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1 /Users/nelsonquintanilla/.conda/envs/dissertation/bin/python /Users/nelsonquintanilla/  
Documents/repos/nfq160/dissertation/main.py  
2 Console output is saving to: /Users/nelsonquintanilla/Documents/repos/nfq160/  
dissertation/console_logs  
3 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/  
builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of  
importlib and slated for removal in Python 3.12; see the module's documentation for  
alternative uses  
4     from imp import reload  
5  
6 Data before pre-processing  
7 Number of articles: 2275  
8 Average word count per article: 864 words  
9  
10 Normalisation and tokenization  
11  
12 Stop Words Removal 1  
13 total of words, stop words removal 1: 959929  
14  
15 Lemmatisation  
16 total of words, lemmatisation: 959956  
17  
18 Stop Words Removal 2  
19 total of words, stop words removal 2: 919087  
20  
21 Transform the documents to a vectorized form  
22  
23 Number of tokens and documents to train  
24 Number of unique tokens: 31451  
25 Number of documents: 2275  
26  
27 Building the Topic Model  
28  
29 Training model for 2  
30 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/  
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38 alternative uses
39     from imp import reload
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importlib and slated for removal in Python 3.12; see the module's documentation for
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43     from imp import reload
44
45 Training model for 4
46 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
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importlib and slated for removal in Python 3.12; see the module's documentation for
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59     from imp import reload
60
61 Training model for 6
62 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
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   alternative uses
75   from imp import reload
76
77 Training model for 8
78 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
   builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
   importlib and slated for removal in Python 3.12; see the module's documentation for
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     importlib and slated for removal in Python 3.12; see the module's documentation for
     alternative uses
91     from imp import reload
92
93 Training model for 10
94 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
     builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
     importlib and slated for removal in Python 3.12; see the module's documentation for
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     builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
     importlib and slated for removal in Python 3.12; see the module's documentation for
     alternative uses
107     from imp import reload
108
109 Training model for 12
110 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
     builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
     importlib and slated for removal in Python 3.12; see the module's documentation for
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importlib and slated for removal in Python 3.12; see the module's documentation for
alternative uses
123 from imp import reload
124
125 Training model for 14
126 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
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importlib and slated for removal in Python 3.12; see the module's documentation for
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        alternative uses
139     from imp import reload
140
141 View the topics in LDA mode
142
143 Topics for a model trained for 2 number of topics
144 [(0,
145     '0.006*"sanction" + 0.006*"country" + 0.006*"year" + 0.005*"eu" + '
