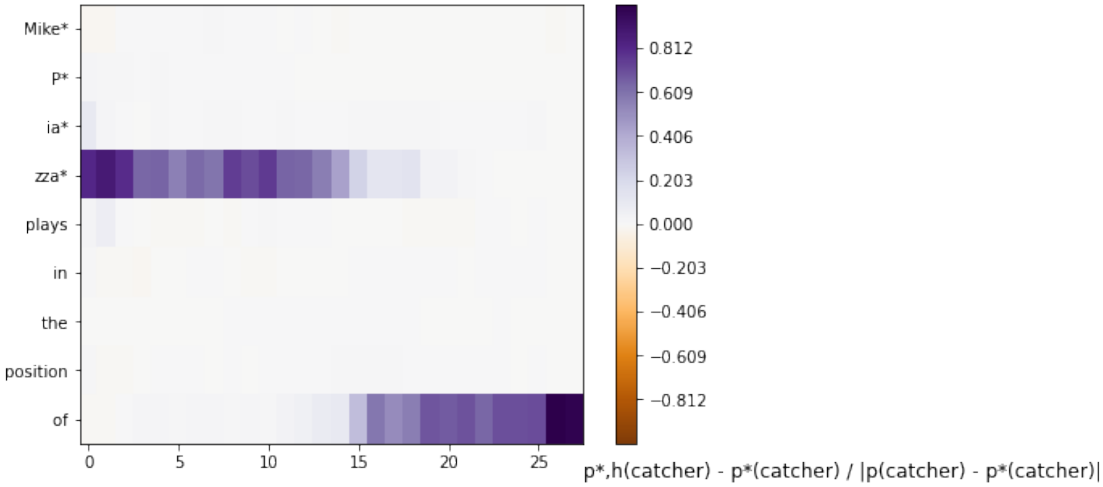

Jean*
_*
Jac*
ques*
Anna*
ud*
speaks
to
the
media
after
a
meeting
with
the
0
5
10
15
20
25
1.945
1.458
0.972
0.486
0.000
−0.486
−0.972
−1.459
−1.945
p*,h(French) - p*(French) / |p(French) - p*(French)|

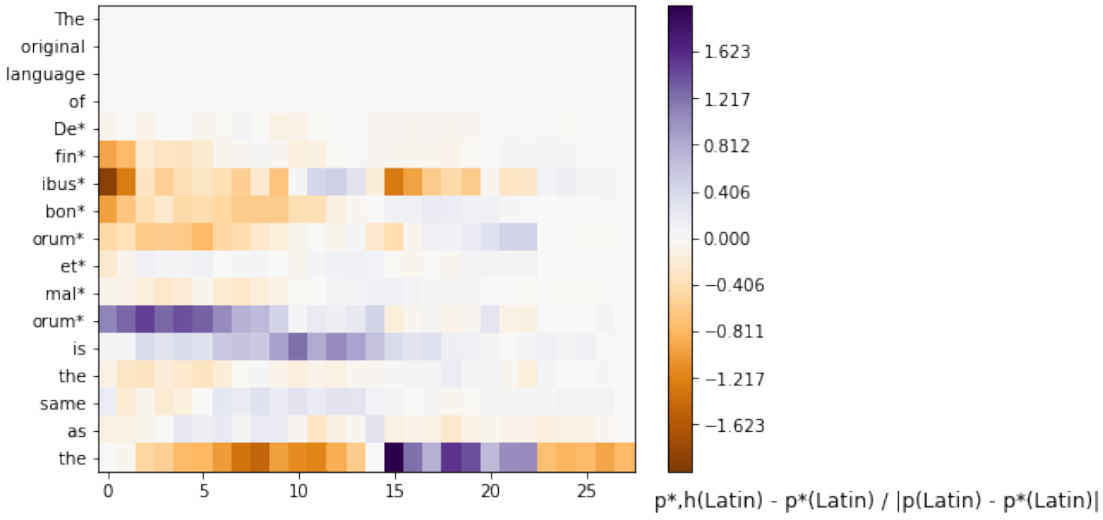

Windows*
Mobile*
is
developed
by
0
5
10
15
20
25
1.391
1.043
0.696
0.348
0.000
−0.348
−0.695
−1.043
−1.391
p*,h(Microsoft) - p*(Microsoft) / |p(Microsoft) - p*(Microsoft)|

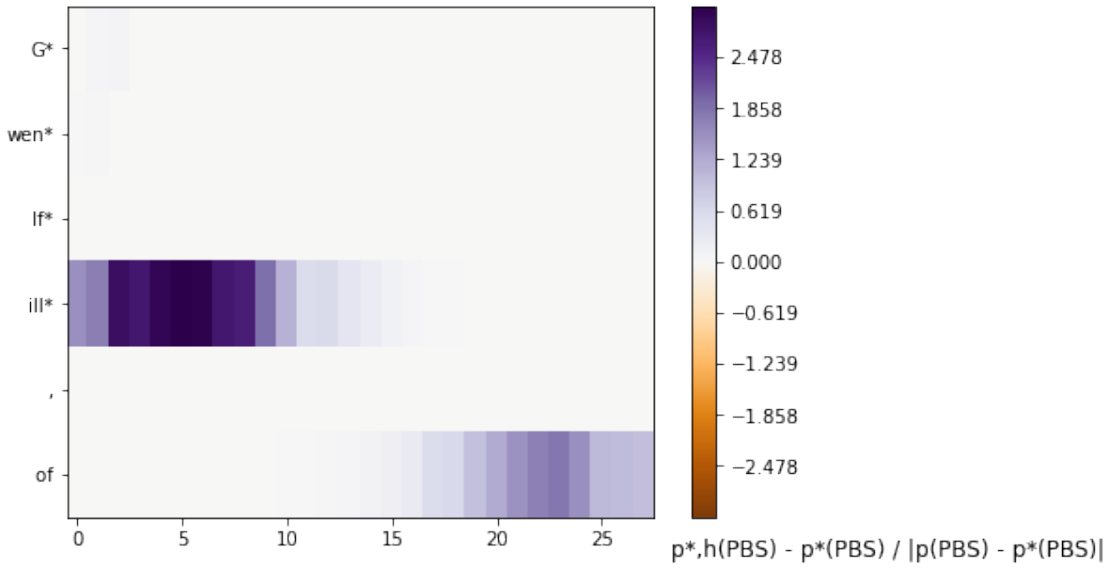

Gi*
ul*
io*
Rom*
ano*
origin
ates
from
the
city
of
0
5
10
15
20
25
7.34
5.51
3.67
1.84
0.00
−1.84
−3.67
−5.51
−7.34
p*,h(Rome) - p*(Rome) / |p(Rome) - p*(Rome)|

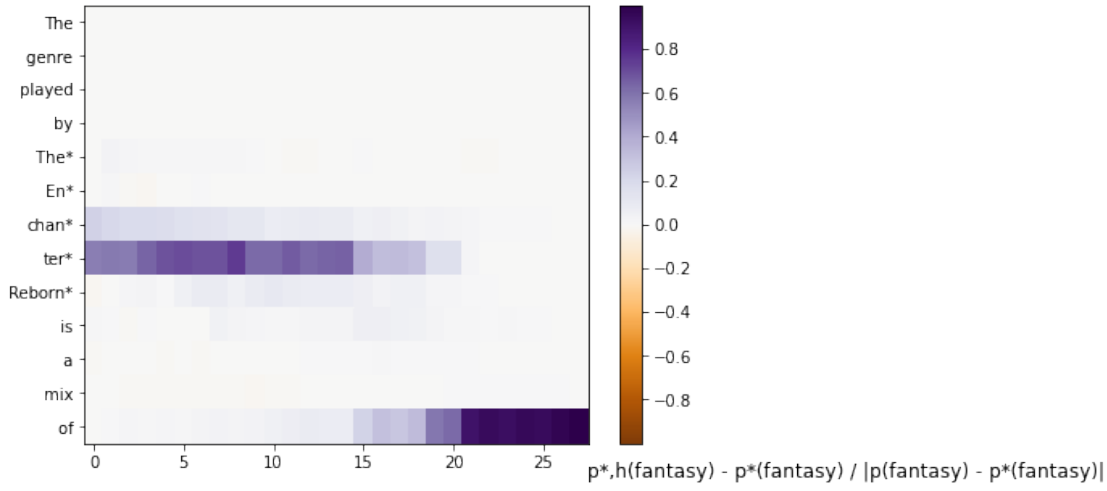

The
native
language
of
Cor*
in*
ne*
Cal*
vet*
is
0
5
10
15
20
25
0.838
0.629
0.419
0.210
0.000
−0.210
−0.419
−0.629
−0.838
p*,h(French) - p*(French) / |p(French) - p*(French)|

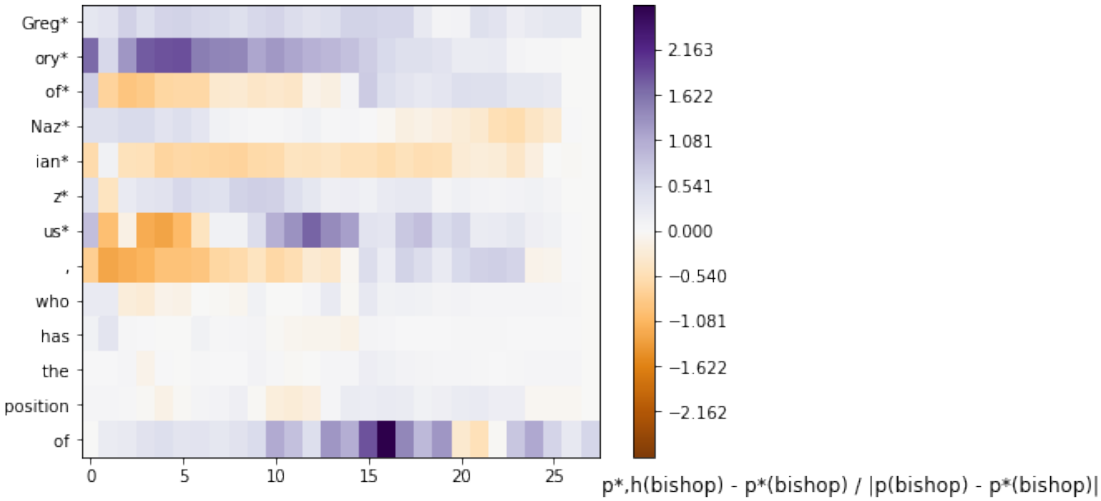

G*
areth*
Barry*
plays
in
the
position
of
a
central
0
5
10
15
20
25
0.688
0.516
0.344
0.172
0.000
−0.172
−0.344
−0.516
−0.688
p*,h(midfielder) - p*(midfielder) / |p(midfielder) - p*(midfielder)|

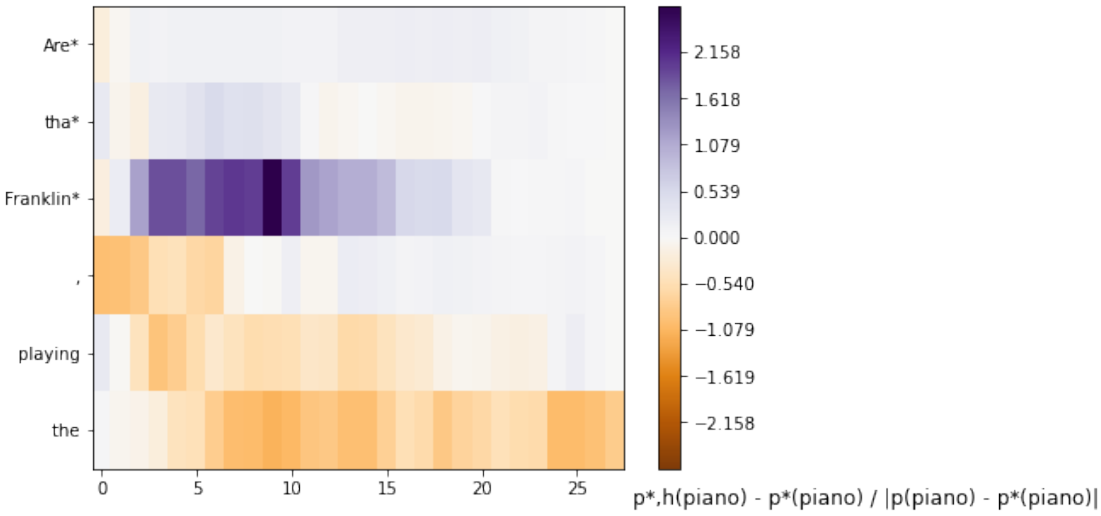

Mike*
P*
ia*
zza*
plays
in
the
position
of
0
5
10
15
20
25
0.812
0.609
0.406
0.203
0.000
−0.203
−0.406
−0.609
−0.812
p*,h(catcher) - p*(catcher) / |p(catcher) - p*(catcher)|

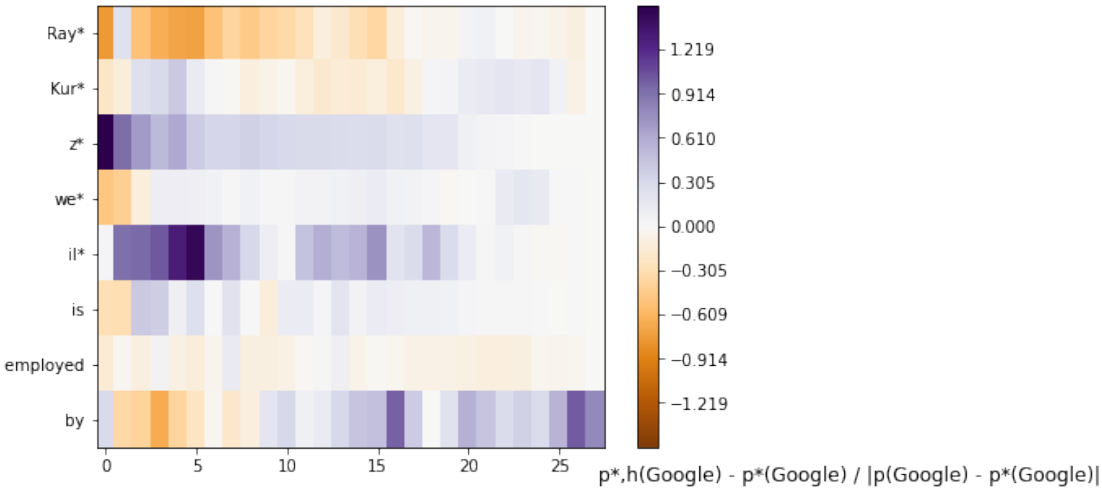

The
original
language
of
De*
fin*
ibus*
bon*
orum*
et*
mal*
orum*
is
the
same
as
the
0
5
10
15
20
25
1.623
1.217
0.812
0.406
0.000
−0.406
−0.811
−1.217
−1.623
p*,h(Latin) - p*(Latin) / |p(Latin) - p*(Latin)|

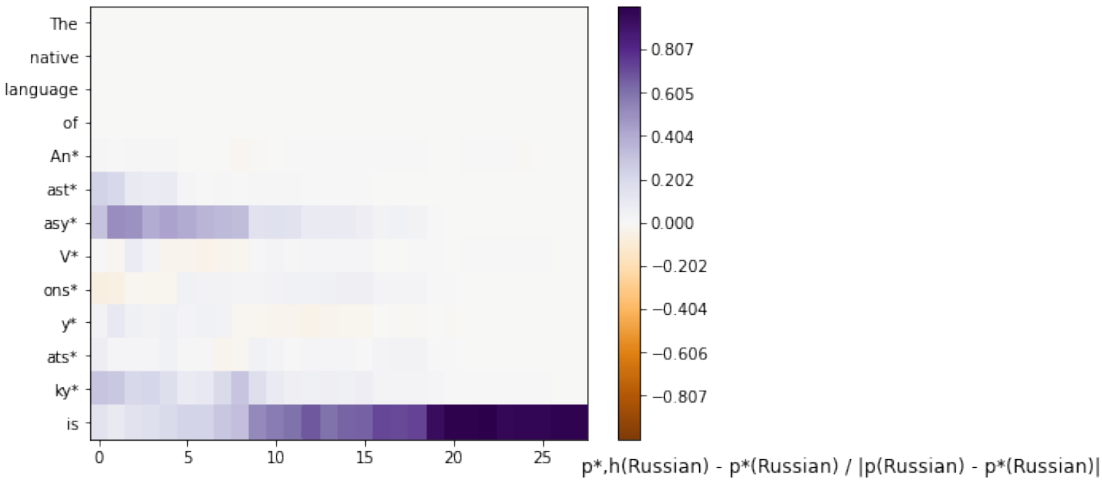

G*
wen*
If*
ill*
,
of
0
5
10
15
20
25
2.478
1.858
1.239
0.619
0.000
−0.619
−1.239
−1.858
−2.478
p*,h(PBS) - p*(PBS) / |p(PBS) - p*(PBS)|

