

System_alignement_example

October 25, 2018

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In [2]: import networkx as nx
        from networkx import *
        import matplotlib.pyplot as plt
        from networkx.algorithms import bipartite
        from nltk import sent_tokenize, word_tokenize
        import numpy as np

        import sys
        sys.path.append('../..')
        sys.path.append('../../utils/')
        from utils import *
        import operator

        import fastText
        model = fastText.load_model('../..../Divers_Data_Maitrise/wiki.simple/wiki.simple.bin')

        #ignorer toutes les depreciations de fonctions
        import warnings
        warnings.simplefilter('ignore')

In [29]: def Alignement_graph_bipartite(question, sequence, list_alignements):
        '''
        Fonction qui crée un graphe bipartit (question, sentence) et qui affecte la similarité
        cosinus comme poids de chaque arête. L'arête en trait plein représente la plus forte
        similarité, les autres similarités seront affichées avec des traits discontinus.
        :list_alignements: les alignements relisés par l'algorithme
        '''

        G=nx.Graph()

        list_words_question = word_tokenize(question.lower())
        list_words_sequence = word_tokenize(sequence.lower())

        nb_words_question = len(list_words_question)
        nb_words_sequence = len(list_words_sequence)
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height_column = max(nb_words_question,nb_words_sequence)
y_linspace_question = np.linspace(0,height_column,nb_words_question)
y_linspace_sentence = np.linspace(0,height_column,nb_words_sequence)

fixed_positions={}
labels={}

list_edges = []
edge_labels = {}
for i in range(0,nb_words_sequence): # mots de la phrase
    num_node = nb_words_question + i
    G.add_node(num_node)
    labels[num_node]=list_words_sequence[i]

    fixed_positions[num_node] = (2,y_linspace_sentence[nb_words_sequence-i-1])

for i in range(0,nb_words_question): # mots de la question
    G.add_node(i)
    labels[i]=list_words_question[i]
    fixed_positions[i] = (0,y_linspace_question[nb_words_question-i-1])

for elem in list_alignements:
    G.add_edge(elem[0][0],elem[0][1] + nb_words_question,sim=elem[1])
    list_edges.append((elem[0][0],elem[0][1] + nb_words_question))
    edge_labels[(elem[0][0],elem[0][1] + nb_words_question)]=elem[1]

pos = nx.spring_layout(G,pos=fixed_positions, fixed=fixed_positions.keys())
plt.figure(3,figsize=(15,height_column*1.75))
nx.draw_networkx_nodes(G,pos,node_color='w',node_size=2500)
nx.draw_networkx_labels(G,pos,labels,font_size=14)
nx.draw_networkx_edge_labels(G,pos,node_color='b',edge_labels=edge_labels, label_pos='center')
nx.draw_networkx_edges(G,pos,node_color='b', edgelist =list_edges, width = 1.0)

plt.axis('off')
# plt.savefig("Graph.png", format="PNG") # pour enregistrer l'image dans un fichier
plt.show()

In [59]: def affiche_table_cosine(question,sequence):
    list_words_question = word_tokenize(question.lower())
    list_words_sequence = word_tokenize(sequence.lower())

    dict_table = {}

    for word_question in list_words_question:
        dict_table[word_question] = []
        vect_word_question = model.get_word_vector(word_question)
        for word_sentence in list_words_sequence:

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        vect_word_sentence = model.get_word_vector(word_sentence)
        sim = cosine_similarity(vect_word_sentence, vect_word_question)
        dict_table[word_question].append(sim)
    df = pd.DataFrame(dict_table, index=list_words_sequence)
    print(df)

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In [79]: Alignement_graph_bipartite( "How many teams have won 15 regular season games since the
affiche_table_cosine("How many teams have won 15 regular season games since the 16-game
question=" How many teams have won 15 regular season games since the 16-game schedule w
sequence=" Despite waiving longtime running back DeAngelo Williams and losing top wide
print("question = ", question)
print("sequence = ",sequence)
print("span output: preseason , the ")
print("reponses attendu: [{'answer_start': 326, 'text': '7'}, {'answer_start': 220, 'te

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	how	many	teams	have	won	15 \
despite	0.180111	0.297788	0.141456	0.334557	0.176312	0.033477
waiving	0.263417	0.279821	0.228723	0.335760	0.208942	0.098574
longtime	0.105054	0.260237	0.198382	0.171893	0.216077	0.109043
running	0.227199	0.248257	0.217001	0.286345	0.292591	0.050586
back	0.255732	0.251295	0.197347	0.335931	0.202551	0.048293
deangelo	0.159614	0.218451	0.191050	0.148227	0.200330	-0.018474
williams	0.157942	0.172824	0.320829	0.257460	0.241178	0.135079
and	0.336480	0.529627	0.219734	0.471179	0.279577	0.031420
losing	0.232618	0.188162	0.246398	0.271993	0.461057	0.113969
top	0.185462	0.201825	0.248208	0.245869	0.236787	-0.058112
wide	0.209433	0.321058	0.114865	0.279591	0.099887	-0.056186
receiver	0.177237	0.142125	0.272061	0.191896	0.246188	-0.032226
kelvin	0.208951	0.096850	0.141148	0.172929	0.116471	0.019504
benjamin	0.174087	0.154768	0.112150	0.161794	0.268103	-0.041533
to	0.441697	0.402437	0.263469	0.454474	0.194594	-0.047946
a	0.293126	0.287221	0.211636	0.338717	0.225341	-0.052464
torn	0.170130	0.156318	0.169949	0.276338	0.186614	0.104502
acl	0.107209	0.129488	0.235037	0.187237	0.222972	0.017298
in	0.260117	0.414742	0.263953	0.368436	0.328049	0.024242
the	0.338904	0.433521	0.316493	0.403897	0.294325	-0.011810
preseason	0.220739	0.209818	0.445420	0.250791	0.307590	0.004544
,	0.226594	0.406108	0.222206	0.354162	0.359686	-0.035634
the	0.338904	0.433521	0.316493	0.403897	0.294325	-0.011810
carolina	0.148251	0.123997	0.229455	0.141258	0.163812	-0.002091
panthers	0.111778	0.147440	0.410049	0.204936	0.269234	0.169275
had	0.254914	0.401307	0.192255	0.626340	0.300312	0.012124
their	0.331670	0.457425	0.267495	0.523271	0.179861	0.062653
best	0.254412	0.259000	0.207685	0.201879	0.426204	0.108302
regular	0.235846	0.314910	0.334722	0.367556	0.201614	-0.009972
season	0.130361	0.142518	0.445702	0.202353	0.265814	0.058131
in	0.260117	0.414742	0.263953	0.368436	0.328049	0.024242
franchise	0.142177	0.193759	0.338682	0.229242	0.231296	0.001347
history	0.286139	0.274684	0.178423	0.244350	0.206597	0.042487
,	0.226594	0.406108	0.222206	0.354162	0.359686	-0.035634
becoming	0.198751	0.274330	0.187838	0.257992	0.234767	-0.022408
the	0.338904	0.433521	0.316493	0.403897	0.294325	-0.011810
seventh	0.101395	0.109816	0.205766	0.120836	0.208083	0.070224
team	0.098680	0.093263	0.673423	0.160415	0.351719	0.118830
to	0.441697	0.402437	0.263469	0.454474	0.194594	-0.047946
win	0.166230	0.151836	0.350152	0.198245	0.667466	0.089423
at	0.215422	0.271697	0.254277	0.290048	0.283724	-0.010676
least	0.283933	0.361893	0.176886	0.451210	0.163509	-0.063072
15	-0.005761	-0.027125	0.038465	0.005345	0.083681	1.000000
regular	0.235846	0.314910	0.334722	0.367556	0.201614	-0.009972

season	0.130361	0.142518	0.445702	0.202353	0.265814	0.058131
games	0.108149	0.217165	0.455288	0.240156	0.324332	-0.002226
since	0.234743	0.343863	0.228121	0.477846	0.284260	-0.003096
the	0.338904	0.433521	0.316493	0.403897	0.294325	-0.011810
league	0.045799	0.157461	0.573230	0.194589	0.332796	0.072033
expanded	0.197929	0.251812	0.158054	0.309046	0.190785	-0.117138
to	0.441697	0.402437	0.263469	0.454474	0.194594	-0.047946
a	0.293126	0.287221	0.211636	0.338717	0.225341	-0.052464
16-game	0.275080	0.228457	0.338997	0.238581	0.247489	0.065076
schedule	0.239493	0.230979	0.233618	0.242376	0.126313	0.031279
in	0.260117	0.414742	0.263953	0.368436	0.328049	0.024242
1978	-0.038505	0.065850	0.087149	0.005109	0.049827	-0.085761
.	0.328722	0.397423	0.234591	0.416144	0.301180	-0.057412