146     '0.005*"government" + 0.005*"putin" + 0.004*"gas" + 0.003*"uk" + '
147     '0.003*"minister" + 0.003*"people"'),
148     (1,
149     '0.009*"war" + 0.007*"people" + 0.007*"force" + 0.007*"city" + '
150     '0.005*"military" + 0.005*"country" + 0.005*"kyiv" + 0.004*"putin" + '
151     '0.004*"day" + 0.003*"attack")]
152
153 Topics for a model trained for 4 number of topics
154 [(0,
155     '0.011*"grain" + 0.009*"food" + 0.009*"port" + 0.008*"country" + '
156     '0.007*"export" + 0.007*"ship" + 0.006*"world" + 0.006*"sea" + 0.006*"price" +
157     '+ 0.005*"turkey"),
158     (1,
159     '0.009*"war" + 0.008*"force" + 0.008*"city" + 0.007*"people" + 0.006*"kyiv" +
160     '+ 0.006*"military" + 0.005*"country" + 0.005*"day" + 0.004*"attack" +
161     '0.004*"zelenskiy"),
162     (2,
163     '0.007*"year" + 0.006*"government" + 0.006*"gas" + 0.006*"eu" + '
164     '0.005*"people" + 0.005*"country" + 0.004*"energy" + 0.004*"germany" + '
165     '0.004*"minister" + 0.004*"right"),
166     (3,
167     '0.011*"putin" + 0.009*"sanction" + 0.008*"war" + 0.006*"country" + '
168     '0.005*"china" + 0.005*"invasion" + 0.005*"state" + 0.004*"government" + '
169     '0.004*"include" + 0.004*"uk")]
170
171 Topics for a model trained for 6 number of topics
172 [(0,
173     '0.015*"grain" + 0.012*"port" + 0.011*"food" + 0.010*"ship" + 0.009*"export" +
174     '+ 0.009*"country" + 0.008*"sea" + 0.008*"world" + 0.007*"turkey" +
175     '0.006*"global"),
176     (1,
177     '0.010*"force" + 0.009*"war" + 0.008*"city" + 0.007*"military" +
178     '0.006*"kyiv" + 0.006*"country" + 0.005*"people" + 0.005*"zelenskiy" +
179     '0.005*"attack" + 0.005*"defence"),
180     (2,
181     '0.009*"eu" + 0.009*"gas" + 0.007*"government" + 0.006*"year" +
182     '0.006*"country" + 0.006*"energy" + 0.006*"germany" + 0.005*"macron" +
183     '0.005*"minister" + 0.005*"party"),
184     (3,
185     '0.013*"putin" + 0.010*"sanction" + 0.007*"war" + 0.007*"china" +
186     '0.006*"country" + 0.005*"uk" + 0.005*"government" + 0.005*"invasion" +
187     '0.005*"state" + 0.005*"include"),
188     (4,
189     '0.011*"people" + 0.009*"war" + 0.007*"city" + 0.006*"day" + 0.006*"year" +
190     '0.005*"leave" + 0.004*"come" + 0.004*"time" + 0.004*"child" + 0.004*"want")]

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191 (5,
192   '0.012*"uk" + 0.009*"refugee" + 0.008*"home" + 0.008*"visa" + 0.008*"people" +
193   '+ 0.008*"family" + 0.007*"year" + 0.006*"government" + 0.005*"scheme" +
194   '0.004*"guardian")]
195
196 Topics for a model trained for 8 number of topics
197 [(0,
198   '0.018*"grain" + 0.015*"port" + 0.013*"food" + 0.012*"ship" + 0.010*"export" +
199   '+ 0.010*"sea" + 0.009*"country" + 0.009*"turkey" + 0.008*"world" +
200   '0.007*"black"),
201 (1,
202   '0.011*"force" + 0.009*"war" + 0.008*"city" + 0.008*"military" +
203   '0.007*"kyiv" + 0.006*"country" + 0.006*"zelenskiy" + 0.005*"attack" +
204   '0.005*"defence" + 0.005*"president"),
205 (2,
206   '0.009*"macron" + 0.008*"year" + 0.008*"party" + 0.007*"right" +
207   '0.007*"vote" + 0.007*"election" + 0.007*"le" + 0.006*"pen" + 0.006*"people" +
208   '+ 0.006*"france"),
209 (3,
210   '0.015*"putin" + 0.010*"war" + 0.008*"sanction" + 0.006*"state" +
211   '0.005*"invasion" + 0.005*"company" + 0.004*"government" + 0.004*"medium" +
212   '0.004*"country" + 0.004*"include"),
213 (4,
214   '0.013*"people" + 0.009*"city" + 0.009*"war" + 0.007*"day" + 0.006*"leave" +
215   '0.005*"year" + 0.005*"child" + 0.005*"family" + 0.005*"come" +
216   '0.004*"kyiv"),
217 (5,
218   '0.005*"covid" + 0.005*"year" + 0.004*"guardian" + 0.004*"people" +
219   '0.004*"like" + 0.004*"time" + 0.004*"johnson" + 0.004*"death" +
220   '0.004*"report" + 0.004*"story"),
221 (6,
222   '0.022*"china" + 0.019*"nuclear" + 0.007*"taiwan" + 0.007*"plant" +
223   '0.007*"chinese" + 0.006*"power" + 0.006*"japan" + 0.006*"beijing" +
224   '0.005*"war" + 0.005*"weapon"),
225 (7,