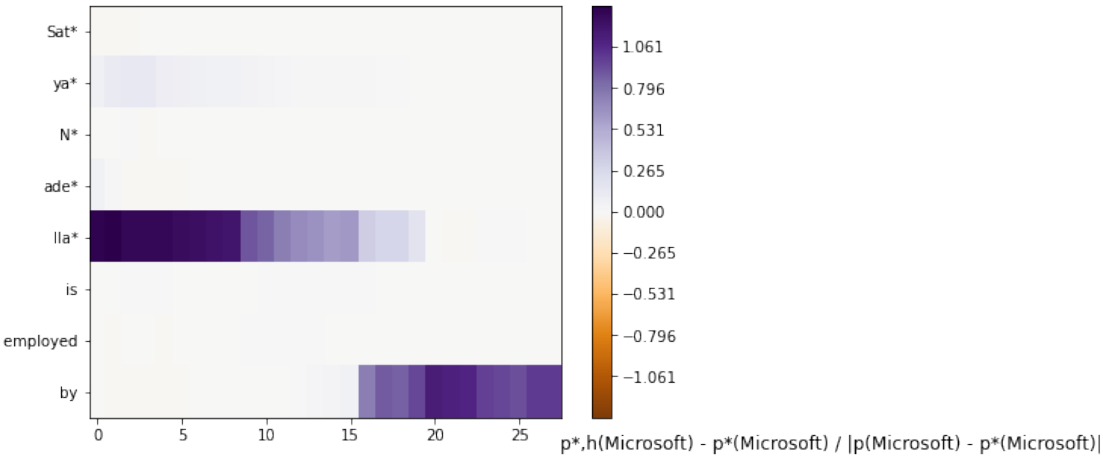

The
genre
played
by
The*
En*
chan*
ter*
Reborn*
is
a
mix
of
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(fantasy) - p*(fantasy) / |p(fantasy) - p*(fantasy)|

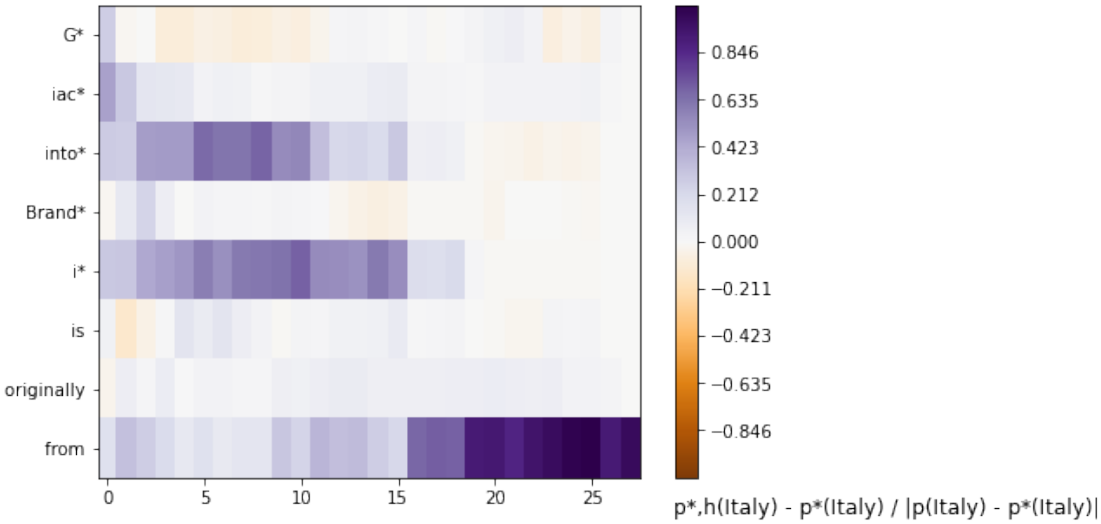

Greg*
ory*
of*
Naz*
ian*
z*
us*
,
who
has
the
position
of
0
5
10
15
20
25
2.163
1.622
1.081
0.541
0.000
−0.540
−1.081
−1.622
−2.162
p*,h(bishop) - p*(bishop) / |p(bishop) - p*(bishop)|

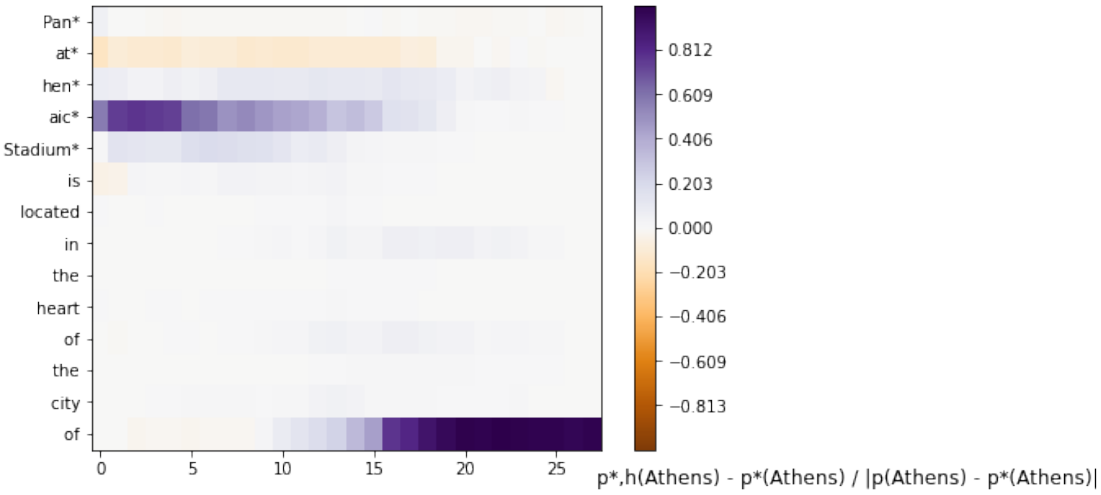

Are*
tha*
Franklin*
,
playing
the
0
5
10
15
20
25
2.158
1.618
1.079
0.539
0.000
−0.540
−1.079
−1.619
−2.158
p*,h(piano) - p*(piano) / |p(piano) - p*(piano)|

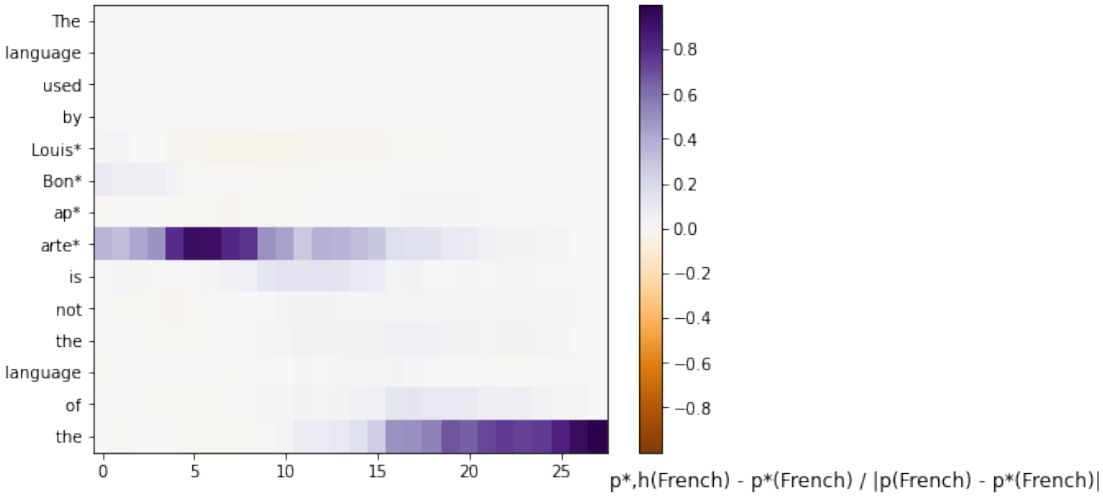

Ray*
Kur*
z*
we*
il*
is
employed
by
0
5
10
15
20
25
1.219
0.914
0.610
0.305
0.000
−0.305
−0.609
−0.914
−1.219
p*,h(Google) - p*(Google) / |p(Google) - p*(Google)|

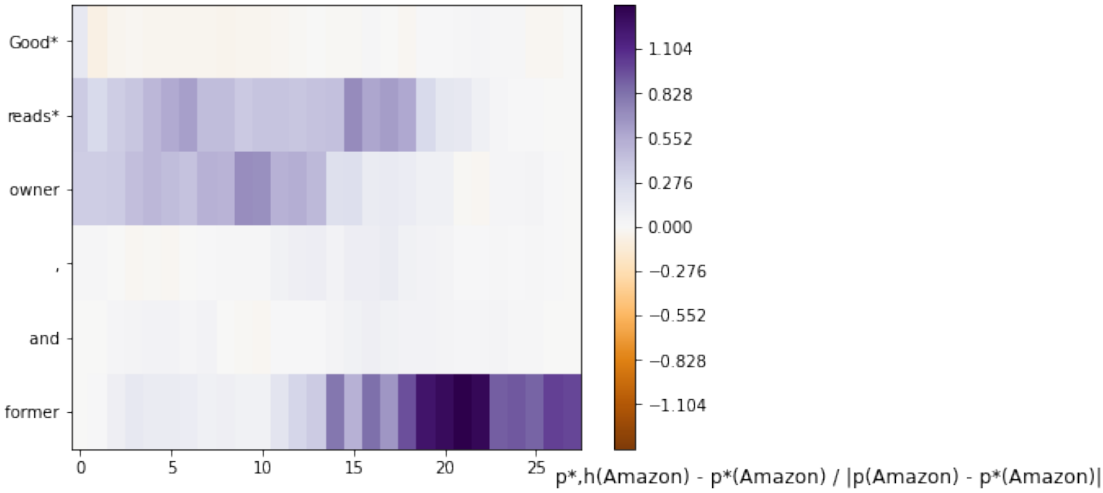

The
native
language
of
An*
ast*
asy*
V*
ons*
y*
ats*
ky*
is
0
5
10
15
20
25
0.807
0.605
0.404
0.202
0.000
−0.202
−0.404
−0.606
−0.807
p*,h(Russian) - p*(Russian) / |p(Russian) - p*(Russian)|

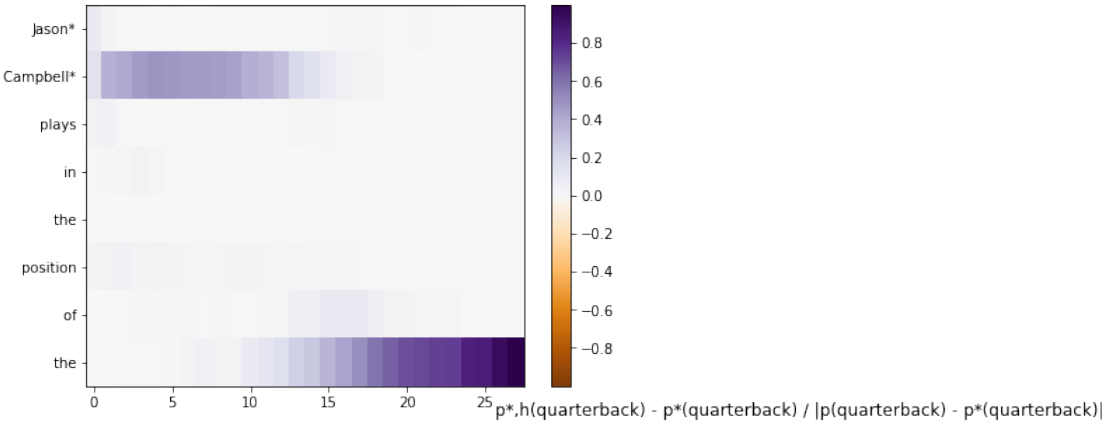

Sat*
ya*
N*
ade*
lla*
is
employed
by
0
5
10
15
20
25
1.061
0.796
0.531
0.265
0.000
−0.265
−0.531
−0.796
−1.061
p*,h(Microsoft) - p*(Microsoft) / |p(Microsoft) - p*(Microsoft)|

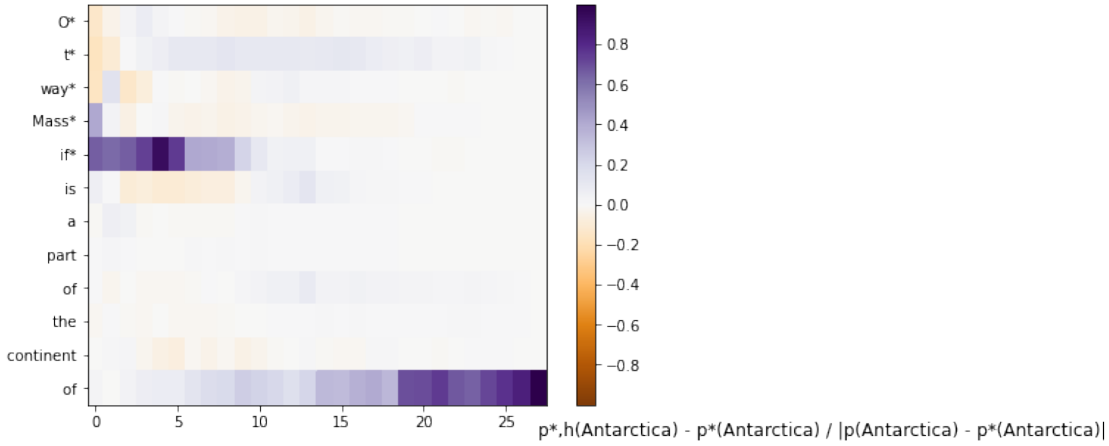

G*
iac*
into*
Brand*
i*
is
originally
from
0
5
10
15
20
25
0.846
0.635
0.423
0.212
0.000
−0.211
−0.423
−0.635
−0.846
p*,h(Italy) - p*(Italy) / |p(Italy) - p*(Italy)|

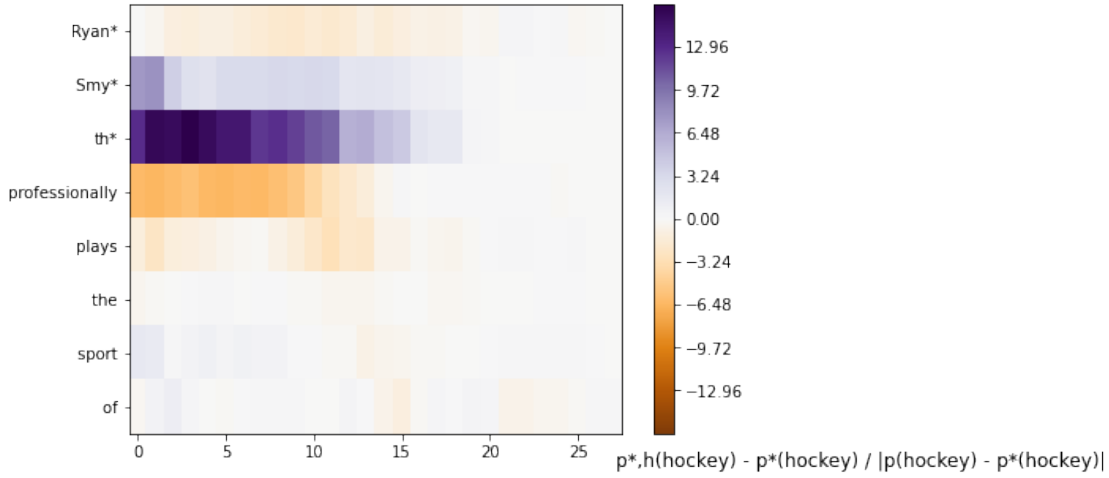

Pan*
at*
hen*
aic*
Stadium*
is
located
in
the
heart
of
the
city
of
0
5
10
15
20
25
0.812
0.609
0.406
0.203
0.000
−0.203
−0.406
−0.609
−0.813
p*,h(Athens) - p*(Athens) / |p(Athens) - p*(Athens)|