	regular	season	games	since	the	16-game \
despite	0.225873	0.258903	0.148366	0.290974	0.317269	0.189572
waiving	0.282302	0.209527	0.246368	0.234999	0.369442	0.259502
longtime	0.155047	0.179011	0.198846	0.311273	0.271729	0.225460
running	0.207441	0.175229	0.201726	0.225550	0.288835	0.246922
back	0.209545	0.168282	0.175986	0.311839	0.361210	0.261779
deangelo	0.099807	0.140868	0.161949	0.185652	0.202465	0.197661
williams	0.181226	0.242839	0.193535	0.214941	0.208523	0.204329
and	0.305448	0.236931	0.233536	0.351557	0.517126	0.234318
losing	0.236075	0.231643	0.258659	0.255746	0.311469	0.295866
top	0.284245	0.243441	0.175841	0.142871	0.317541	0.231332
wide	0.225327	0.107841	0.122227	0.153438	0.280781	0.170723
receiver	0.203370	0.219469	0.182166	0.104370	0.218505	0.228965
kelvin	0.126860	0.123911	0.099783	0.109878	0.205885	0.181737
benjamin	0.102508	0.113613	0.107168	0.157897	0.250704	0.150587
to	0.308612	0.223827	0.233814	0.373376	0.535392	0.295066
a	0.313108	0.185551	0.197538	0.330359	0.582920	0.313092
torn	0.162262	0.198882	0.133131	0.248833	0.270182	0.185442
acl	0.178129	0.318511	0.174978	0.131873	0.238456	0.210186
in	0.231728	0.218402	0.248021	0.432568	0.666239	0.274357
the	0.321409	0.250716	0.267614	0.405496	1.000000	0.339044
preseason	0.382976	0.687945	0.430942	0.250387	0.323481	0.402102
,	0.233654	0.223237	0.277811	0.399143	0.493308	0.256312
the	0.321409	0.250716	0.267614	0.405496	1.000000	0.339044
carolina	0.146012	0.219629	0.186588	0.173214	0.247492	0.213253
panthers	0.211787	0.386789	0.386645	0.125185	0.260278	0.293662
had	0.264792	0.197897	0.184041	0.484540	0.387585	0.171476
their	0.336457	0.212954	0.222925	0.266829	0.516537	0.276102
best	0.229612	0.200425	0.204019	0.164104	0.313411	0.264441
regular	1.000000	0.400253	0.249026	0.264780	0.321409	0.263402
season	0.400253	1.000000	0.343304	0.256684	0.250716	0.318912
in	0.231728	0.218402	0.248021	0.432568	0.666239	0.274357
franchise	0.279265	0.375449	0.410046	0.277458	0.308724	0.411743
history	0.146328	0.139058	0.214949	0.342751	0.332150	0.288808

,	0.233654	0.223237	0.277811	0.399143	0.493308	0.256312
becoming	0.218807	0.228466	0.174944	0.376643	0.333666	0.213870
the	0.321409	0.250716	0.267614	0.405496	1.000000	0.339044
seventh	0.152667	0.251055	0.165338	0.217874	0.367325	0.202213
team	0.247664	0.345138	0.392494	0.220517	0.225642	0.363316
to	0.308612	0.223827	0.233814	0.373376	0.535392	0.295066
win	0.196616	0.268524	0.349600	0.198052	0.283087	0.327263
at	0.252475	0.181201	0.230068	0.309608	0.457213	0.241601
least	0.324478	0.191010	0.228198	0.328643	0.342888	0.213631
15	-0.009972	0.058131	-0.002226	-0.003096	-0.011810	0.065076
regular	1.000000	0.400253	0.249026	0.264780	0.321409	0.263402
season	0.400253	1.000000	0.343304	0.256684	0.250716	0.318912
games	0.249026	0.343304	1.000000	0.316093	0.267614	0.629963
since	0.264780	0.256684	0.316093	1.000000	0.405496	0.215949
the	0.321409	0.250716	0.267614	0.405496	1.000000	0.339044
league	0.290990	0.414189	0.370657	0.223738	0.272415	0.345831
expanded	0.207059	0.116120	0.147182	0.290600	0.325889	0.243250
to	0.308612	0.223827	0.233814	0.373376	0.535392	0.295066
a	0.313108	0.185551	0.197538	0.330359	0.582920	0.313092
16-game	0.263402	0.318912	0.629963	0.215949	0.339044	1.000000
schedule	0.361747	0.293083	0.202161	0.209453	0.219864	0.173709
in	0.231728	0.218402	0.248021	0.432568	0.666239	0.274357
1978	0.042647	0.089499	0.074231	0.093140	0.131482	-0.010490
.	0.277888	0.246747	0.271731	0.431787	0.593451	0.361634

	schedule	was	adopted	?
despite	0.171174	0.365062	0.222702	0.143505
waiving	0.214654	0.269803	0.288993	0.242996
longtime	0.168890	0.336540	0.282689	0.076577
running	0.291185	0.209397	0.109022	0.156797
back	0.174768	0.243898	0.189217	0.239777
deangelo	0.149472	0.282707	0.151047	0.183706
williams	0.130945	0.233171	0.141956	0.192441
and	0.215392	0.374096	0.188085	0.205442
losing	0.152900	0.224553	0.149819	0.150564
top	0.101906	0.138165	0.064725	0.172652
wide	0.107690	0.155245	0.126853	0.127194
receiver	0.133779	0.189642	0.144626	0.115879
kelvin	0.104701	0.181171	0.159425	0.181970
benjamin	0.126865	0.243780	0.208396	0.203364
to	0.284790	0.363635	0.193978	0.294633
a	0.207679	0.450847	0.215172	0.239167
torn	0.072722	0.293884	0.101129	0.135640
acl	0.143709	0.149036	0.000230	0.147369
in	0.205257	0.455141	0.226372	0.204310
the	0.219864	0.487115	0.234625	0.220681
preseason	0.322975	0.260302	0.121168	0.138842
,	0.183580	0.454561	0.194890	0.310912

the	0.219864	0.487115	0.234625	0.220681
carolina	0.066136	0.266870	0.099721	0.118474
panthers	0.204375	0.260562	0.204777	0.166090
had	0.166382	0.592721	0.311367	0.207284
their	0.237617	0.239630	0.226675	0.189825
best	0.174683	0.281784	0.112433	0.279905
regular	0.361747	0.151379	0.078622	0.183347
season	0.293083	0.247980	0.102372	0.167933
in	0.205257	0.455141	0.226372	0.204310
franchise	0.191540	0.252087	0.129111	0.134455
history	0.151329	0.255890	0.116280	0.250197
,	0.183580	0.454561	0.194890	0.310912
becoming	0.175846	0.398939	0.183610	0.173541
the	0.219864	0.487115	0.234625	0.220681
seventh	0.188000	0.349946	0.174989	0.109815
team	0.168041	0.139865	0.174662	0.112434
to	0.284790	0.363635	0.193978	0.294633
win	0.142705	0.290976	0.134393	0.187312
at	0.259995	0.367078	0.106099	0.219786
least	0.231940	0.207913	0.150709	0.288669
15	0.031279	0.083816	0.065651	-0.010706
regular	0.361747	0.151379	0.078622	0.183347
season	0.293083	0.247980	0.102372	0.167933
games	0.202161	0.215966	0.109142	0.136000
since	0.209453	0.438466	0.292237	0.287659
the	0.219864	0.487115	0.234625	0.220681
league	0.133252	0.214258	0.165890	0.159415
expanded	0.218005	0.236901	0.253048	0.212436
to	0.284790	0.363635	0.193978	0.294633
a	0.207679	0.450847	0.215172	0.239167
16-game	0.173709	0.219238	0.112269	0.266394
schedule	1.000000	0.217440	0.153587	0.167436
in	0.205257	0.455141	0.226372	0.204310
1978	-0.009666	0.087750	0.085754	0.063649
.	0.179020	0.401462	0.160398	0.413095

question = How many teams have won 15 regular season games since the 16-game schedule was adop

sequence = Despite waiving longtime running back DeAngelo Williams and losing top wide receive