226   '0.011*"eu" + 0.009*"uk" + 0.009*"country" + 0.009*"government" +
227   '0.008*"gas" + 0.007*"sanction" + 0.006*"minister" + 0.006*"germany" +
228   '0.005*"energy" + 0.005*"european")]
229
230 Topics for a model trained for 10 number of topics
231 [(0,
232   '0.011*"wagner" + 0.009*"syria" + 0.008*"india" + 0.008*"africa" +
233   '0.008*"group" + 0.006*"syrian" + 0.006*"african" + 0.006*"israel" +
234   '0.005*"year" + 0.005*"country"),
235 (1,
236   '0.011*"force" + 0.010*"war" + 0.008*"city" + 0.008*"military" +
237   '0.007*"kyiv" + 0.006*"country" + 0.006*"zelenskiy" + 0.006*"president" +
238   '0.005*"defence" + 0.005*"attack"),
239 (2,
240   '0.009*"macron" + 0.009*"year" + 0.008*"party" + 0.008*"right" +
241   '0.007*"vote" + 0.007*"le" + 0.006*"election" + 0.006*"pen" + 0.006*"people" +
242   '+ 0.006*"france"),
243 (3,
244   '0.015*"putin" + 0.009*"war" + 0.009*"sanction" + 0.006*"state" +
245   '0.006*"company" + 0.005*"invasion" + 0.005*"government" + 0.005*"include" +
246   '0.004*"kremlin" + 0.004*"abramovich"),
247 (4,

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248   '0.013*"people" + 0.010*"city" + 0.009*"war" + 0.008*"day" + 0.006*"leave" + '
249   '0.005*"year" + 0.005*"child" + 0.005*"family" + 0.005*"come" + '
250   '0.005*"kyiv"' ),
251 (5,
252   '0.006*"guardian" + 0.005*"people" + 0.005*"like" + 0.005*"year" + '
253   '0.004*"report" + 0.004*"story" + 0.004*"woman" + 0.004*"day" + 0.004*"time" +
254   '+ 0.004*"johnson"' ),
255 (6,
256   '0.026*"china" + 0.013*"nuclear" + 0.008*"chinese" + 0.008*"taiwan" + '
257   '0.006*"beijing" + 0.006*"war" + 0.006*"japan" + 0.006*"weapon" + '
258   '0.006*"country" + 0.006*"world"' ),
259 (7,
260   '0.011*"eu" + 0.010*"uk" + 0.009*"country" + 0.009*"government" + '
261   '0.009*"gas" + 0.007*"sanction" + 0.006*"minister" + 0.006*"germany" + '
262   '0.005*"energy" + 0.005*"european"' ),
263 (8,
264   '0.012*"gorbachev" + 0.012*"orban" + 0.008*"hungary" + 0.008*"hungarian" + '
265   '0.005*"party" + 0.004*"leader" + 0.004*"year" + 0.004*"election" + '
266   '0.004*"opposition" + 0.003*"fidesz"' ),
267 (9,
268   '0.011*"plant" + 0.011*"grain" + 0.010*"port" + 0.009*"sea" + 0.009*"ship" + '
269   '0.008*"nuclear" + 0.008*"food" + 0.006*"black" + 0.006*"export" + '
270   '0.005*"power"' )
271
272 Topics for a model trained for 12 number of topics
273 [(0,
274   '0.021*"wagner" + 0.020*"syria" + 0.014*"syrian" + 0.008*"mali" + '
275   '0.008*"group" + 0.007*"assad" + 0.005*"mercenary" + 0.005*"africa" + '
276   '0.005*"malian" + 0.005*"year"' ),
277 (1,
278   '0.010*"war" + 0.006*"country" + 0.005*"nato" + 0.005*"military" + '
279   '0.004*"year" + 0.004*"people" + 0.004*"report" + 0.004*"putin" + '
280   '0.004*"invasion" + 0.004*"government"' ),
281 (2,
282   '0.015*"macron" + 0.011*"le" + 0.010*"vote" + 0.010*"party" + 0.010*"pen" + '
283   '0.009*"france" + 0.009*"election" + 0.009*"right" + 0.008*"french" + '
284   '0.007*"year"' ),
285 (3,
286   '0.016*"putin" + 0.015*"sanction" + 0.009*"company" + 0.007*"abramovich" + '
287   '0.006*"uk" + 0.006*"state" + 0.006*"include" + 0.005*"government" + '
288   '0.005*"asset" + 0.004*"invasion"' ),
289 (4,
290   '0.008*"people" + 0.008*"war" + 0.008*"year" + 0.006*"putin" + '
291   '0.006*"soviet" + 0.005*"country" + 0.005*"world" + 0.004*"time" + '
292   '0.004*"new" + 0.003*"leader"' ),
293 (5,
294   '0.008*"covid" + 0.008*"ovsyannikova" + 0.005*"protest" + 0.005*"death" + '
295   '0.004*"brazil" + 0.004*"chicken" + 0.004*"people" + 0.004*"war" + '
296   '0.004*"virus" + 0.004*"case"' ),
297 (6,
298   '0.028*"china" + 0.013*"nuclear" + 0.009*"chinese" + 0.008*"taiwan" + '
299   '0.007*"beijing" + 0.007*"japan" + 0.006*"weapon" + 0.006*"country" + '
300   '0.006*"north" + 0.006*"war"' ),
301 (7,
302   '0.011*"uk" + 0.011*"eu" + 0.010*"gas" + 0.010*"government" + '
303   '0.009*"country" + 0.007*"refugee" + 0.007*"energy" + 0.006*"oil" + '