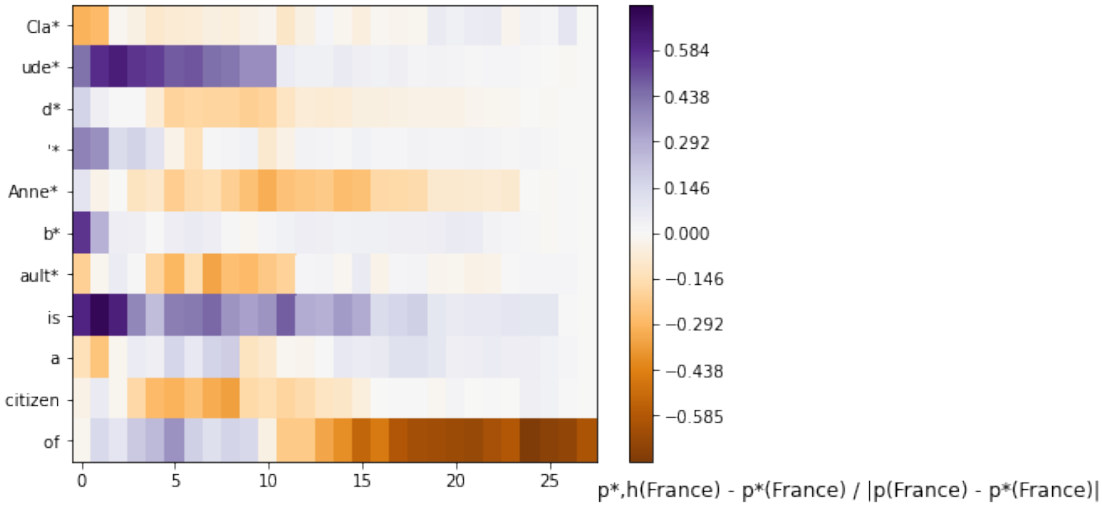

The
language
used
by
Louis*
Bon*
ap*
arte*
is
not
the
language
of
the
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(French) - p*(French) / |p(French) - p*(French)|

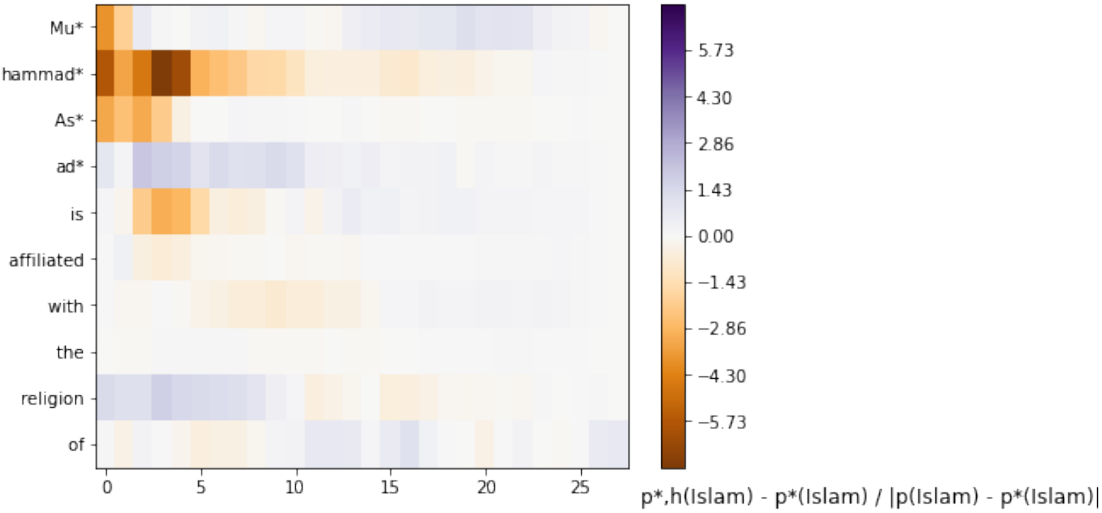

Good*
reads*
owner
,
and
former
0
5
10
15
20
25
1.104
0.828
0.552
0.276
0.000
−0.276
−0.552
−0.828
−1.104
p*,h(Amazon) - p*(Amazon) / |p(Amazon) - p*(Amazon)|

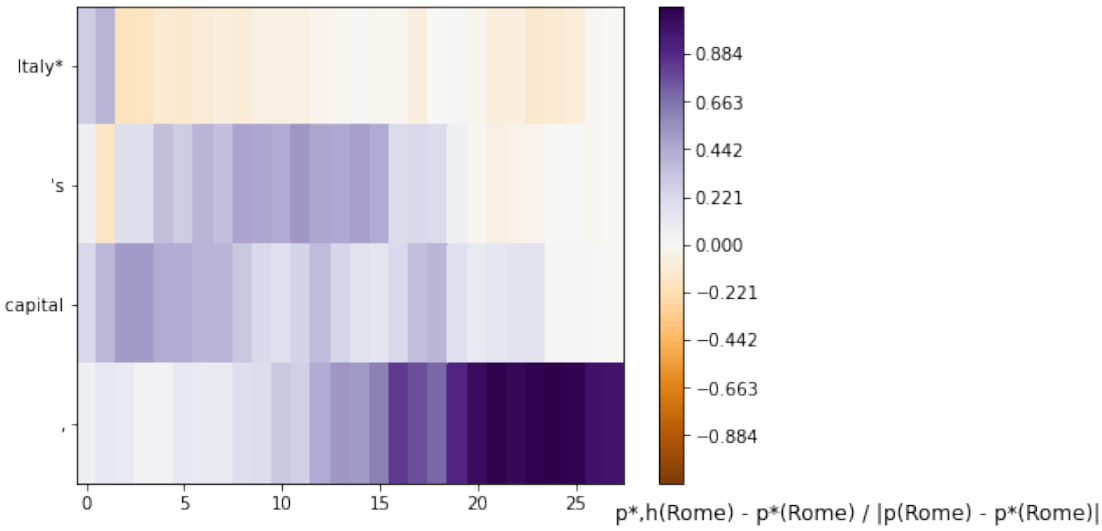

Jason*
Campbell*
plays
in
the
position
of
the
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(quarterback) - p*(quarterback) / |p(quarterback) - p*(quarterback)|

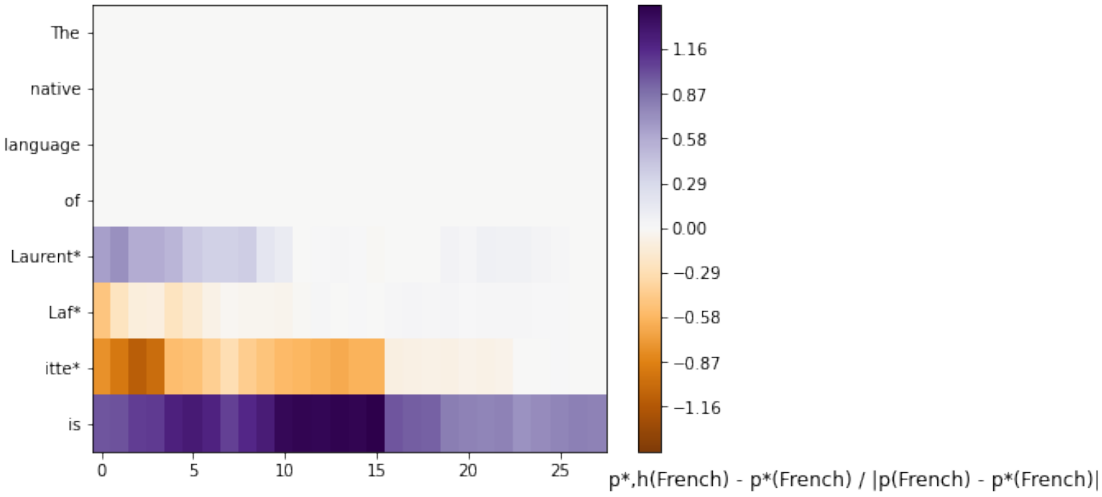

O*
t*
way*
Mass*
if*
is
a
part
of
the
continent
of
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Antarctica) - p*(Antarctica) / |p(Antarctica) - p*(Antarctica)|

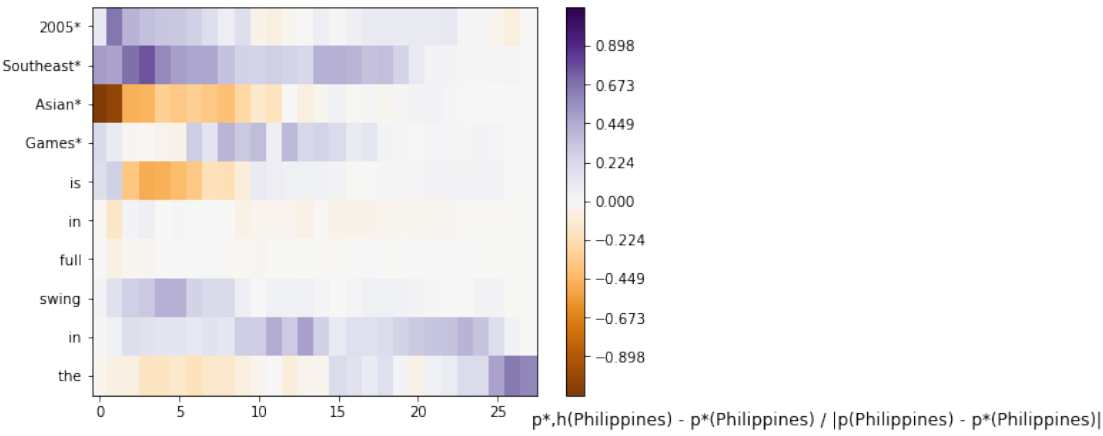

Ryan*
Smy*
th*
professionally
plays
the
sport
of
0
5
10
15
20
25
12.96
9.72
6.48
3.24
0.00
−3.24
−6.48
−9.72
−12.96
p*,h(hockey) - p*(hockey) / |p(hockey) - p*(hockey)|

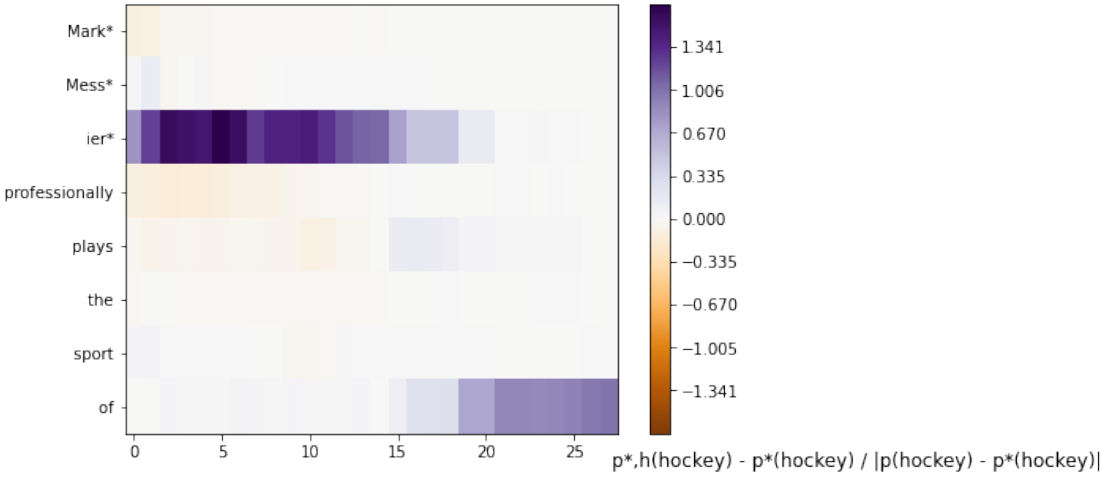

Cla*
ude*
d*
'*
Anne*
b*
ault*
is
a
citizen
of
0
5
10
15
20
25
0.584
0.438
0.292
0.146
0.000
−0.146
−0.292
−0.438
−0.585
p*,h(France) - p*(France) / |p(France) - p*(France)|

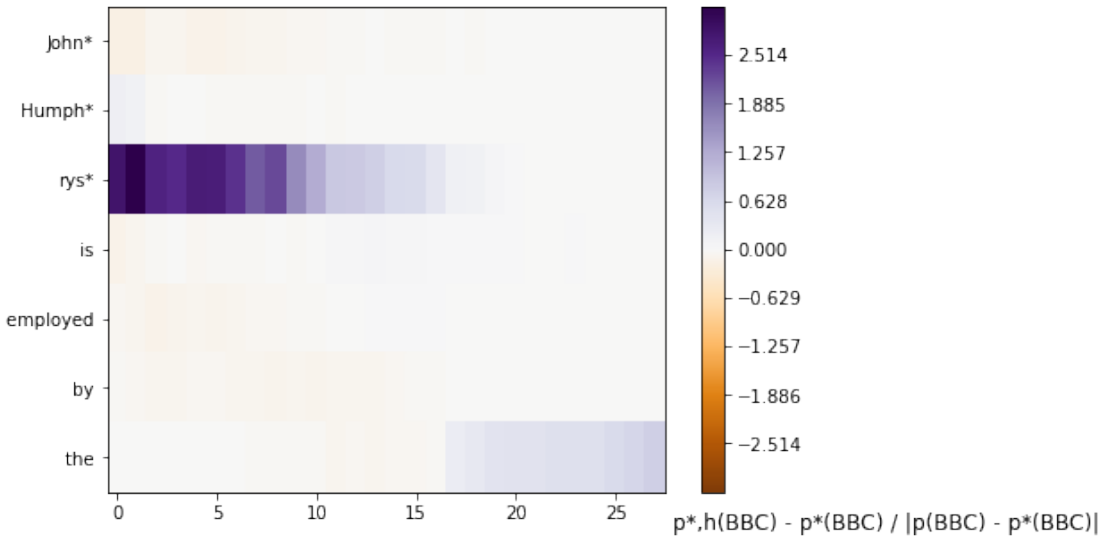

Mu*
hammad*
As*
ad*
is
affiliated
with
the
religion
of
0
5
10
15
20
25
5.73
4.30
2.86
1.43
0.00
−1.43
−2.86
−4.30
−5.73
p*,h(Islam) - p*(Islam) / |p(Islam) - p*(Islam)|

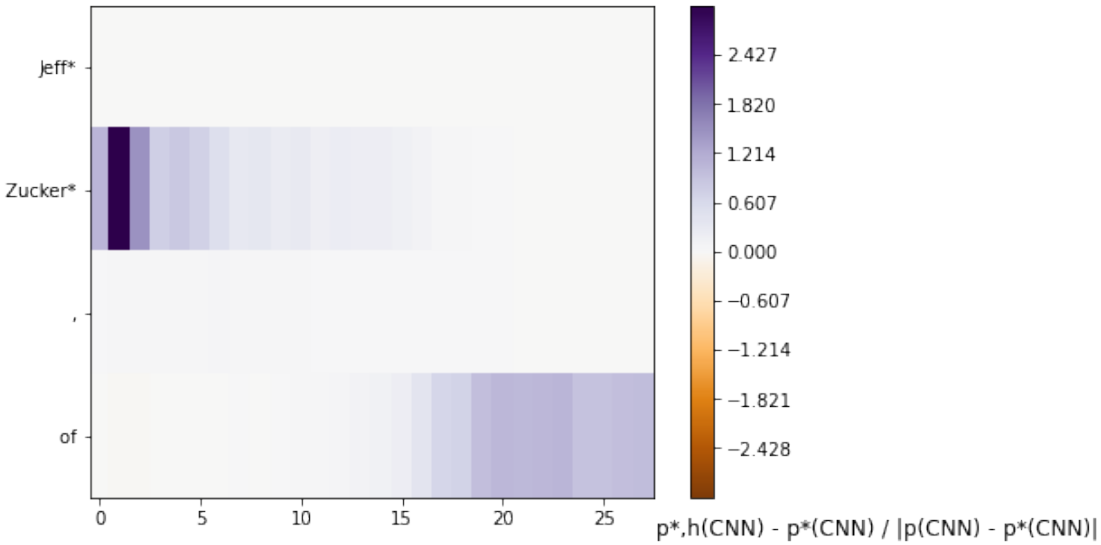

Italy*
's
capital
,
0
5
10
15
20
25
0.884
0.663
0.442
0.221
0.000
−0.221
−0.442
−0.663
−0.884
p*,h(Rome) - p*(Rome) / |p(Rome) - p*(Rome)|