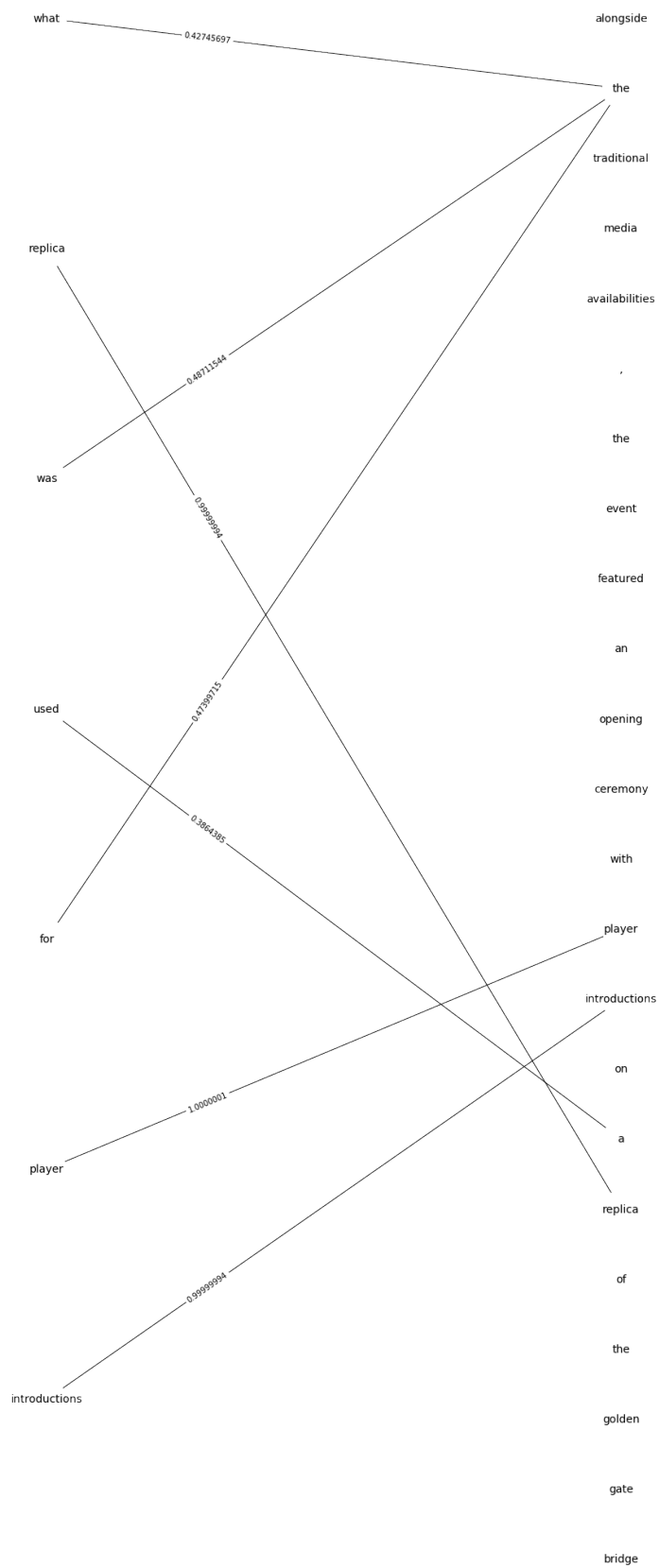
span output: preseason , the

reponses attendu: [{'answer_start': 326, 'text': '7'}, {'answer_start': 220, 'text': 'seventh'}],

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In [80]: Aligment_graph_bipartite( "What replica was used for player introductions?","Alongsid
affiche_table_cosine("What replica was used for player introductions?","Alongside the t
question=" What replica was used for player introductions? "
sequence=" Alongside the traditional media availabilities, the event featured an openin
print("question = ", question)
print("sequence = ",sequence)
print("span output: traditional media availabilities , the event featured an opening ce
```



```
print("reponses attendu: [{'answer_start': 362, 'text': 'the Golden Gate Bridge.'}], {'a
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	what	replica	was	used	for	player \
alongside	0.154390	0.155846	0.186976	0.179456	0.216323	0.211146
the	0.427457	0.257688	0.487115	0.371838	0.473997	0.199008
traditional	0.200668	0.083898	0.178453	0.344156	0.243826	0.149032
media	0.182921	0.114526	0.178418	0.193232	0.244234	0.208704
availabilities	0.266779	0.159701	0.097925	0.344356	0.349357	0.070680
,	0.308747	0.133075	0.454561	0.312040	0.446487	0.258263
the	0.427457	0.257688	0.487115	0.371838	0.473997	0.199008
event	0.269814	0.167502	0.283412	0.192439	0.216481	0.114942
featured	0.203304	0.127840	0.306452	0.248458	0.307274	0.191346
an	0.282188	0.169507	0.369437	0.257289	0.323671	0.172949
opening	0.181467	0.256618	0.208176	0.188672	0.264928	0.189173
ceremony	0.165814	0.139035	0.264487	0.188183	0.249879	0.111517
with	0.246484	0.154847	0.274119	0.304743	0.391405	0.158230
player	0.159252	0.111576	0.196733	0.144699	0.247079	1.000000
introductions	0.243578	0.180362	0.230920	0.308887	0.310183	0.058156
on	0.342261	0.152422	0.390922	0.247858	0.361997	0.208126
a	0.332040	0.232512	0.450847	0.386438	0.440381	0.259100
replica	0.145986	1.000000	0.196556	0.195700	0.138160	0.111576
of	0.332908	0.206137	0.406907	0.307527	0.418599	0.162704
the	0.427457	0.257688	0.487115	0.371838	0.473997	0.199008
golden	0.172582	0.206935	0.212822	0.119327	0.286209	0.134390
gate	0.159731	0.248780	0.228138	0.201239	0.134256	0.095507
bridge	0.167391	0.189076	0.232932	0.111199	0.147982	0.199612
.	0.356790	0.181996	0.401462	0.331113	0.472604	0.224911

	introductions	?
alongside	0.241065	0.205797
the	0.294271	0.220681
traditional	0.242480	0.132751
media	0.206167	0.157101
availabilities	0.418304	0.226200
,	0.288723	0.310912
the	0.294271	0.220681
event	0.181180	0.160763
featured	0.314787	0.294410
an	0.159687	0.197939
opening	0.306466	0.165024
ceremony	0.208276	0.187344
with	0.292556	0.243331
player	0.058156	0.189890
introductions	1.000000	0.272086
on	0.232210	0.271499
a	0.216682	0.239167
replica	0.180362	0.079878

```

of                0.249932  0.182614
the                0.294271  0.220681
golden            0.152587  0.132469
gate              0.082785  0.071437
bridge            0.068869  0.139610
.                 0.303185  0.413095

```

```

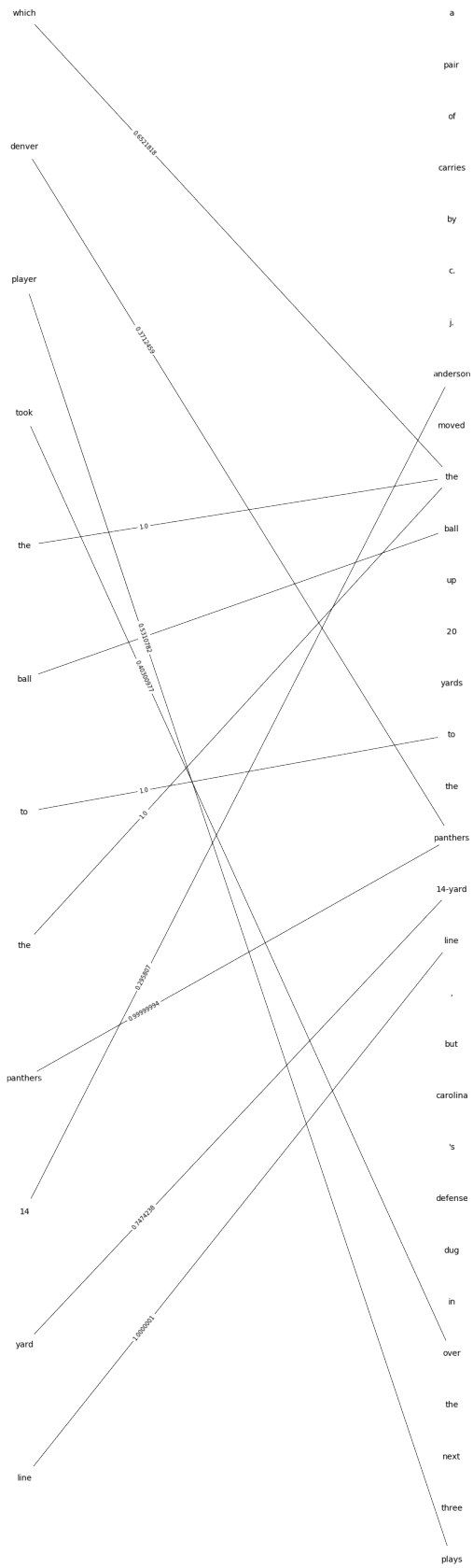
question =    What replica was used for player introductions?
sequence =    Alongside the traditional media availabilities, the event featured an opening ceremon
span output: traditional media availabilities , the event featured an opening ceremony with
reponses attendu: [{'answer_start': 362, 'text': 'the Golden Gate Bridge.'}, {'answer_start': 36