304   '0.006*"sanction" + 0.006*"year"' ),

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305 (8,
306   '0.023*"orban" + 0.019*"hungary" + 0.014*"hungarian" + 0.006*"budapest" + '
307   '0.005*"opposition" + 0.005*"fidesz" + 0.004*"party" + 0.004*"eu" + '
308   '0.004*"election" + 0.004*"year"'),
309 (9,
310   '0.013*"grain" + 0.012*"plant" + 0.011*"port" + 0.011*"food" + 0.011*"ship" +
311   '+ 0.010*"nuclear" + 0.009*"sea" + 0.007*"export" + 0.007*"power" +
312   '0.007*"country"'),
313 (10,
314   '0.012*"force" + 0.010*"war" + 0.009*"city" + 0.008*"military" + '
315   '0.007*"kyiv" + 0.007*"putin" + 0.006*"zelenskiy" + 0.006*"country" + '
316   '0.006*"president" + 0.006*"moscow"'),
317 (11,
318   '0.013*"people" + 0.011*"city" + 0.009*"day" + 0.008*"leave" + 0.008*"war" + '
319   '0.007*"child" + 0.006*"kyiv" + 0.006*"family" + 0.005*"home" + '
320   '0.005*"come"')
321
322 Topics for a model trained for 14 number of topics
323 [(0,
324   '0.006*"syria" + 0.006*"assad" + 0.004*"ireland" + 0.004*"titenko" + '
325   '0.003*"irish" + 0.003*"monument" + 0.003*"dolphin" + 0.003*"meta" + '
326   '0.003*"facebook" + 0.003*"stamp"'),
327 (1,
328   '0.006*"war" + 0.005*"country" + 0.005*"year" + 0.004*"government" + '
329   '0.004*"people" + 0.004*"johnson" + 0.004*"time" + 0.003*"report" + '
330   '0.003*"right" + 0.003*"like"'),
331 (2,
332   '0.016*"macron" + 0.013*"le" + 0.012*"pen" + 0.010*"vote" + 0.010*"france" + '
333   '0.010*"party" + 0.010*"right" + 0.009*"election" + 0.009*"french" + '
334   '0.007*"year"'),
335 (3,
336   '0.017*"putin" + 0.010*"war" + 0.007*"state" + 0.007*"kremlin" + '
337   '0.006*"medium" + 0.006*"sanction" + 0.005*"invasion" + 0.005*"government" + '
338   '0.005*"moscow" + 0.004*"year"'),
339 (4,
340   '0.009*"people" + 0.008*"year" + 0.006*"war" + 0.006*"soviet" + '
341   '0.005*"country" + 0.004*"world" + 0.004*"gorbachev" + 0.004*"time" + '
342   '0.004*"new" + 0.003*"day"'),
343 (5,
344   '0.010*"covid" + 0.009*"ovsyannikova" + 0.007*"protest" + 0.006*"death" + '
345   '0.005*"case" + 0.005*"people" + 0.005*"vaccine" + 0.004*"virus" + '
346   '0.004*"brazil" + 0.004*"war"'),
347 (6,
348   '0.031*"china" + 0.018*"nuclear" + 0.010*"taiwan" + 0.009*"chinese" + '
349   '0.008*"japan" + 0.008*"beijing" + 0.007*"weapon" + 0.007*"korea" + '
350   '0.007*"north" + 0.006*"india"'),
351 (7,
352   '0.017*"uk" + 0.011*"government" + 0.011*"refugee" + 0.008*"visa" + '
353   '0.008*"country" + 0.008*"home" + 0.008*"family" + 0.007*"people" + '
354   '0.006*"oil" + 0.005*"year"'),
355 (8,
356   '0.022*"orban" + 0.019*"hungary" + 0.014*"hungarian" + 0.007*"election" + '
357   '0.006*"budapest" + 0.006*"party" + 0.005*"opposition" + 0.005*"fidesz" + '
358   '0.004*"usmanov" + 0.004*"odinga"'),
359 (9,
360   '0.016*"grain" + 0.014*"food" + 0.013*"port" + 0.013*"ship" + 0.011*"sea" + '
361   '0.010*"price" + 0.010*"export" + 0.008*"country" + 0.008*"black" + '

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362     '0.007*"world"' ),
363     (10,
364      '0.012*"war" + 0.011*"putin" + 0.010*"country" + 0.008*"eu" + '
365      '0.007*"president" + 0.007*"minister" + 0.006*"nato" + 0.006*"sanction" + '
366      '0.006*"gas" + 0.005*"germany"' ),
367     (11,
368      '0.014*"people" + 0.009*"day" + 0.009*"city" + 0.009*"war" + 0.008*"leave" + '
369      '0.007*"child" + 0.006*"family" + 0.005*"kyiv" + 0.005*"year" + '
370      '0.005*"home"' ),
371     (12,
372      '0.015*"company" + 0.015*"sanction" + 0.006*"business" + 0.006*"yacht" + '
373      '0.005*"include" + 0.005*"uk" + 0.005*"government" + 0.005*"bank" + '
374      '0.005*"new" + 0.005*"owner"' ),
375     (13,
376      '0.016*"force" + 0.014*"city" + 0.009*"military" + 0.009*"kyiv" + '
377      '0.008*"war" + 0.008*"civilian" + 0.007*"region" + 0.007*"attack" + '
378      '0.006*"people" + 0.006*"mariupol"' )]
379
380 Compute Perplexity
381
382 Compute Topic Coherence Score