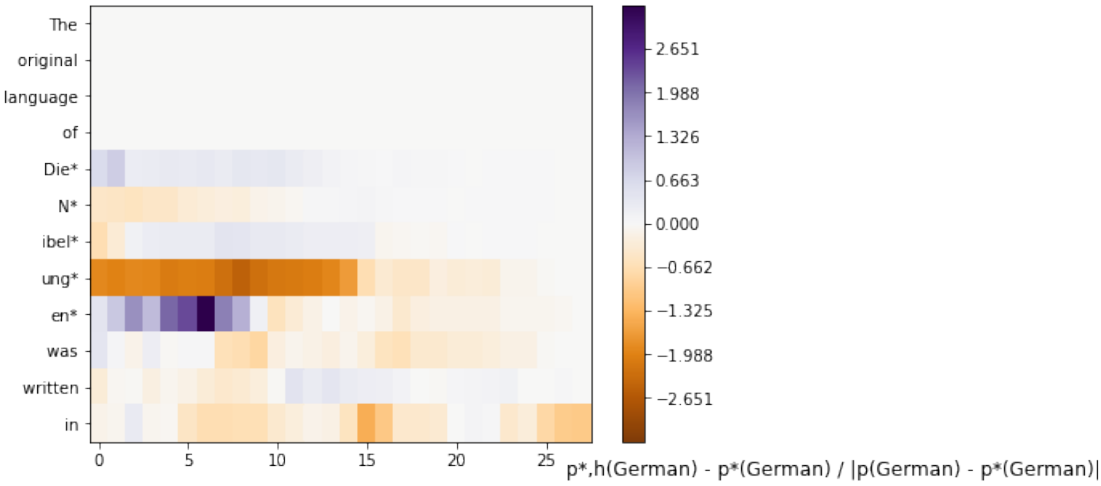

The
native
language
of
Laurent*
Laf*
itte*
is
0
5
10
15
20
25
1.16
0.87
0.58
0.29
0.00
−0.29
−0.58
−0.87
−1.16
p*,h(French) - p*(French) / |p(French) - p*(French)|

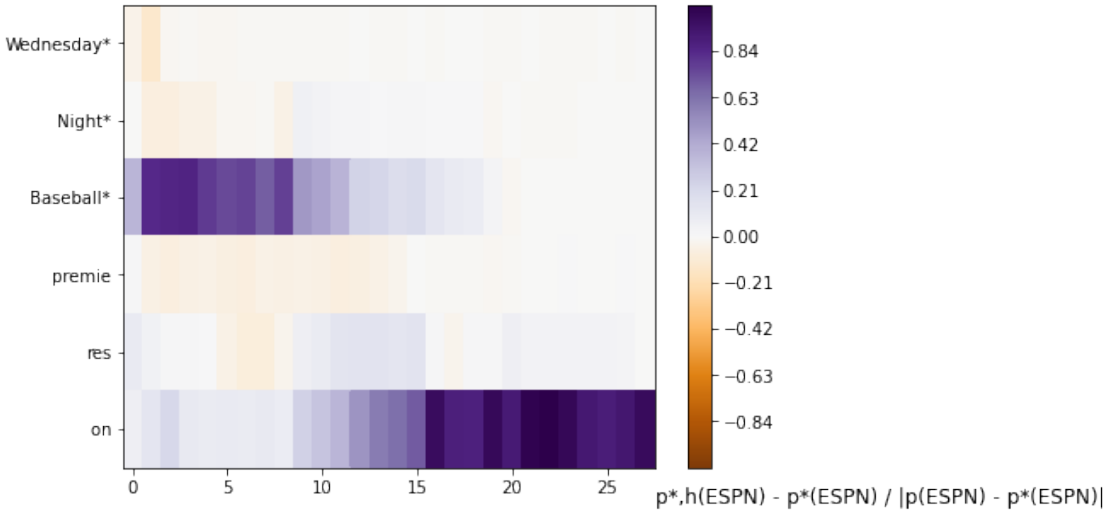

2005*
Southeast*
Asian*
Games*
is
in
full
swing
in
the
0
5
10
15
20
25
0.898
0.673
0.449
0.224
0.000
−0.224
−0.449
−0.673
−0.898
p*,h(Philippines) - p*(Philippines) / |p(Philippines) - p*(Philippines)|

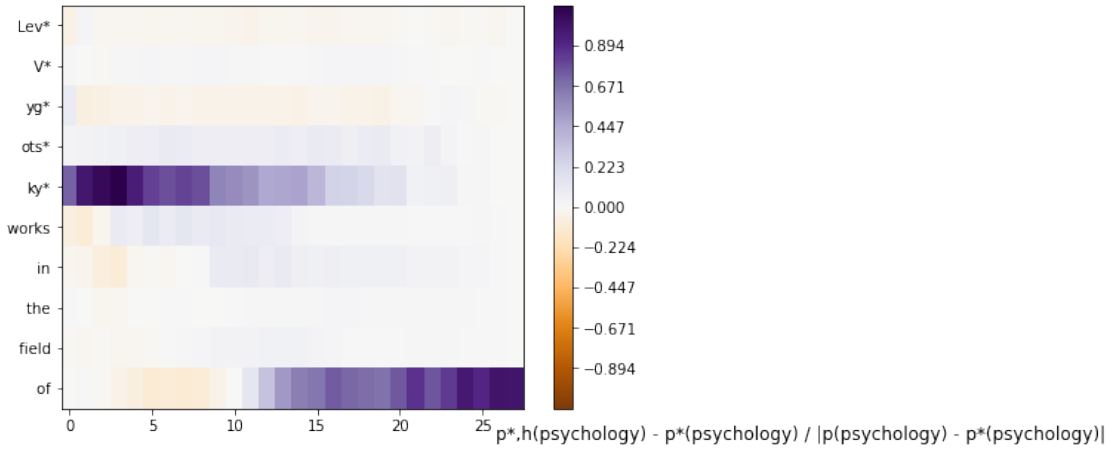

Mark*
Mess*
ier*
professionally
plays
the
sport
of
0
5
10
15
20
25
1.341
1.006
0.670
0.335
0.000
−0.335
−0.670
−1.005
−1.341
p*,h(hockey) - p*(hockey) / |p(hockey) - p*(hockey)|

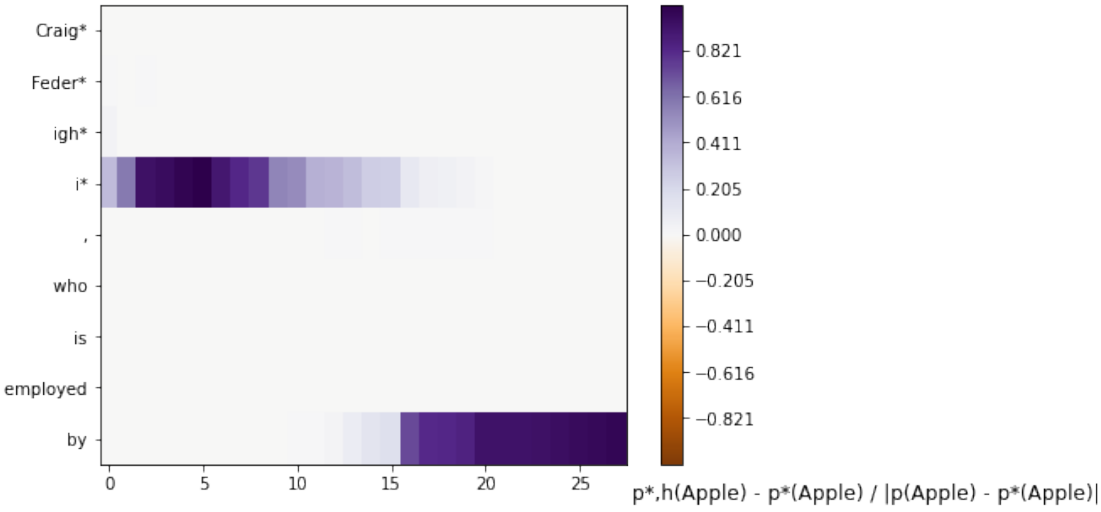

John*
Humph*
rys*
is
employed
by
the
0
5
10
15
20
25
2.514
1.885
1.257
0.628
0.000
−0.629
−1.257
−1.886
−2.514
p*,h(BBC) - p*(BBC) / |p(BBC) - p*(BBC)|

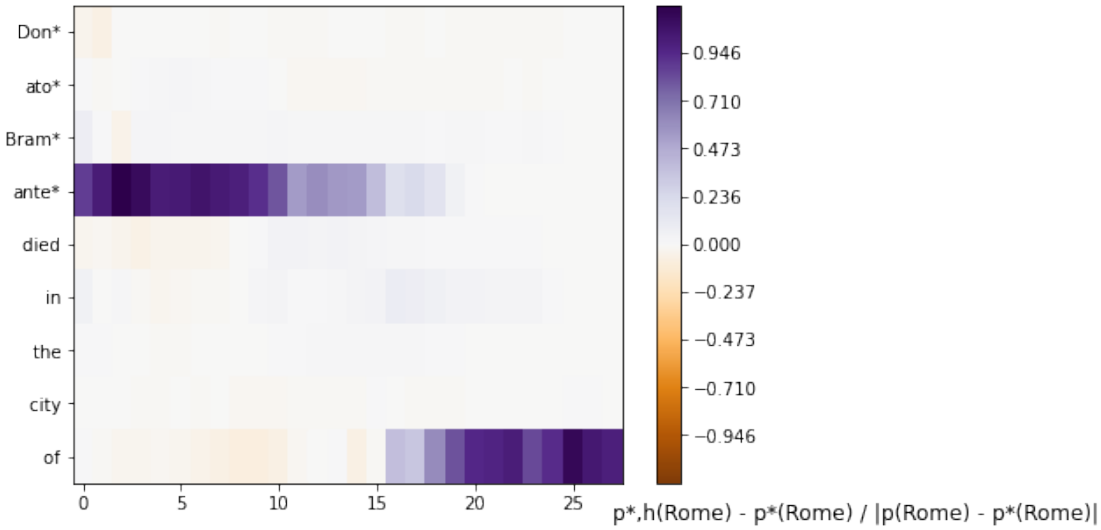

Jeff*
Zucker*
,
of
0
5
10
15
20
25
2.427
1.820
1.214
0.607
0.000
−0.607
−1.214
−1.821
−2.428
p*,h(CNN) - p*(CNN) / |p(CNN) - p*(CNN)|

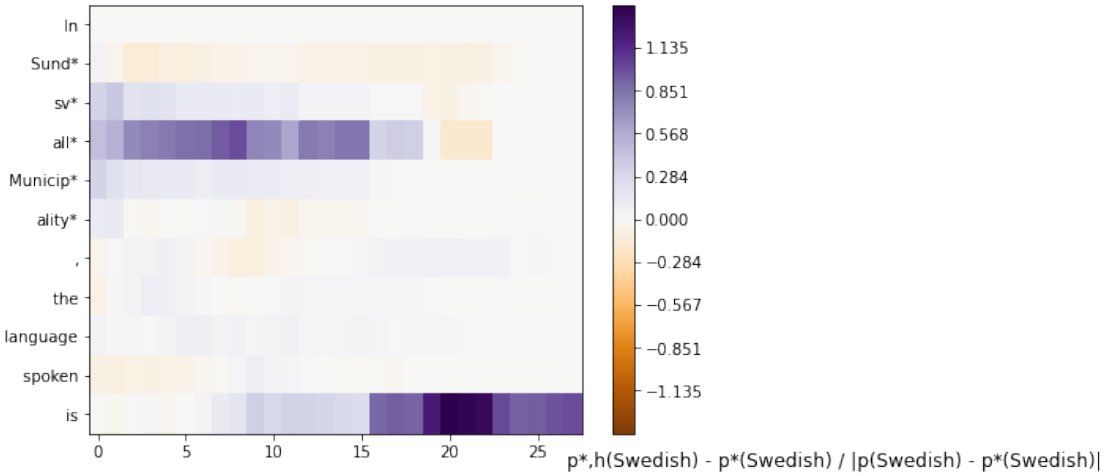

The
original
language
of
Die*
N*
ibel*
ung*
en*
was
written
in
0
5
10
15
20
25
2.651
1.988
1.326
0.663
0.000
−0.662
−1.325
−1.988
−2.651
p*,h(German) - p*(German) / |p(German) - p*(German)|

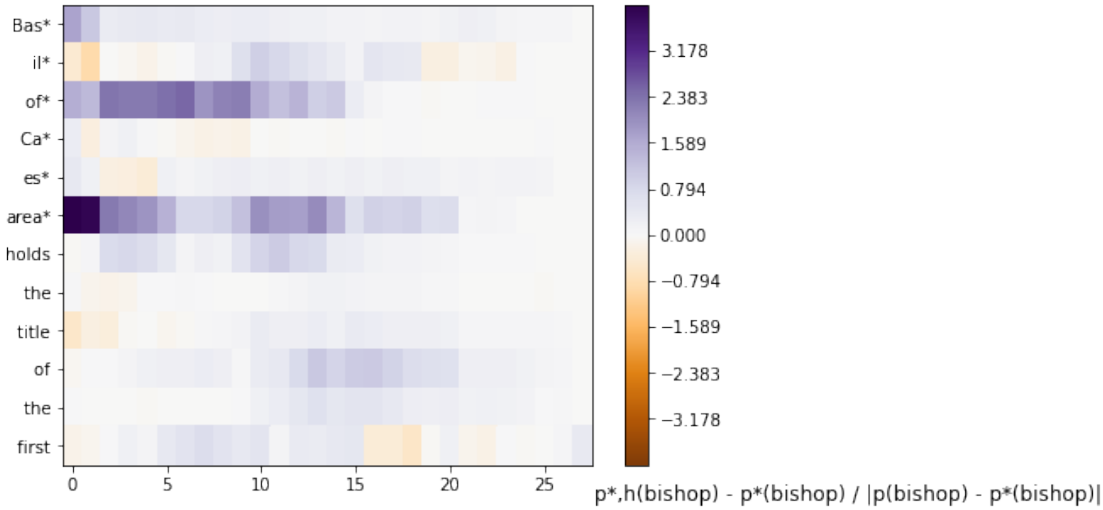

Wednesday*
Night*
Baseball*
premie
res
on
0
5
10
15
20
25
0.84
0.63
0.42
0.21
0.00
−0.21
−0.42
−0.63
−0.84
p*,h(ESPN) - p*(ESPN) / |p(ESPN) - p*(ESPN)|

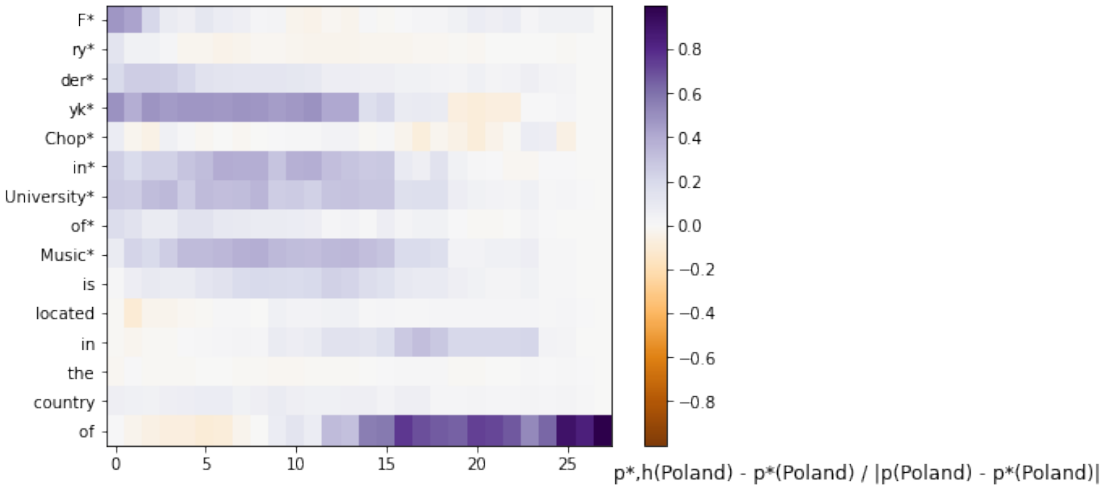

Lev*
V*
yg*
ots*
ky*
works
in
the
field
of
0
5
10
15
20
25
0.894
0.671
0.447
0.223
0.000
−0.224
−0.447
−0.671
−0.894
p*,h(psychology) - p*(psychology) / |p(psychology) - p*(psychology)|