```

```

In [88]: Aligment_graph_bipartite( "Which Denver player took the ball to the Panthers 14 yard
affiche_table_cosine("Which Denver player took the ball to the Panthers 14 yard line?",
question=" Which Denver player took the ball to the Panthers 14 yard line? "
sequence=" A pair of carries by C. J. Anderson moved the ball up 20 yards to the Panthe
print("question = ", question)
print("sequence = ",sequence)
print("span output: , but carolina 's defense dug in ")
print("reponses attendu: [{'answer_start': 197, 'text': 'C. J. Anderson'}, {'answer_sta

```



	which	denver	player	took	the	ball \
a	0.568945	0.179860	0.259100	0.186970	0.582920	0.235783
pair	0.362263	0.209477	0.139352	0.125482	0.264337	0.269339
of	0.501163	0.145951	0.162704	0.276627	0.733189	0.151221
carries	0.364848	0.181570	0.145414	0.221500	0.367862	0.243608
by	0.405434	0.162416	0.136297	0.211697	0.440875	0.138162
c.	-0.105577	0.007843	-0.001186	-0.156064	-0.234516	-0.079041
j.	-0.031879	0.015842	-0.026113	0.003778	0.038010	0.004582
anderson	0.158740	0.306904	0.183227	0.156157	0.224284	0.188931
moved	0.183685	0.195104	0.111530	0.337987	0.320310	0.168430
the	0.652182	0.205240	0.199008	0.316576	1.000000	0.188956
ball	0.246269	0.193530	0.389311	0.093510	0.188956	1.000000
up	0.363881	0.224063	0.139372	0.220300	0.384231	0.191362
20	-0.061743	-0.002844	-0.107624	-0.060569	-0.064190	-0.135235
yards	0.183094	0.313133	0.245250	0.137446	0.160703	0.315458
to	0.534506	0.237065	0.177192	0.245763	0.535392	0.256320
the	0.652182	0.205240	0.199008	0.316576	1.000000	0.188956
panthers	0.200321	0.371246	0.239609	0.154638	0.260278	0.179617
14-yard	0.288198	0.222115	0.193639	0.206502	0.323246	0.275263
line	0.250855	0.155617	0.138983	0.142310	0.297895	0.213807
,	0.365800	0.251737	0.258263	0.276553	0.493308	0.217017
but	0.553370	0.114553	0.118452	0.257150	0.485970	0.189015
carolina	0.169394	0.343840	0.137997	0.143614	0.247492	0.119532
's	0.038561	-0.087660	-0.029029	0.061500	-0.015404	-0.028032
defense	0.231414	0.238428	0.188166	0.114286	0.260477	0.203791
dug	0.209265	0.145103	0.111279	0.248208	0.258038	0.237050
in	0.484052	0.222157	0.185127	0.281830	0.666239	0.147220
over	0.425624	0.100123	0.132595	0.403010	0.398565	0.150637
the	0.652182	0.205240	0.199008	0.316576	1.000000	0.188956
next	0.318756	0.119267	0.159105	0.205617	0.358331	0.109908
three	0.409191	0.192297	0.183379	0.224404	0.434527	0.181530
plays	0.201978	0.220163	0.531078	0.214982	0.176070	0.241812
.	0.459421	0.257363	0.224911	0.248102	0.593451	0.214211

	to	panthers	14	yard	line	?
a	0.455036	0.225527	0.025683	0.206291	0.234993	0.239167
pair	0.208459	0.163398	0.124525	0.127226	0.189427	0.116959
of	0.415485	0.233574	0.050991	0.141379	0.237655	0.182614
carries	0.251423	0.135832	0.027197	0.243308	0.212474	0.138313
by	0.335342	0.169486	0.081363	0.172807	0.143311	0.179666
c.	-0.015615	-0.133464	0.060859	-0.054324	-0.120770	0.019048
j.	-0.053723	-0.002077	0.006171	-0.067530	-0.063566	0.004273
anderson	0.185943	0.327311	0.295807	0.201926	0.152625	0.185700
moved	0.291847	0.281857	0.034207	0.191880	0.153627	0.151126
the	0.535392	0.260278	-0.011880	0.226343	0.297895	0.220681

ball	0.256320	0.179617	0.078871	0.260262	0.213807	0.176624
up	0.403753	0.224873	0.111668	0.196668	0.259176	0.181982
20	-0.018199	-0.095944	-0.016548	-0.011635	-0.048872	0.113604
yards	0.161297	0.338153	0.129198	0.732799	0.239694	0.124538
to	1.000000	0.218578	0.005056	0.151605	0.261562	0.294633
the	0.535392	0.260278	-0.011880	0.226343	0.297895	0.220681
panthers	0.218578	1.000000	0.206137	0.186356	0.138025	0.166090
14-yard	0.246756	0.241152	0.203043	0.747424	0.207952	0.135606
line	0.261562	0.138025	-0.035955	0.247397	1.000000	0.162715
,	0.442459	0.249464	0.154826	0.105653	0.226371	0.310912
but	0.554238	0.190833	0.047558	0.179048	0.241664	0.279220
carolina	0.232969	0.415495	0.118580	0.168217	0.146489	0.118474
's	0.037827	0.069407	-0.005886	0.044874	-0.068945	-0.023396
defense	0.227972	0.171592	0.048467	0.214043	0.186083	0.219358
dug	0.209876	0.134502	0.119740	0.278403	0.248643	0.157027
in	0.450107	0.211583	0.079152	0.167349	0.225878	0.204310
over	0.386358	0.137283	0.027448	0.132898	0.229118	0.257429
the	0.535392	0.260278	-0.011880	0.226343	0.297895	0.220681
next	0.341639	0.166617	0.128331	0.138071	0.137299	0.167460
three	0.304382	0.273598	0.109480	0.202469	0.159184	0.209284
plays	0.169263	0.223482	0.107708	0.129868	0.094214	0.141382
.	0.464503	0.234466	0.086216	0.135386	0.258516	0.413095

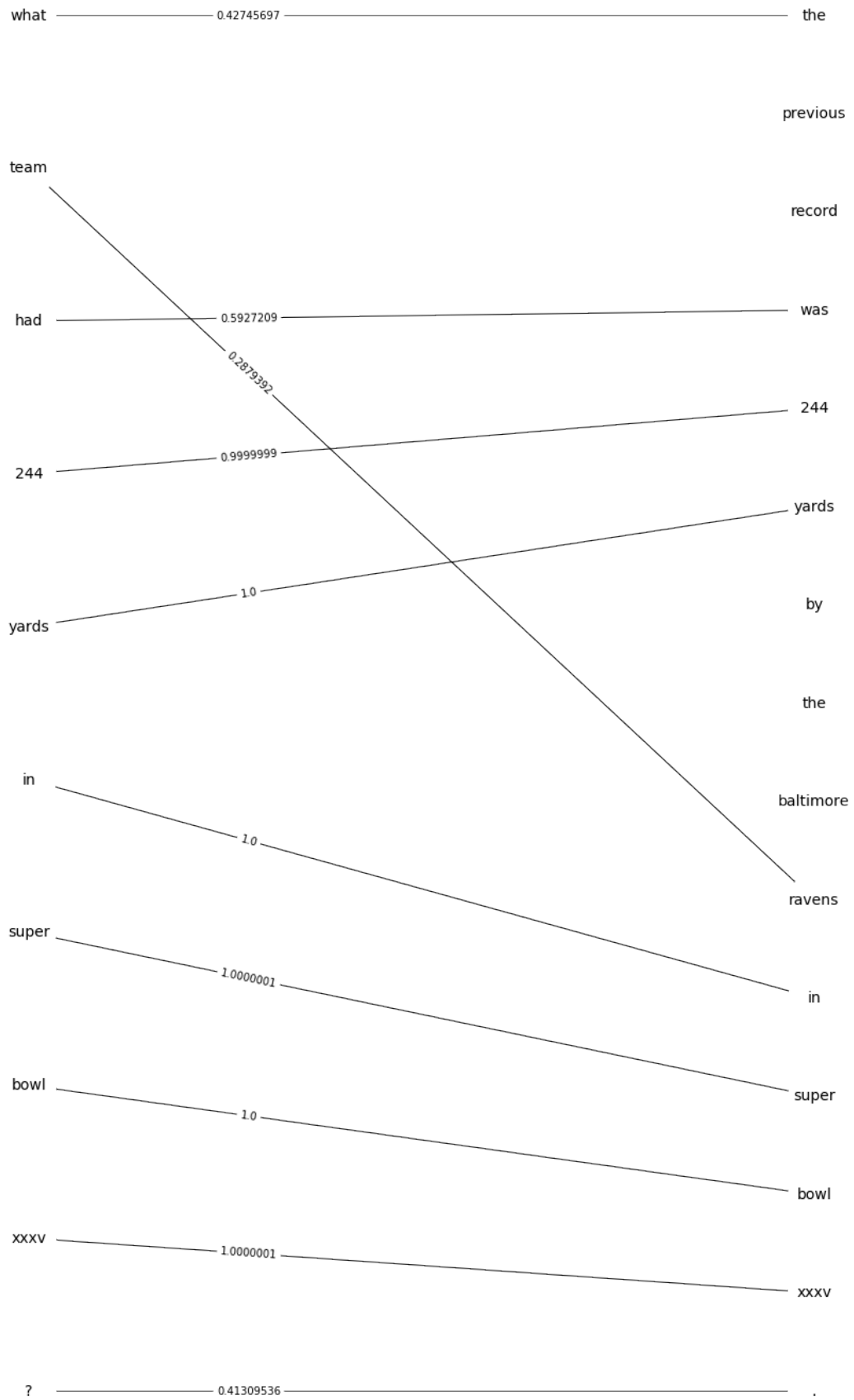
question = Which Denver player took the ball to the Panthers 14 yard line?