383 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
importlib and slated for removal in Python 3.12; see the module's documentation for
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384     from imp import reload
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397 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
```

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397 builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
    importlib and slated for removal in Python 3.12; see the module's documentation for
    alternative uses
398     from imp import reload
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419 alternative uses
420     from imp import reload
421 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
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builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
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builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
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465 importlib and slated for removal in Python 3.12; see the module's documentation for
   alternative uses
466   from imp import reload
467 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
   builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
   importlib and slated for removal in Python 3.12; see the module's documentation for
   alternative uses
468   from imp import reload
469 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
   builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
   importlib and slated for removal in Python 3.12; see the module's documentation for
   alternative uses
470   from imp import reload
471 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
   builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
   importlib and slated for removal in Python 3.12; see the module's documentation for
   alternative uses
472   from imp import reload
473 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
   builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
   importlib and slated for removal in Python 3.12; see the module's documentation for
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477 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
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479 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
   builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
   importlib and slated for removal in Python 3.12; see the module's documentation for
   alternative uses
480   from imp import reload
481 (list_index, number_topics, c_v_coherence, perplexity)
482 [(1, 2, 0.3830217036402228, -8.153061071860664),
483 (2, 4, 0.4450827230812552, -8.115913366631322),
484 (3, 6, 0.4623825824009566, -8.08881336913471),
485 (4, 8, 0.4684804011295999, -8.085820331270895),
486 (5, 10, 0.4248403149359025, -8.092389236416258),
487 (6, 12, 0.4506748003465833, -8.083823973187966),
488 (7, 14, 0.4667095813706915, -8.076425838750906)]
489
490 Visualize the topics
491 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/pyLDAvis
  /_prepare.py:247: FutureWarning: In a future version of pandas all arguments of
   DataFrame.drop except for the argument 'labels' will be keyword-only.
492   by='salience', ascending=False).head(R).drop('salience', 1)
493 /Users/nelsonquintanilla/.conda/envs/dissertation/lib/python3.10/site-packages/past/
   builtins/misc.py:45: DeprecationWarning: the imp module is deprecated in favour of
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    /_prepare.py:247: FutureWarning: In a future version of pandas all arguments of
    DataFrame.drop except for the argument 'labels' will be keyword-only.
782     by='saliency', ascending=False).head(R).drop('saliency', 1)
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962 Process finished with exit code 0  
963
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