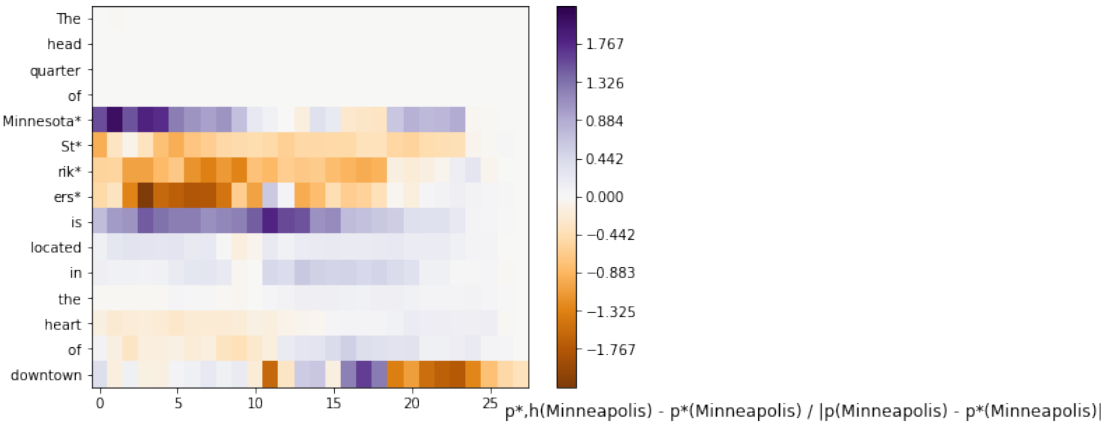

Craig*
Feder*
igh*
i*
,
who
is
employed
by
0
5
10
15
20
25
0.821
0.616
0.411
0.205
0.000
−0.205
−0.411
−0.616
−0.821
p*,h(Apple) - p*(Apple) / |p(Apple) - p*(Apple)|

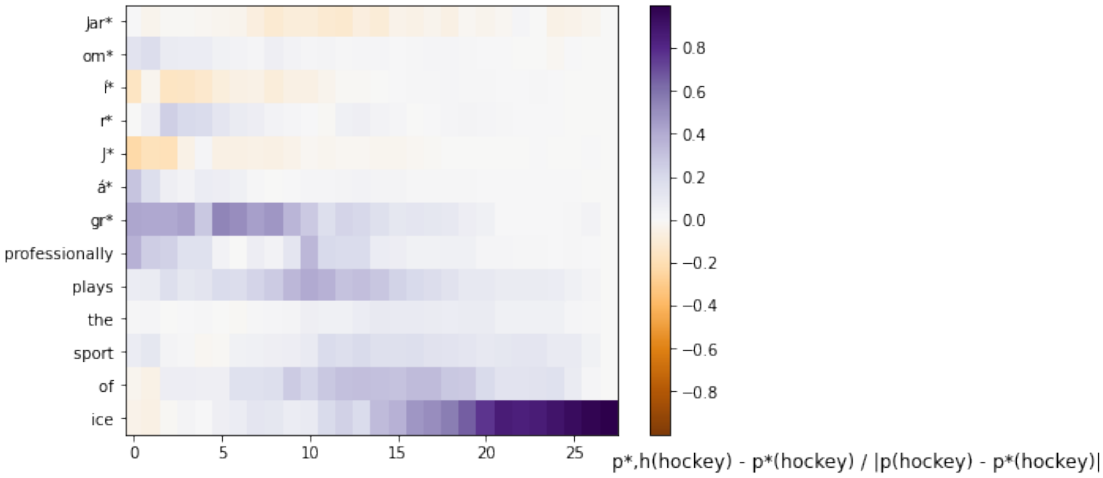

Don*
ato*
Bram*
ante*
died
in
the
city
of
0
5
10
15
20
25
0.946
0.710
0.473
0.236
0.000
−0.237
−0.473
−0.710
−0.946
p*,h(Rome) - p*(Rome) / |p(Rome) - p*(Rome)|

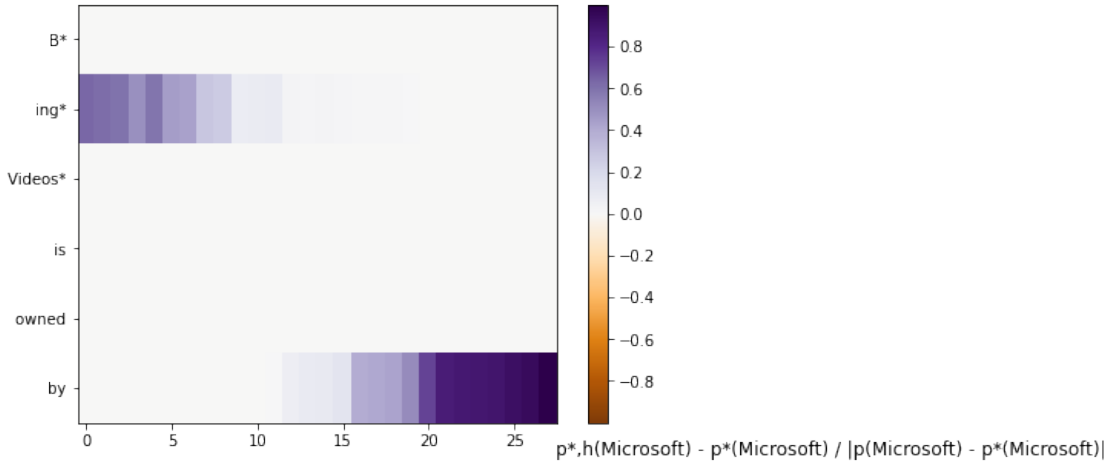

In
Sund*
sv*
all*
Municip*
ality*
,
the
language
spoken
is
0
5
10
15
20
25
1.135
0.851
0.568
0.284
0.000
−0.284
−0.567
−0.851
−1.135
p*,h(Swedish) - p*(Swedish) / |p(Swedish) - p*(Swedish)|

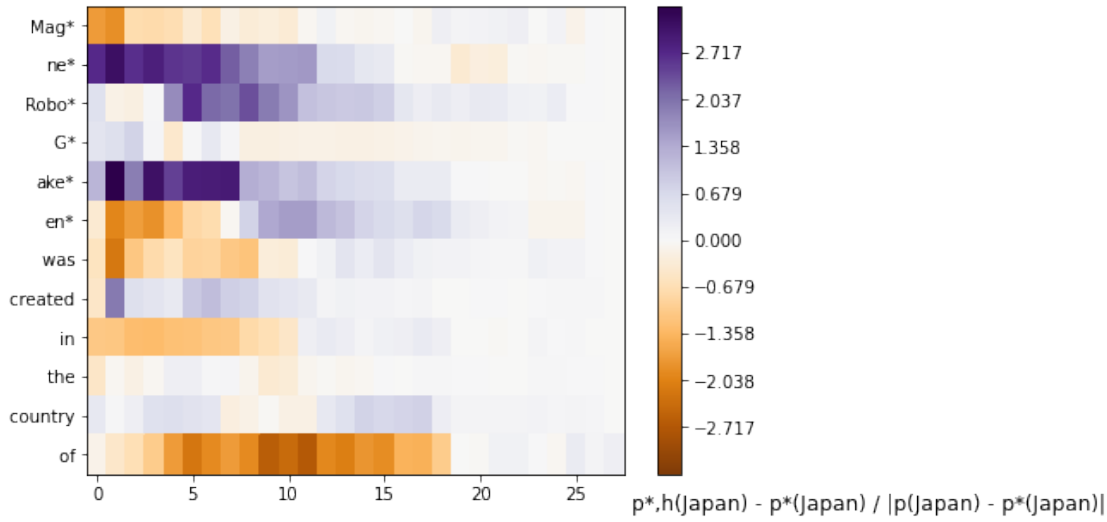

Bas*
il*
of*
Ca*
es*
area*
holds
the
title
of
the
first
0
5
10
15
20
25
3.178
2.383
1.589
0.794
0.000
−0.794
−1.589
−2.383
−3.178
p*,h(bishop) - p*(bishop) / |p(bishop) - p*(bishop)|

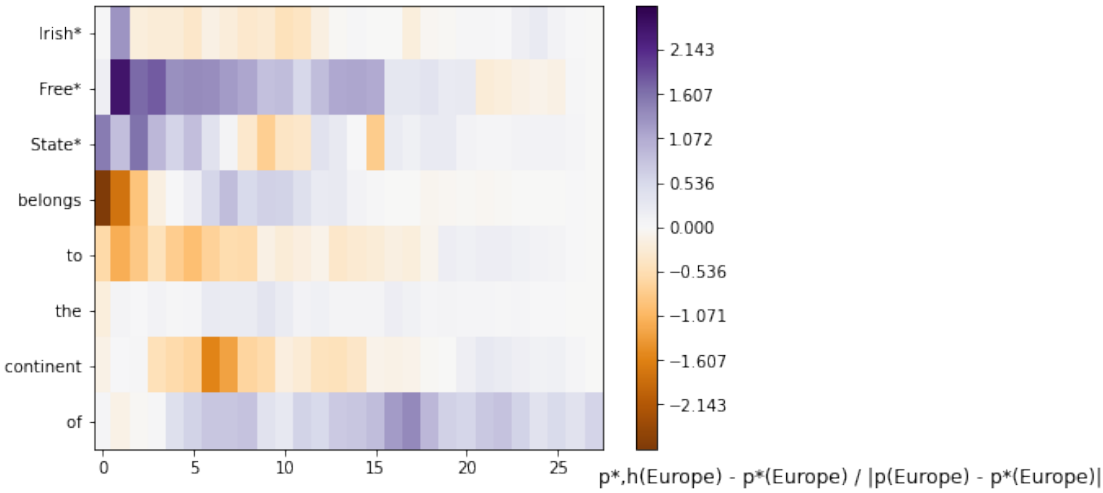

F*
ry*
der*
yk*
Chop*
in*
University*
of*
Music*
is
located
in
the
country
of
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Poland) - p*(Poland) / |p(Poland) - p*(Poland)|

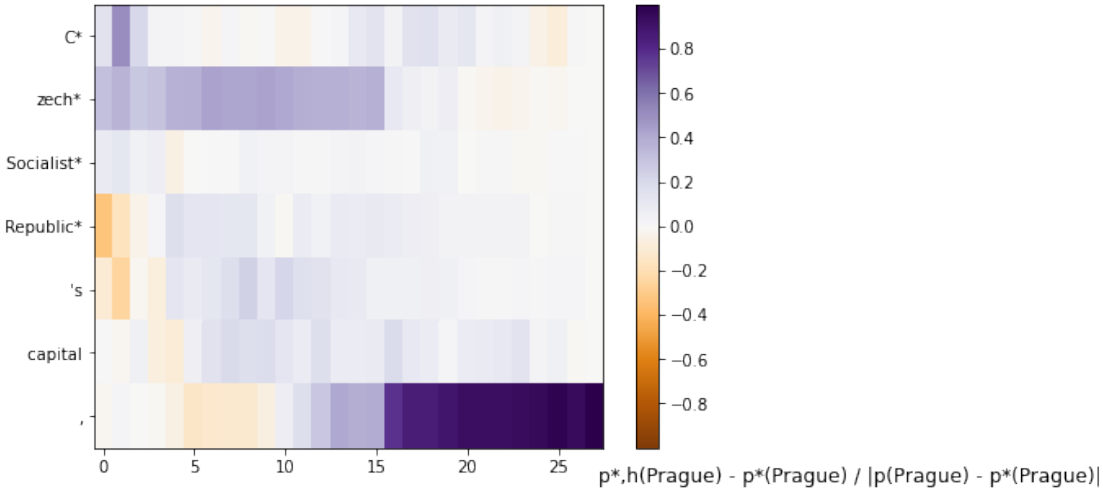

The
head
quarter
of
Minnesota*
St*
rik*
ers*
is
located
in
the
heart
of
downtown
0
5
10
15
20
25
1.767
1.326
0.884
0.442
0.000
−0.442
−0.883
−1.325
−1.767
p*,h(Minneapolis) - p*(Minneapolis) / |p(Minneapolis) - p*(Minneapolis)|

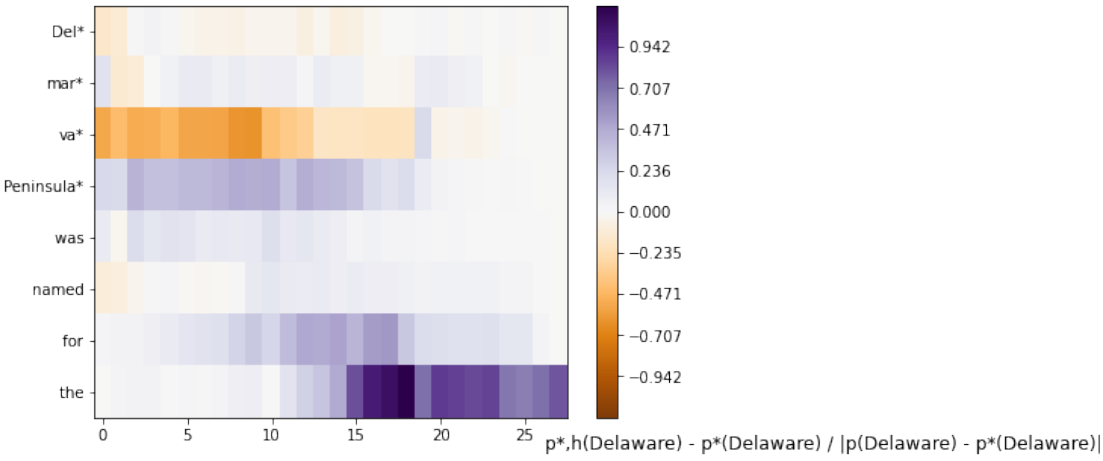

Jar*
om*
í*
r*
J*
á*
gr*
professionally
plays
the
sport
of
ice
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(hockey) - p*(hockey) / |p(hockey) - p*(hockey)|

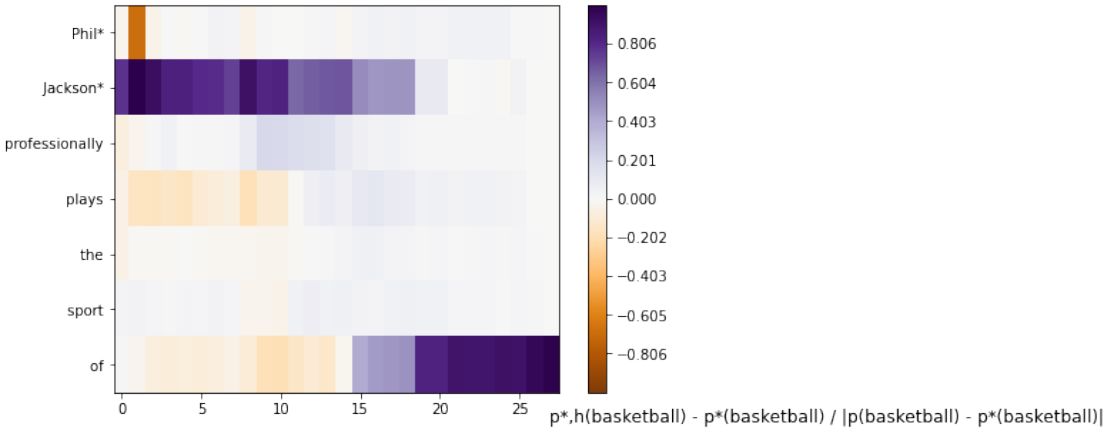

B*
ing*
Videos*
is
owned
by
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Microsoft) - p*(Microsoft) / |p(Microsoft) - p*(Microsoft)|