sequence = A pair of carries by C. J. Anderson moved the ball up 20 yards to the Panthers 14-y

span output: , but carolina 's defense dug in

reponses attendu: [{'answer_start': 197, 'text': 'C. J. Anderson'}, {'answer_start': 197, 'text':

```
In [83]: Aligment_graph_bipartite( "What team had 244 yards in Super Bowl XXXV?", "The previous
affiche_table_cosine("What team had 244 yards in Super Bowl XXXV?", "The previous record
question=" What team had 244 yards in Super Bowl XXXV? "
sequence=" The previous record was 244 yards by the Baltimore Ravens in Super Bowl XXXV
print("question = ", question)
print("sequence = ", sequence)
print("span output: by the baltimore ")
print("reponses attendu: [{'answer_start': 308, 'text': 'Baltimore Ravens'}, {'answer_s
```



	what	team	had	244	yards	in \
the	0.427457	0.225642	0.387585	0.260799	0.160703	0.666239
previous	0.274369	0.166723	0.349143	0.064523	0.254882	0.231849
record	0.177249	0.191061	0.247778	-0.002769	0.358748	0.231625
was	0.221110	0.139865	0.592721	0.190548	0.182336	0.455141
244	0.249027	-0.075941	0.231910	1.000000	-0.087157	0.211613
yards	0.130480	0.179008	0.198945	-0.087157	1.000000	0.142066
by	0.245548	0.128267	0.372941	0.232011	0.170805	0.370934
the	0.427457	0.225642	0.387585	0.260799	0.160703	0.666239
baltimore	0.133837	0.228147	0.217907	0.038187	0.350716	0.259703
ravens	0.168566	0.287939	0.210888	-0.044273	0.420886	0.176617
in	0.308086	0.188412	0.385027	0.211613	0.142066	1.000000
super	0.136517	0.233397	0.172169	0.023673	0.227804	0.185760
bowl	0.159425	0.204607	0.166146	0.008262	0.299398	0.172362
xxxv	0.183311	0.272313	0.243029	-0.024621	0.372193	0.236925
.	0.356790	0.264675	0.373487	0.158965	0.176646	0.559157

	super	bowl	xxxv	?
the	0.219591	0.215762	0.304461	0.220681
previous	0.248495	0.159106	0.283456	0.167245
record	0.250544	0.243893	0.336220	0.144071
was	0.214210	0.219155	0.311719	0.184121
244	0.023673	0.008262	-0.024621	0.020726
yards	0.227804	0.299398	0.372193	0.124538
by	0.152333	0.129923	0.190639	0.179666
the	0.219591	0.215762	0.304461	0.220681
baltimore	0.273565	0.328006	0.418020	0.136407
ravens	0.301843	0.462760	0.539155	0.130213
in	0.185760	0.172362	0.236925	0.204310
super	1.000000	0.484824	0.569851	0.166327
bowl	0.484824	1.000000	0.618274	0.211181
xxxv	0.569851	0.618274	1.000000	0.212126
.	0.275742	0.215169	0.273666	0.413095

question = What team had 244 yards in Super Bowl XXXV?

sequence = The previous record was 244 yards by the Baltimore Ravens in Super Bowl XXXV.

span output: by the baltimore

reponses attendu: [{'answer_start': 308, 'text': 'Baltimore Ravens'}, {'answer_start': 304, 'text': 'The previous record was 244 yards by the Baltimore Ravens in Super Bowl XXXV.'}]

```
In [84]: Alignement_graph_bipartite( "What was the overly generous royalty amount that Tesla had
affiche_table_cosine("What was the overly generous royalty amount that Tesla had been receiving?
question=" What was the overly generous royalty amount that Tesla had been receiving?
sequence=" Westinghouse convinced Tesla to release his company from the licensing agreement
print("question = ", question)
print("sequence = ",sequence)
```

```
print("span output: purchasing the patents for a lump sum ")
print("reponses attendu: [{'answer_start': 1183, 'text': '$2.50 per AC horsepower royal
```


	what	was	the	overly	generous	royalty \
westinghouse	0.161263	0.307021	0.310110	0.113063	0.261997	0.231748
convinced	0.360399	0.277561	0.195420	0.335847	0.345737	0.037891
tesla	0.232212	0.164552	0.132440	0.100021	0.186601	0.196883
to	0.455848	0.363635	0.535392	0.298518	0.293821	0.163435
release	0.191222	0.213600	0.281477	0.167093	0.089774	0.148853
his	0.269765	0.440525	0.439401	0.199102	0.402019	0.208541
company	0.233377	0.229314	0.265917	0.067268	0.182533	0.297280
from	0.273762	0.311715	0.401505	0.189311	0.178052	0.196394
the	0.427457	0.487115	1.000000	0.199899	0.221497	0.217954
licensing	0.286492	0.144392	0.243316	0.221517	0.252599	0.299009
agreement	0.285109	0.239753	0.249070	0.185414	0.245677	0.203081
over	0.280076	0.244864	0.398565	0.252698	0.218935	0.151160
tesla	0.232212	0.164552	0.132440	0.100021	0.186601	0.196883
's	0.026924	0.008975	-0.015404	-0.118640	-0.030756	0.069848
ac	0.120803	0.162639	0.118943	0.056538	0.141438	0.138652
patents	0.163178	0.155880	0.202369	0.078054	0.244158	0.204131
in	0.308086	0.455141	0.666239	0.185347	0.226155	0.173150
exchange	0.113236	0.156127	0.254371	0.078218	0.124940	0.214880
for	0.301719	0.386395	0.473997	0.242505	0.290378	0.166540
westinghouse	0.161263	0.307021	0.310110	0.113063	0.261997	0.231748
electric	0.154516	0.177230	0.213452	0.145885	0.175440	0.172046
purchasing	0.233668	0.181643	0.222163	0.167843	0.293734	0.296848
the	0.427457	0.487115	1.000000	0.199899	0.221497	0.217954
patents	0.163178	0.155880	0.202369	0.078054	0.244158	0.204131
for	0.301719	0.386395	0.473997	0.242505	0.290378	0.166540
a	0.332040	0.450847	0.582920	0.237277	0.241130	0.190301
lump	0.260530	0.143885	0.192032	0.292449	0.178015	0.084250
sum	0.271448	0.160963	0.175977	0.244890	0.209305	0.121577
payment	0.240738	0.180893	0.227876	0.226965	0.341606	0.284142
of	0.332908	0.406907	0.733189	0.152006	0.257418	0.226436
...
a	0.332040	0.450847	0.582920	0.237277	0.241130	0.190301
break	0.285854	0.173818	0.282295	0.259010	0.159181	0.090149
from	0.273762	0.311715	0.401505	0.189311	0.178052	0.196394
what	1.000000	0.221110	0.427457	0.370788	0.283520	0.180909
,	0.308747	0.454561	0.493308	0.224760	0.323124	0.202183
due	0.152047	0.290114	0.225776	0.248964	0.191363	0.087716
to	0.455848	0.363635	0.535392	0.298518	0.293821	0.163435
alternating	0.100960	0.155243	0.345761	0.216855	0.139763	0.076506
current	0.182945	0.201404	0.331441	0.150068	0.148923	0.105402
's	0.026924	0.008975	-0.015404	-0.118640	-0.030756	0.069848
rapid	0.166009	0.144145	0.242509	0.116509	0.105502	0.043097
gain	0.276092	0.110712	0.268223	0.229087	0.321651	0.211840
in	0.308086	0.455141	0.666239	0.185347	0.226155	0.173150