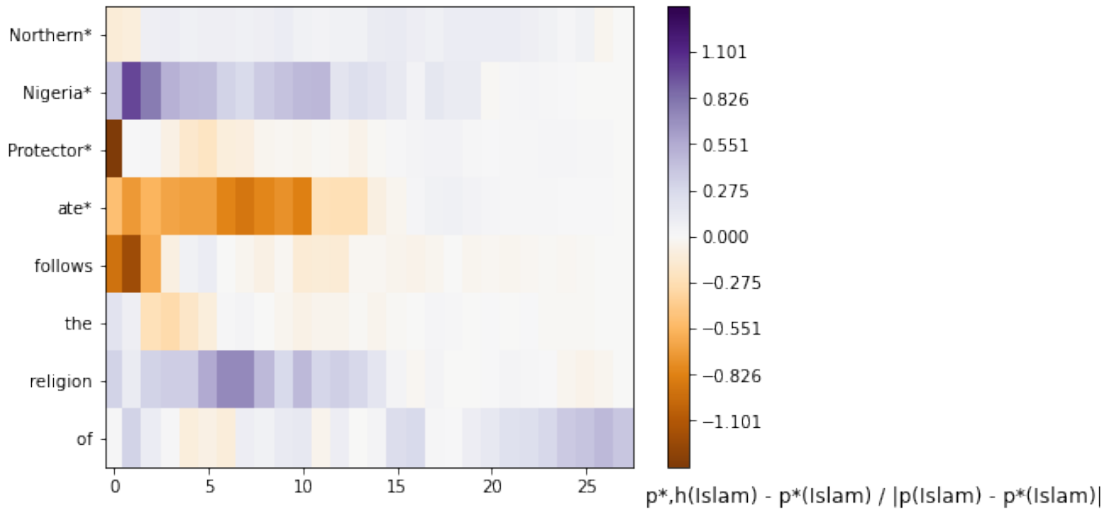

Mag*
ne*
Robo*
G*
ake*
en*
was
created
in
the
country
of
0
5
10
15
20
25
2.717
2.037
1.358
0.679
0.000
−0.679
−1.358
−2.038
−2.717
p*,h(Japan) - p*(Japan) / |p(Japan) - p*(Japan)|

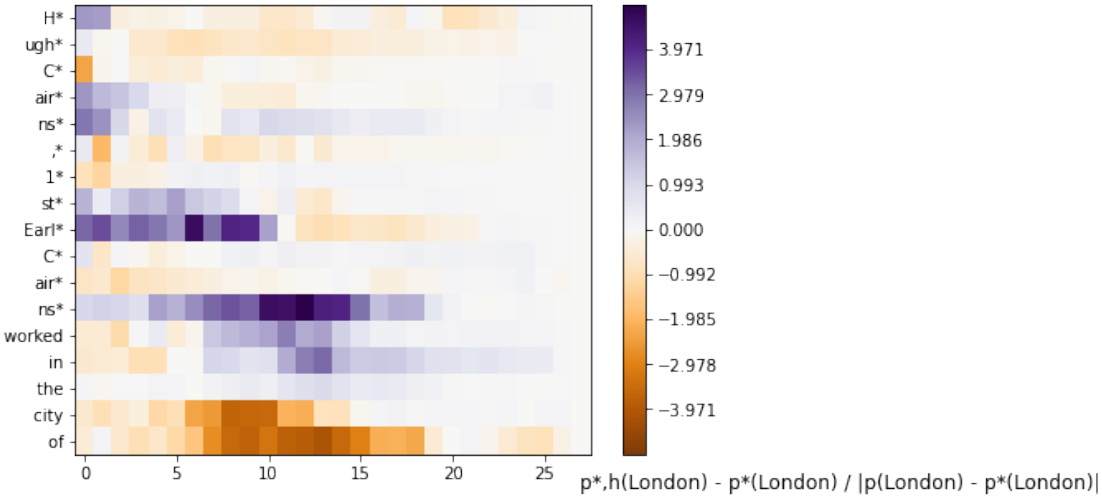

Irish*
Free*
State*
belongs
to
the
continent
of
0
5
10
15
20
25
2.143
1.607
1.072
0.536
0.000
−0.536
−1.071
−1.607
−2.143
p*,h(Europe) - p*(Europe) / |p(Europe) - p*(Europe)|

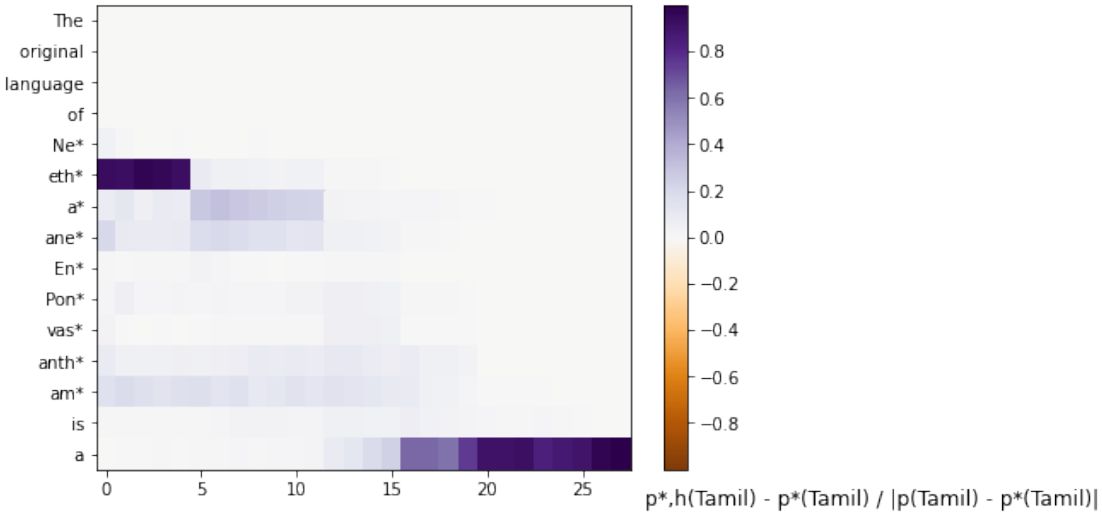

C*
zech*
Socialist*
Republic*
's
capital
,
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Prague) - p*(Prague) / |p(Prague) - p*(Prague)|

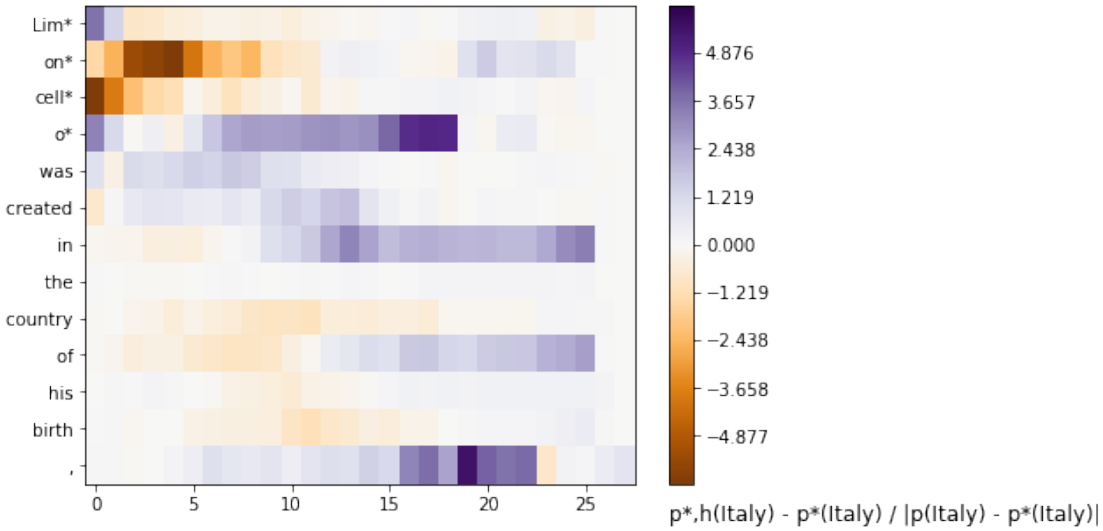

Del*
mar*
va*
Peninsula*
was
named
for
the
0
5
10
15
20
25
0.942
0.707
0.471
0.236
0.000
−0.235
−0.471
−0.707
−0.942
p*,h(Delaware) - p*(Delaware) / |p(Delaware) - p*(Delaware)|

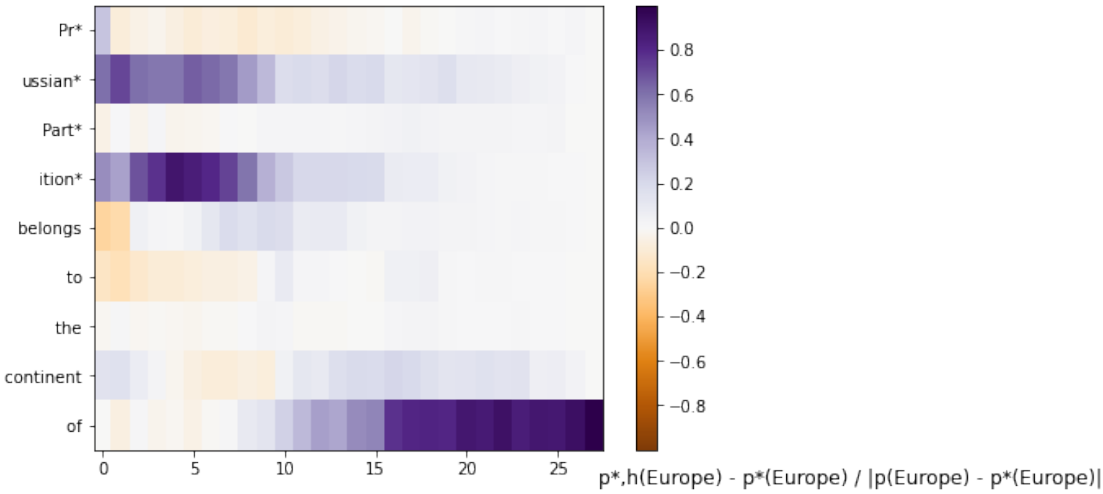

Phil*
Jackson*
professionally
plays
the
sport
of
0
5
10
15
20
25
0.806
0.604
0.403
0.201
0.000
−0.202
−0.403
−0.605
−0.806
p*,h(basketball) - p*(basketball) / |p(basketball) - p*(basketball)|

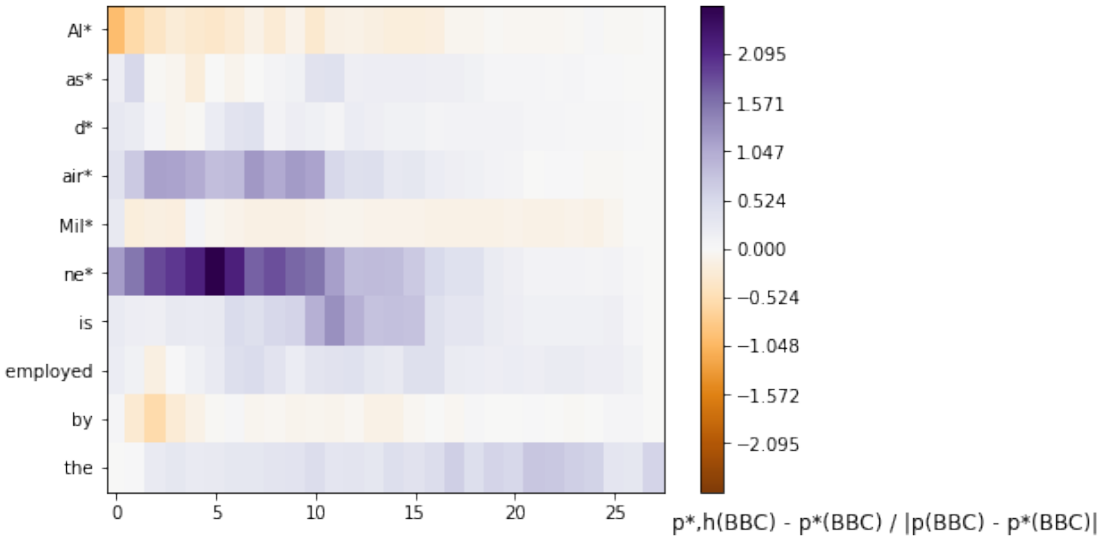

Northern*
Nigeria*
Protector*
ate*
follows
the
religion
of
0
5
10
15
20
25
1.101
0.826
0.551
0.275
0.000
−0.275
−0.551
−0.826
−1.101
p*,h(Islam) - p*(Islam) / |p(Islam) - p*(Islam)|

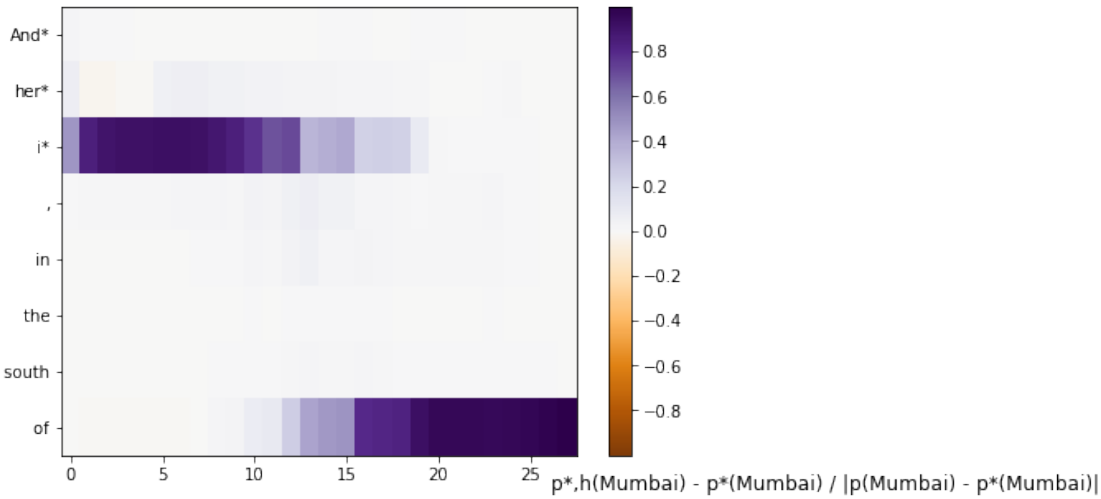

H*
ugh*
C*
air*
ns*
,*
1*
st*
Earl*
C*
air*
ns*
worked
in
the
city
of
0
5
10
15
20
25
3.971
2.979
1.986
0.993
0.000
−0.992
−1.985
−2.978
−3.971
p*,h(London) - p*(London) / |p(London) - p*(London)|

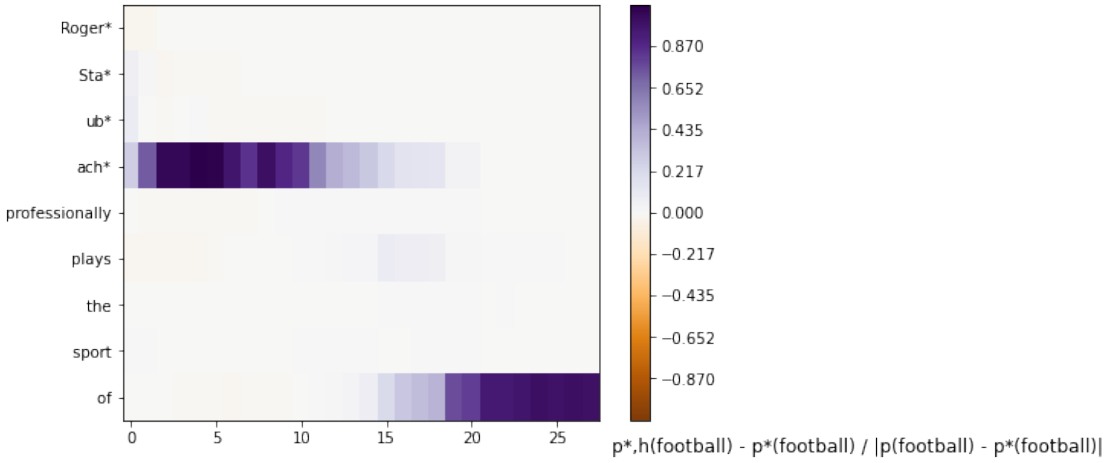

The
original
language
of
Ne*
eth*
a*
ane*
En*
Pon*
vas*
anth*
am*
is
a
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Tamil) - p*(Tamil) / |p(Tamil) - p*(Tamil)|

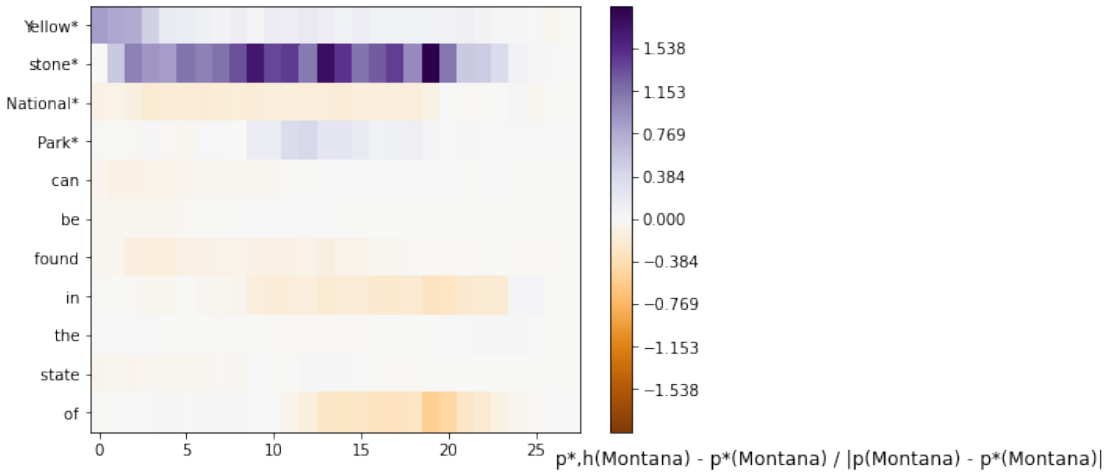

Lim*
on*
cell*
o*
was
created
in
the
country
of
his
birth
,
0
5
10
15
20
25
4.876
3.657
2.438
1.219
0.000
−1.219
−2.438
−3.658
−4.877
p*,h(Italy) - p*(Italy) / |p(Italy) - p*(Italy)|

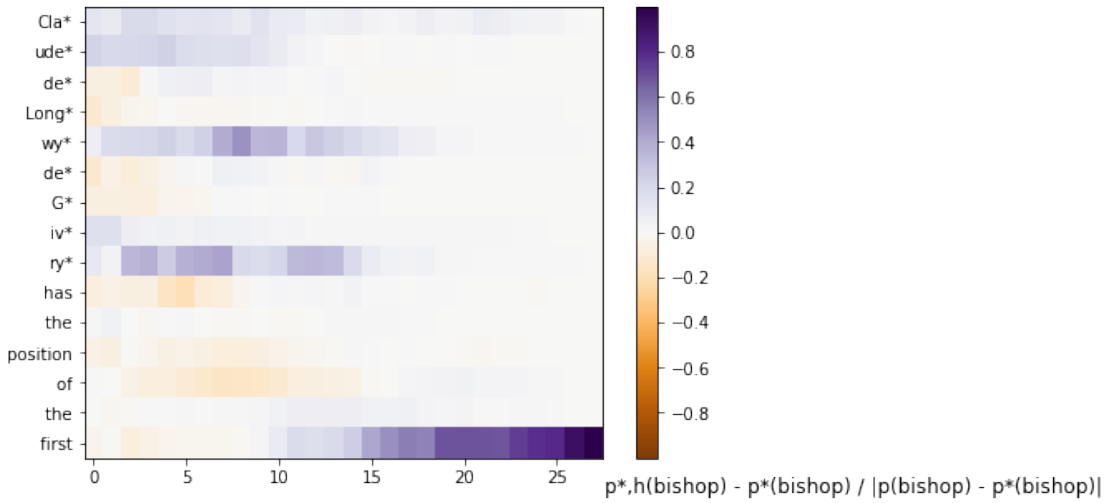

Pr*
ussian*
Part*
ition*
belongs
to
the
continent
of
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Europe) - p*(Europe) / |p(Europe) - p*(Europe)|

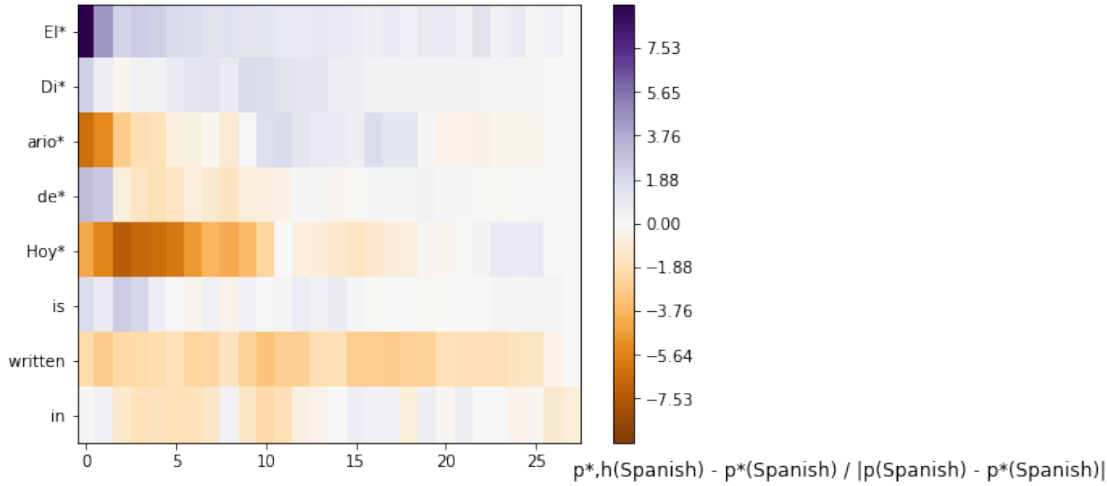

Al*
as*
d*
air*
Mil*
ne*
is
employed
by
the
0
5
10
15
20
25
2.095
1.571
1.047
0.524
0.000
−0.524
−1.048
−1.572
−2.095
p*,h(BBC) - p*(BBC) / |p(BBC) - p*(BBC)|

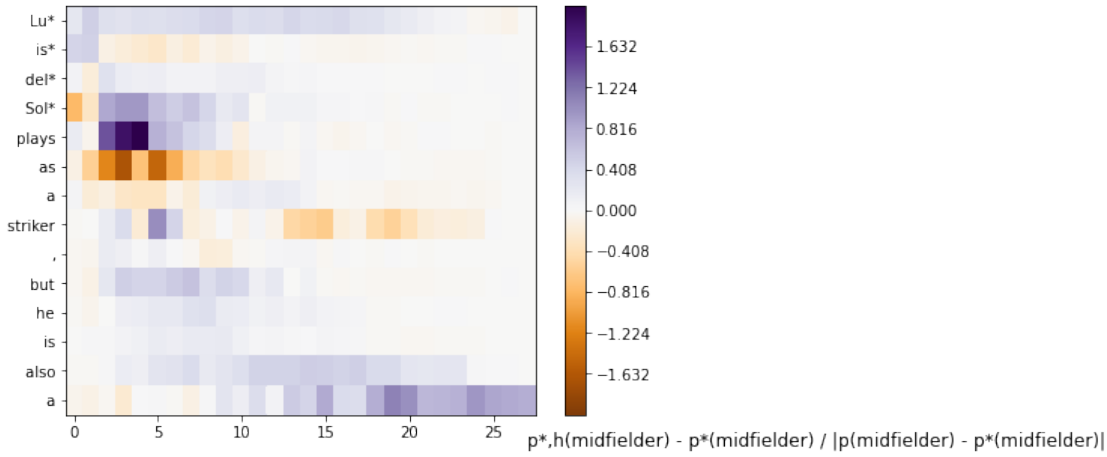

And*
her*
i*
,
in
the
south
of
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Mumbai) - p*(Mumbai) / |p(Mumbai) - p*(Mumbai)|

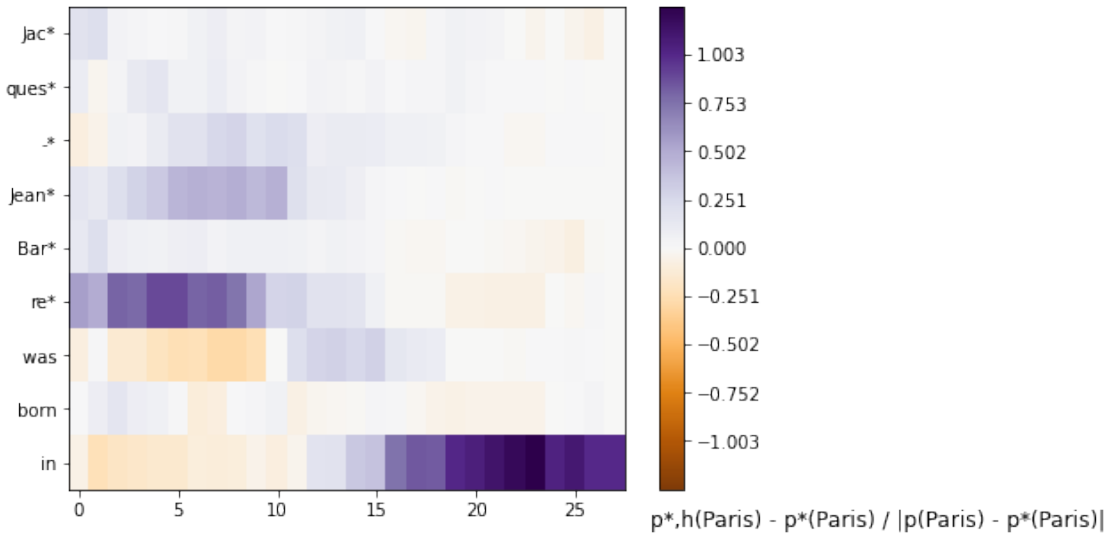

Roger*
Sta*
ub*
ach*
professionally
plays
the
sport
of
0
5
10
15
20
25
0.870
0.652
0.435
0.217
0.000
−0.217
−0.435
−0.652
−0.870
p*,h(football) - p*(football) / |p(football) - p*(football)|

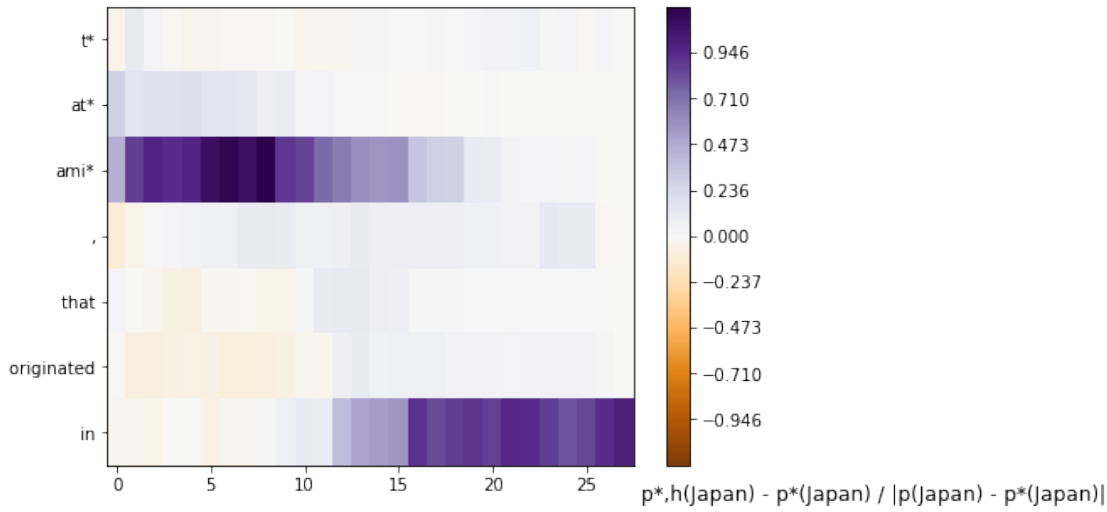

Yellow*
stone*
National*
Park*
can
be
found
in
the
state
of
0
5
10
15
20
25
1.538
1.153
0.769
0.384
0.000
−0.384
−0.769
−1.153
−1.538
p*,h(Montana) - p*(Montana) / |p(Montana) - p*(Montana)|

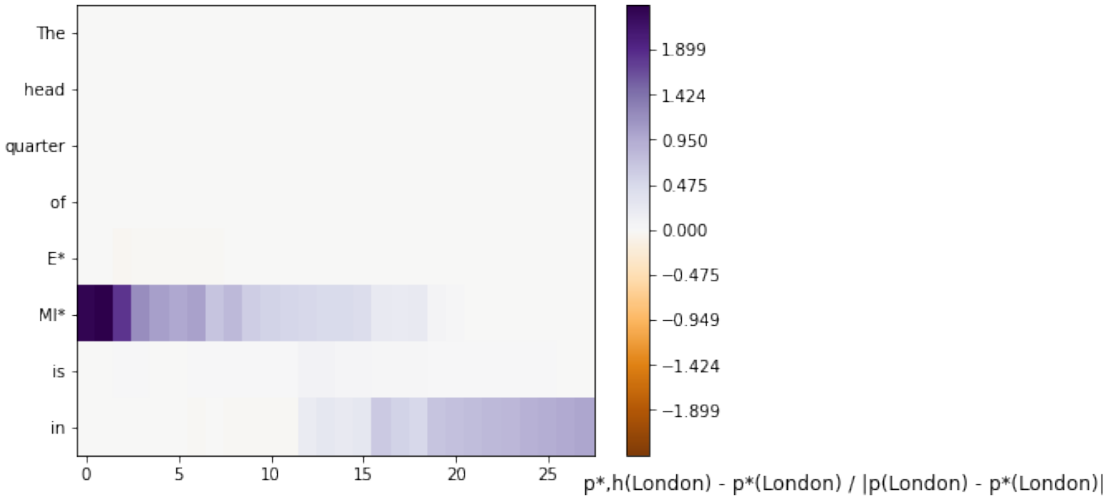

Cla*
ude*
de*
Long*
wy*
de*
G*
iv*
ry*
has
the
position
of
the
first
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(bishop) - p*(bishop) / |p(bishop) - p*(bishop)|

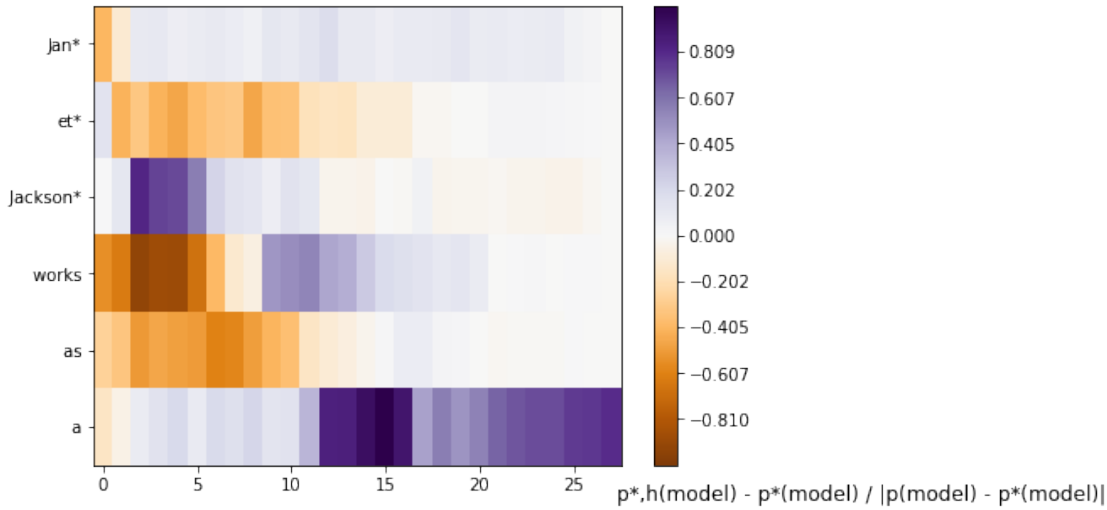

El*
Di*
ario*
de*
Hoy*
is
written
in
0
5
10
15
20
25
7.53
5.65
3.76
1.88
0.00
−1.88
−3.76
−5.64
−7.53
p*,h(Spanish) - p*(Spanish) / |p(Spanish) - p*(Spanish)|