popularity	0.187219	0.272261	0.247277	0.222612	0.271135	0.272859
,	0.308747	0.454561	0.493308	0.224760	0.323124	0.202183
had	0.238496	0.592721	0.387585	0.214051	0.282062	0.163563
turned	0.224271	0.399494	0.341417	0.177797	0.268495	0.119566
out	0.363320	0.281683	0.394045	0.248824	0.197569	0.055369
to	0.455848	0.363635	0.535392	0.298518	0.293821	0.163435
be	0.392983	0.422287	0.424814	0.381987	0.282327	0.129777
an	0.282188	0.369437	0.420749	0.214613	0.212643	0.121342
overly	0.370788	0.185889	0.199899	1.000000	0.283478	0.016408
generous	0.283520	0.242504	0.221497	0.283478	1.000000	0.357902
\$	0.248589	0.238387	0.233675	0.103187	0.238142	0.233828
2.50	-0.254918	-0.077395	-0.097074	-0.359098	-0.187578	-0.053173
per	0.213843	0.127170	0.216919	0.172471	0.192432	0.182482
ac	0.120803	0.162639	0.118943	0.056538	0.141438	0.138652
horsepower	0.203674	0.249017	0.225413	0.188939	0.206193	0.211122
royalty	0.180909	0.213170	0.217954	0.016408	0.357902	1.000000
.	0.356790	0.401462	0.593451	0.180524	0.249637	0.182253

	amount	that	tesla	had	been	receiving \
westinghouse	0.152516	0.191491	0.357648	0.219834	0.218116	0.198136
convinced	0.198508	0.430030	0.132565	0.362796	0.226892	0.167367
tesla	0.249556	0.221027	1.000000	0.120507	0.049615	0.158558
to	0.309799	0.543635	0.175489	0.379844	0.349458	0.262382
release	0.272738	0.286818	0.146369	0.154118	0.202936	0.195085
his	0.183193	0.317383	0.158073	0.440152	0.278513	0.349791
company	0.193500	0.227233	0.230457	0.192696	0.128774	0.125052
from	0.261525	0.347767	0.103249	0.307524	0.276248	0.293689
the	0.333686	0.547399	0.132440	0.387585	0.356393	0.305692
licensing	0.263652	0.295678	0.194010	0.172461	0.248259	0.269279
agreement	0.195591	0.305745	0.158099	0.283117	0.214233	0.138560
over	0.302743	0.388293	0.163560	0.393762	0.369514	0.241644
tesla	0.249556	0.221027	1.000000	0.120507	0.049615	0.158558
's	0.051227	0.043980	0.064490	-0.004401	-0.107348	-0.034329
ac	0.097402	0.106934	0.317663	0.098573	0.081518	0.125356
patents	0.199539	0.250367	0.352291	0.176081	0.142385	0.267248
in	0.256943	0.435920	0.170977	0.385027	0.351511	0.241629
exchange	0.232141	0.182881	0.111017	0.088761	0.082312	0.225908
for	0.300762	0.413764	0.139839	0.327014	0.390687	0.356564
westinghouse	0.152516	0.191491	0.357648	0.219834	0.218116	0.198136
electric	0.224313	0.198679	0.382441	0.170378	0.123280	0.147817
purchasing	0.328976	0.309643	0.244356	0.290326	0.221436	0.218033
the	0.333686	0.547399	0.132440	0.387585	0.356393	0.305692
patents	0.199539	0.250367	0.352291	0.176081	0.142385	0.267248
for	0.300762	0.413764	0.139839	0.327014	0.390687	0.356564
a	0.343945	0.475379	0.221193	0.348976	0.331540	0.286650
lump	0.247599	0.321839	0.032331	0.157315	0.209243	0.131609
sum	0.388569	0.329483	0.255391	0.236851	0.140827	0.199988
payment	0.389108	0.304608	0.246947	0.192247	0.153110	0.298582

of	0.254118	0.414982	0.188375	0.377556	0.316851	0.280648
...
a	0.343945	0.475379	0.221193	0.348976	0.331540	0.286650
break	0.234561	0.336236	0.073422	0.242520	0.192690	0.109640
from	0.261525	0.347767	0.103249	0.307524	0.276248	0.293689
what	0.260284	0.629773	0.232212	0.238496	0.256780	0.182474
,	0.211255	0.413754	0.205993	0.354877	0.348736	0.256163
due	0.271179	0.282729	0.134406	0.243724	0.246350	0.153621
to	0.309799	0.543635	0.175489	0.379844	0.349458	0.262382
alternating	0.268648	0.230866	0.209653	0.131202	0.231228	0.219312
current	0.168353	0.201646	0.193742	0.147651	0.244927	0.151432
's	0.051227	0.043980	0.064490	-0.004401	-0.107348	-0.034329
rapid	0.200317	0.206086	0.188931	0.146645	0.132905	0.109441
gain	0.329575	0.248316	0.214621	0.260027	0.188316	0.315050
in	0.256943	0.435920	0.170977	0.385027	0.351511	0.241629
popularity	0.269262	0.261692	0.243358	0.264445	0.262148	0.193405
,	0.211255	0.413754	0.205993	0.354877	0.348736	0.256163
had	0.261237	0.440736	0.120507	1.000000	0.604889	0.247247
turned	0.205075	0.339118	0.148019	0.380878	0.339552	0.197022
out	0.303776	0.439961	0.201768	0.317211	0.252602	0.233374
to	0.309799	0.543635	0.175489	0.379844	0.349458	0.262382
be	0.366699	0.603602	0.151808	0.353154	0.530433	0.192567
an	0.257673	0.365764	0.137147	0.223278	0.249475	0.148139
overly	0.246868	0.386611	0.100021	0.214051	0.297095	0.205815
generous	0.265098	0.296973	0.186601	0.282062	0.259288	0.260195
\$	0.332024	0.215703	0.234587	0.227813	0.175363	0.253572
2.50	-0.196336	-0.278444	-0.127241	-0.163982	-0.147391	-0.231370
per	0.304096	0.251848	0.207820	0.200362	0.173754	0.174436
ac	0.097402	0.106934	0.317663	0.098573	0.081518	0.125356
horsepower	0.350312	0.265489	0.421203	0.270043	0.236703	0.112975
royalty	0.179727	0.141945	0.196883	0.163563	0.112119	0.211999
.	0.248939	0.446042	0.179498	0.373487	0.336452	0.277230

	?
westinghouse	0.173079
convinced	0.276853
tesla	0.102508
to	0.294633
release	0.144893
his	0.180751
company	0.121958
from	0.199698
the	0.220681
licensing	0.230487
agreement	0.158302
over	0.257429
tesla	0.102508
's	-0.023396

ac	0.190715
patents	0.114811
in	0.204310
exchange	0.048213
for	0.264628
westinghouse	0.173079
electric	0.156747
purchasing	0.130697
the	0.220681
patents	0.114811
for	0.264628
a	0.239167
lump	0.254021
sum	0.147371
payment	0.174774
of	0.182614
...	...
a	0.239167
break	0.197532
from	0.199698
what	0.505124
,	0.310912
due	0.109550
to	0.294633
alternating	0.138786
current	0.120746
's	-0.023396
rapid	0.171999
gain	0.141792
in	0.204310
popularity	0.169412
,	0.310912
had	0.207284
turned	0.130948
out	0.220207
to	0.294633
be	0.332426
an	0.197939
overly	0.308106
generous	0.233730
\$	0.278613
2.50	-0.283514
per	0.223238
ac	0.190715
horsepower	0.217987
royalty	0.177032
.	0.413095

[66 rows x 13 columns]

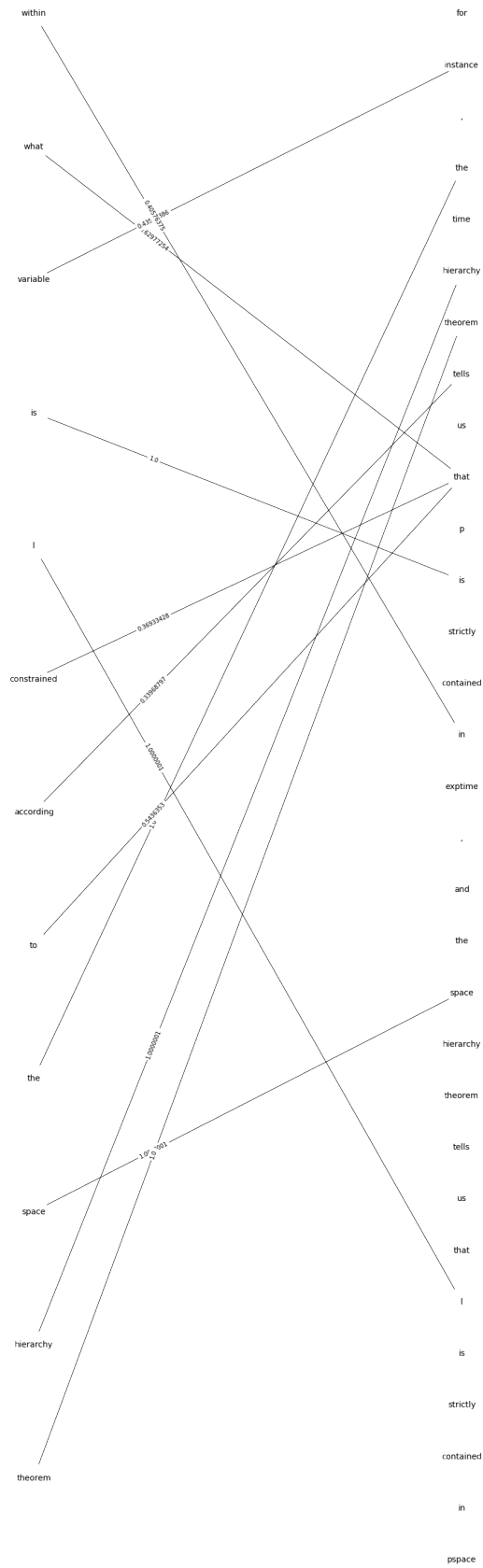
question = What was the overly generous royalty amount that Tesla had been receiving?

sequence = Westinghouse convinced Tesla to release his company from the licensing agreement over

span output: purchasing the patents for a lump sum

reponses attendu: [{'answer_start': 1183, 'text': '\$2.50 per AC horsepower royalty'}, {'answer_s

```
In [85]: Alignement_graph_bipartite( "Within what variable is L constrained according to the spa
affiche_table_cosine("Within what variable is L constrained according to the space hier
question=" Within what variable is L constrained according to the space hierarchy theor
sequence=" For instance, the time hierarchy theorem tells us that P is strictly contain
print("question = ", question)
print("sequence = ",sequence)
print("span output: hierarchy theorem tells us that ")
print("reponses attendu: [{'answer_start': 268, 'text': 'PSPACE'}, {'answer_start': 268
```

	within	what	variable	is	l	constrained	\
for	0.308733	0.301719	0.194392	0.432681	0.080091	0.279250	
instance	0.327920	0.386204	0.435124	0.331548	0.134896	0.341843	
,	0.251314	0.308747	0.181792	0.469191	0.271445	0.268571	
the	0.398275	0.427457	0.182879	0.582367	0.187706	0.230898	
time	0.254144	0.363193	0.201898	0.251874	0.092732	0.234209	
hierarchy	0.219932	0.210707	0.240200	0.129258	0.020818	0.335877	
theorem	0.087198	0.270768	0.344981	0.236793	0.106706	0.323890	
tells	0.146231	0.396252	0.109024	0.296757	0.122230	0.135824	
us	0.103034	0.320817	0.113260	0.180824	0.187564	0.158026	
that	0.337989	0.629773	0.277720	0.399548	0.118781	0.369334	
p	0.129451	0.185865	0.209132	0.117572	0.304085	0.167834	
is	0.301356	0.288376	0.284299	1.000000	0.182230	0.233509	
strictly	0.299419	0.270303	0.228191	0.254689	0.126469	0.301056	
contained	0.389031	0.189978	0.219448	0.314391	0.097401	0.287531	
in	0.405764	0.308086	0.153599	0.539444	0.201330	0.231587	
exptime	0.301163	0.280599	0.399689	0.228158	0.259493	0.302121	
,	0.251314	0.308747	0.181792	0.469191	0.271445	0.268571	
and	0.350495	0.313092	0.173472	0.385975	0.223279	0.297152	
the	0.398275	0.427457	0.182879	0.582367	0.187706	0.230898	
space	0.244136	0.205259	0.198117	0.185785	0.165878	0.216373	
hierarchy	0.219932	0.210707	0.240200	0.129258	0.020818	0.335877	
theorem	0.087198	0.270768	0.344981	0.236793	0.106706	0.323890	
tells	0.146231	0.396252	0.109024	0.296757	0.122230	0.135824	
us	0.103034	0.320817	0.113260	0.180824	0.187564	0.158026	
that	0.337989	0.629773	0.277720	0.399548	0.118781	0.369334	
l	0.082510	0.053181	0.118999	0.182230	1.000000	0.069021	
is	0.301356	0.288376	0.284299	1.000000	0.182230	0.233509	
strictly	0.299419	0.270303	0.228191	0.254689	0.126469	0.301056	
contained	0.389031	0.189978	0.219448	0.314391	0.097401	0.287531	
in	0.405764	0.308086	0.153599	0.539444	0.201330	0.231587	
pspace	0.258718	0.259798	0.316094	0.164614	0.250913	0.261150	
.	0.298453	0.356790	0.186514	0.456966	0.255914	0.233413	

	according	to	the	space	hierarchy	theorem	\
for	0.195655	0.445125	0.473997	0.242320	0.094279	0.153082	
instance	0.202972	0.353385	0.353978	0.249277	0.332306	0.332403	
,	0.310709	0.442459	0.493308	0.228558	0.153451	0.160035	
the	0.320297	0.535392	1.000000	0.244959	0.226046	0.184307	
time	0.196359	0.367999	0.430615	0.278004	0.204820	0.221380	
hierarchy	0.210803	0.192280	0.226046	0.139877	1.000000	0.223000	
theorem	0.147849	0.148784	0.184307	0.262145	0.223000	1.000000	
tells	0.339688	0.305349	0.288591	0.132924	0.130483	0.174002	
us	0.205302	0.292897	0.257277	0.148566	0.064234	0.133514	
that	0.291469	0.543635	0.547399	0.236846	0.245862	0.289250	

p	0.057343	0.142698	0.164816	0.172976	0.136478	0.175534
is	0.283899	0.427451	0.582367	0.185785	0.129258	0.236793
strictly	0.239299	0.281207	0.244186	0.164353	0.281226	0.145884
contained	0.251995	0.210750	0.314402	0.165701	0.154194	0.095156
in	0.292593	0.450107	0.666239	0.176485	0.092863	0.125085
exptime	0.292106	0.407227	0.303646	0.256702	0.171895	0.291523
,	0.310709	0.442459	0.493308	0.228558	0.153451	0.160035
and	0.306456	0.489713	0.517126	0.229017	0.226405	0.101366
the	0.320297	0.535392	1.000000	0.244959	0.226046	0.184307
space	0.102437	0.227129	0.244959	1.000000	0.139877	0.262145
hierarchy	0.210803	0.192280	0.226046	0.139877	1.000000	0.223000
theorem	0.147849	0.148784	0.184307	0.262145	0.223000	1.000000
tells	0.339688	0.305349	0.288591	0.132924	0.130483	0.174002
us	0.205302	0.292897	0.257277	0.148566	0.064234	0.133514
that	0.291469	0.543635	0.547399	0.236846	0.245862	0.289250
l	0.098405	0.130003	0.187706	0.165878	0.020818	0.106706
is	0.283899	0.427451	0.582367	0.185785	0.129258	0.236793
strictly	0.239299	0.281207	0.244186	0.164353	0.281226	0.145884
contained	0.251995	0.210750	0.314402	0.165701	0.154194	0.095156
in	0.292593	0.450107	0.666239	0.176485	0.092863	0.125085
pspace	0.108181	0.247135	0.194607	0.744398	0.211925	0.271732
.	0.290522	0.464503	0.593451	0.238549	0.201384	0.191659

?