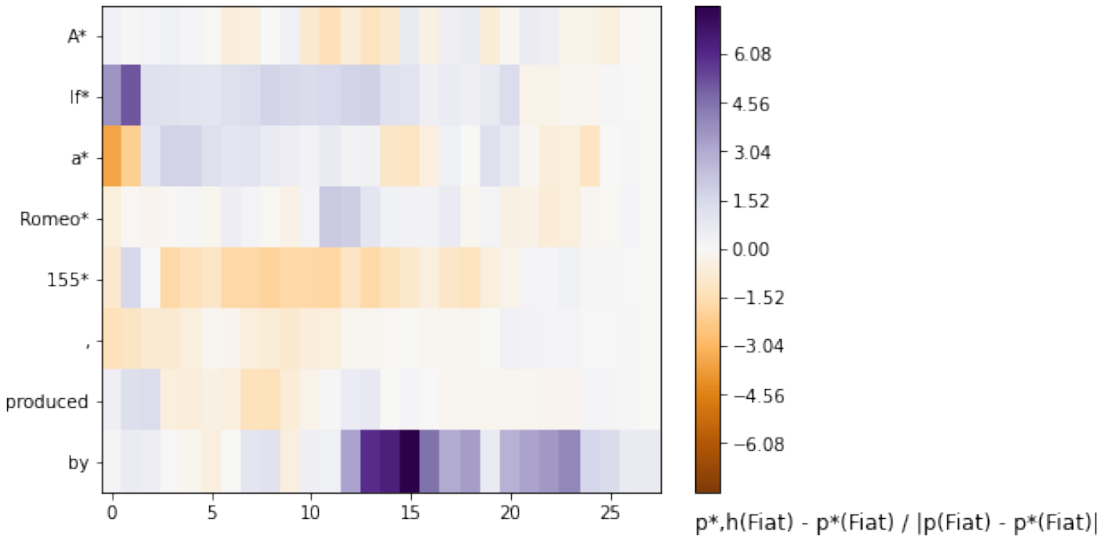

Lu*
is*
del*
Sol*
plays
as
a
striker
,
but
he
is
also
a
0
5
10
15
20
25
1.632
1.224
0.816
0.408
0.000
−0.408
−0.816
−1.224
−1.632
p*,h(midfielder) - p*(midfielder) / |p(midfielder) - p*(midfielder)|

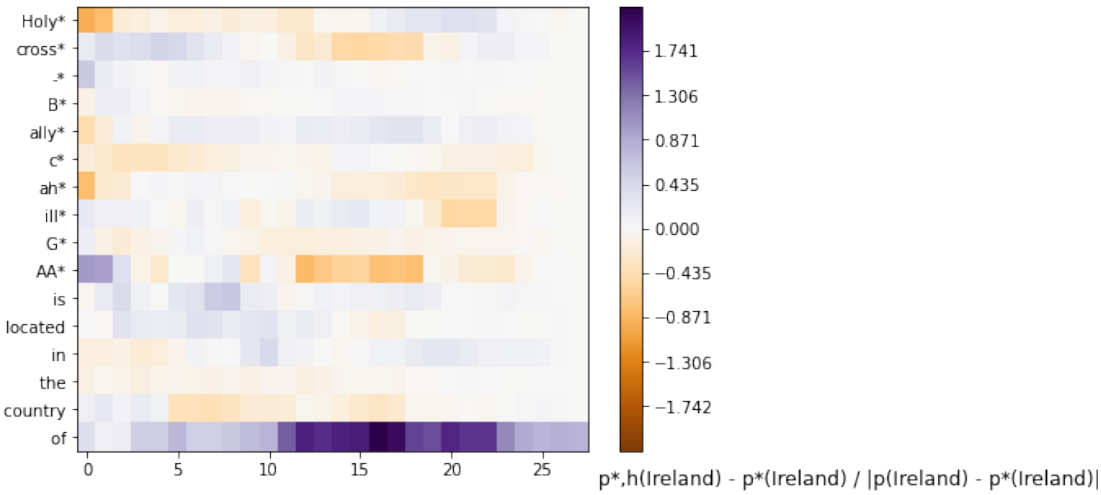

Jac*
ques*
-*
Jean*
Bar*
re*
was
born
in
0
5
10
15
20
25
1.003
0.753
0.502
0.251
0.000
−0.251
−0.502
−0.752
−1.003
p*,h(Paris) - p*(Paris) / |p(Paris) - p*(Paris)|

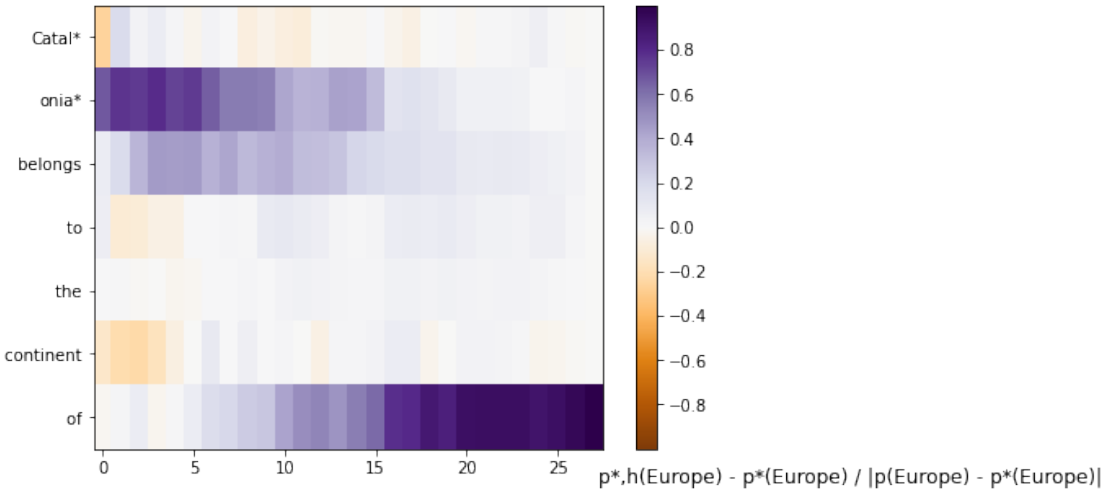

t*
at*
ami*
,
that
originated
in
0
5
10
15
20
25
0.946
0.710
0.473
0.236
0.000
−0.237
−0.473
−0.710
−0.946
p*,h(Japan) - p*(Japan) / |p(Japan) - p*(Japan)|

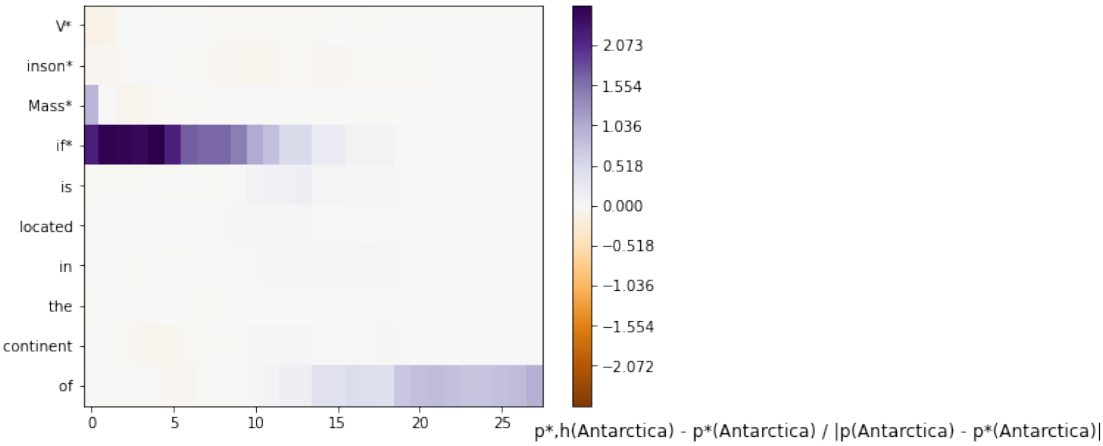

The
head
quarter
of
E*
MI*
is
in
0
5
10
15
20
25
1.899
1.424
0.950
0.475
0.000
−0.475
−0.949
−1.424
−1.899
p*,h(London) - p*(London) / |p(London) - p*(London)|

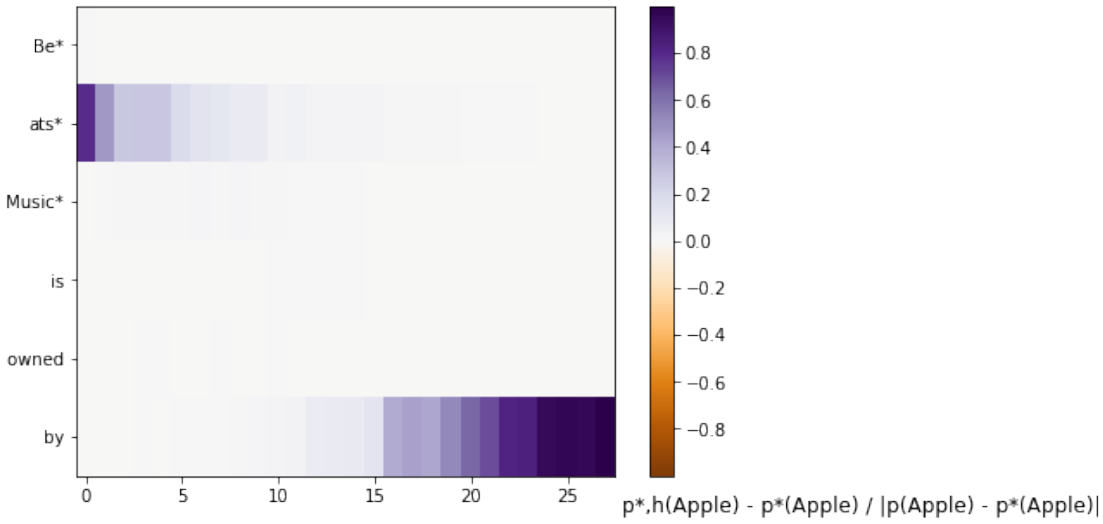

Jan*
et*
Jackson*
works
as
a
0
5
10
15
20
25
0.809
0.607
0.405
0.202
0.000
−0.202
−0.405
−0.607
−0.810
p*,h(model) - p*(model) / |p(model) - p*(model)|

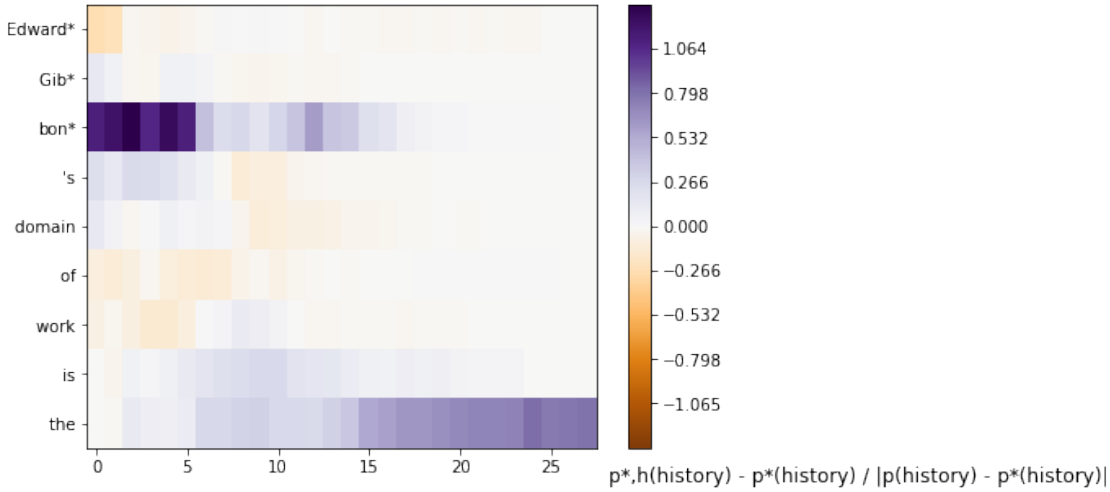

A*
If*
a*
Romeo*
155*
,
produced
by
0
5
10
15
20
25
6.08
4.56
3.04
1.52
0.00
−1.52
−3.04
−4.56
−6.08
p*,h(Fiat) - p*(Fiat) / |p(Fiat) - p*(Fiat)|

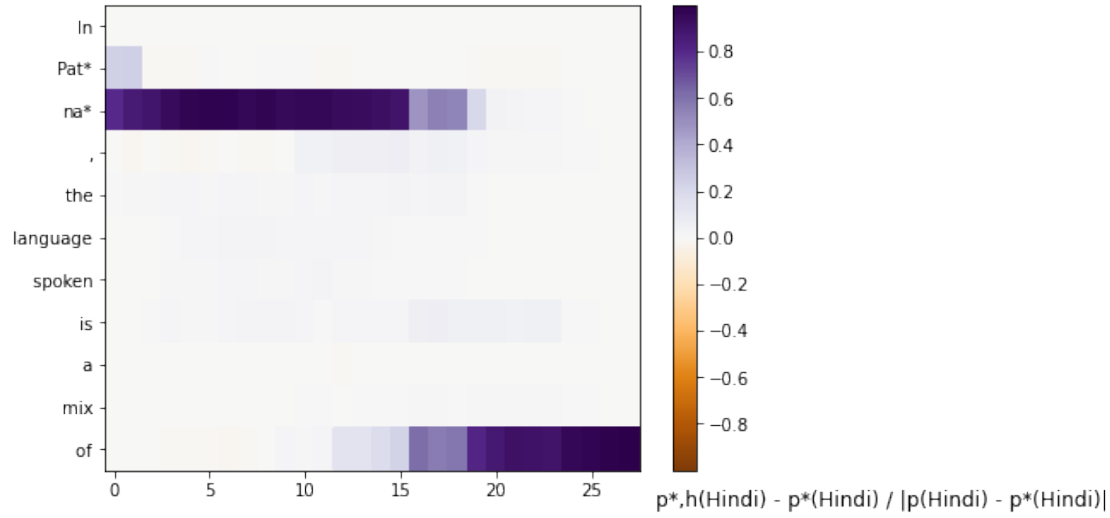

Holy*
cross*
-*
B*
ally*
c*
ah*
ill*
G*
AA*
is
located
in
the
country
of
0
5
10
15
20
25
1.741
1.306
0.871
0.435
0.000
−0.435
−0.871
−1.306
−1.742
p*,h(Ireland) - p*(Ireland) / |p(Ireland) - p*(Ireland)|


Catal*
onia*
belongs
to
the
continent
of
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Europe) - p*(Europe) / |p(Europe) - p*(Europe)|


V*
inson*
Mass*
if*
is
located
in
the
continent
of
0
5
10
15
20
25
2.073
1.554
1.036
0.518
0.000
−0.518
−1.036
−1.554
−2.072
p*,h(Antarctica) - p*(Antarctica) / |p(Antarctica) - p*(Antarctica)|


Be*
ats*
Music*
is
owned
by
0
5
10
15
20
25
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.8
p*,h(Apple) - p*(Apple) / |p(Apple) - p*(Apple)|





[9]:
```
# zero cutoff
for prob, access in res:
    text, tkens, num_layers, _, _ = access
    x = num_layers
    y = tkens
    c = 0.001
    lower_bound = 0
    upper_bound = max(torch.max(prob).item(), c)
    incr = (upper_bound - lower_bound) / 10000
    token = text.split()[-1]
```