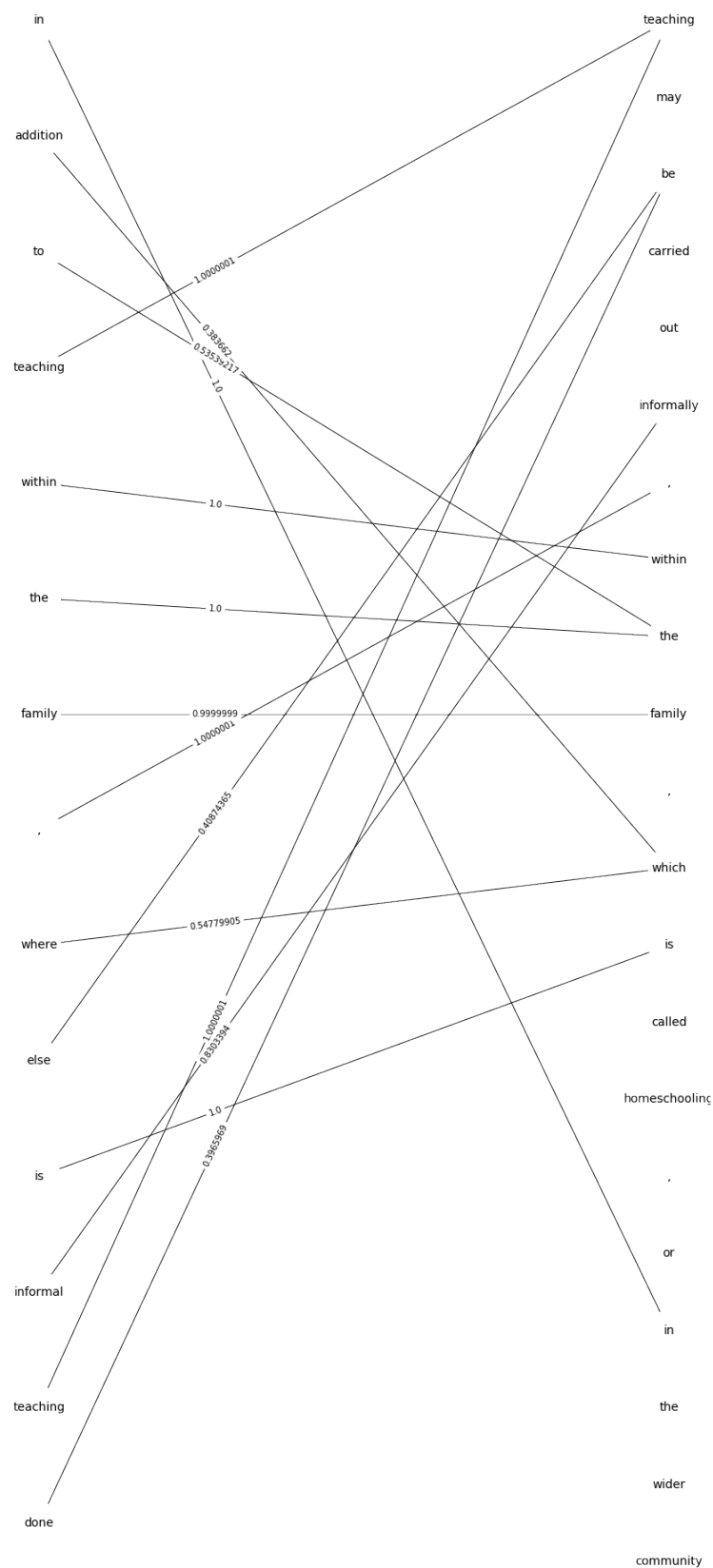
for	0.264628
instance	0.302059
,	0.310912
the	0.220681
time	0.273915
hierarchy	0.232083
theorem	0.187291
tells	0.204697
us	0.274243
that	0.327163
p	0.208405
is	0.229614
strictly	0.202920
contained	0.171996
in	0.204310
exptime	0.207549
,	0.310912
and	0.205442
the	0.220681
space	0.188554
hierarchy	0.232083
theorem	0.187291
tells	0.204697
us	0.274243

```

that      0.327163
l         0.108039
is        0.229614
strictly  0.202920
contained 0.171996
in        0.204310
pspace    0.338418
.         0.413095
question = Within what variable is L constrained according to the space hierarchy theorem?
sequence = For instance, the time hierarchy theorem tells us that P is strictly contained in E
span output: hierarchy theorem tells us that
reponses attendu: [{'answer_start': 268, 'text': 'PSPACE'}, {'answer_start': 268, 'text': 'PSPACE'}]
```

```

In [87]: Aligned_graph_bipartite( "In addition to teaching within the family, where else is informal teaching d
affiche_table_cosine("In addition to teaching within the family, where else is informal teaching d
question=" In addition to teaching within the family, where else is informal teaching d
sequence=" Teaching may be carried out informally, within the family, which is called h
print("question = ", question)
print("sequence = ",sequence)
print("span output: called homeschooling , or ")
print("reponses attendu: [{'answer_start': 96, 'text': 'the wider community'}, {'answer_start': 96, 'text': 'the wider community'}]
```



	in	addition	to	teaching	within	the	\
teaching	0.265906	0.225425	0.276213	1.000000	0.202227	0.218269	
may	0.342415	0.212908	0.391583	0.176098	0.213524	0.269429	
be	0.348182	0.347874	0.497284	0.209657	0.290548	0.424814	
carried	0.226890	0.200323	0.218675	0.168895	0.146585	0.318550	
out	0.357621	0.200683	0.423870	0.179500	0.217271	0.394045	
informally	0.238348	0.192662	0.331745	0.180801	0.254943	0.327887	
,	0.520147	0.304020	0.442459	0.254709	0.251314	0.493308	
within	0.405764	0.246206	0.349802	0.202227	1.000000	0.398275	
the	0.666239	0.329554	0.535392	0.218269	0.398275	1.000000	
family	0.216600	0.156298	0.212850	0.200105	0.199812	0.239485	
,	0.520147	0.304020	0.442459	0.254709	0.251314	0.493308	
which	0.484052	0.383662	0.534506	0.228606	0.435397	0.652182	
is	0.539444	0.272715	0.427451	0.162134	0.301356	0.582367	
called	0.408474	0.224818	0.298714	0.156058	0.240717	0.489897	
homeschooling	0.315560	0.232977	0.358682	0.593684	0.210982	0.259213	
,	0.520147	0.304020	0.442459	0.254709	0.251314	0.493308	
or	0.358642	0.291402	0.389212	0.159164	0.339083	0.417487	
in	1.000000	0.303308	0.450107	0.265906	0.405764	0.666239	
the	0.666239	0.329554	0.535392	0.218269	0.398275	1.000000	
wider	0.245101	0.222464	0.395401	0.182467	0.280888	0.378299	
community	0.218389	0.190507	0.286375	0.241820	0.261460	0.260140	
.	0.559157	0.274810	0.464503	0.264795	0.298453	0.593451	

	family	,	where	else	is	informal	\
teaching	0.200105	0.254709	0.249293	0.154648	0.162134	0.225395	
may	0.151213	0.500792	0.232155	0.252102	0.322793	0.263829	
be	0.183887	0.392545	0.365122	0.408744	0.481913	0.272271	
carried	0.073738	0.249409	0.212270	0.140845	0.150773	0.164720	
out	0.112296	0.316111	0.409444	0.312775	0.281786	0.156930	
informally	0.194288	0.313809	0.290289	0.207378	0.323808	0.830339	
,	0.221427	1.000000	0.314950	0.264352	0.469191	0.267898	
within	0.199812	0.251314	0.361159	0.213546	0.301356	0.223542	
the	0.239485	0.493308	0.500389	0.193706	0.582367	0.246957	
family	1.000000	0.221427	0.205596	0.146060	0.203922	0.221299	
,	0.221427	1.000000	0.314950	0.264352	0.469191	0.267898	
which	0.252918	0.365800	0.547799	0.309423	0.445740	0.254567	
is	0.203922	0.469191	0.358671	0.227247	1.000000	0.236492	
called	0.200545	0.265491	0.385734	0.183688	0.430266	0.227544	
homeschooling	0.330340	0.287418	0.315390	0.237589	0.197723	0.225256	
,	0.221427	1.000000	0.314950	0.264352	0.469191	0.267898	
or	0.188292	0.376950	0.365105	0.389427	0.418710	0.305387	
in	0.216600	0.520147	0.534481	0.227590	0.539444	0.203905	
the	0.239485	0.493308	0.500389	0.193706	0.582367	0.246957	
wider	0.092288	0.221903	0.204840	0.252038	0.217969	0.251611	

community	0.191083	0.276111	0.198787	0.188801	0.260238	0.233421
.	0.241148	0.681251	0.413901	0.305484	0.456966	0.193344

	done	?
teaching	0.236410	0.204247
may	0.230585	0.276825
be	0.396597	0.332426
carried	0.372102	0.130552
out	0.291113	0.220207
informally	0.208511	0.151359
,	0.320791	0.310912
within	0.128305	0.187029
the	0.265759	0.220681
family	0.100271	0.152229
,	0.320791	0.310912
which	0.298351	0.258146
is	0.253603	0.229614
called	0.326698	0.189633
homeschooling	0.233606	0.268946
,	0.320791	0.310912
or	0.385767	0.323896
in	0.221653	0.204310
the	0.265759	0.220681
wider	0.174795	0.205325
community	0.227746	0.238042
.	0.313232	0.413095

question = In addition to teaching within the family, where else is informal teaching done?
sequence = Teaching may be carried out informally, within the family, which is called homescho
span output: called homeschooling , or
reponses attendu: [{'answer_start': 96, 'text': 'the wider community'}, {'answer_start': 100, 't