

Natural Language Processing

Topic & Sentiment Analysis

on the

HK National Security Law

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1.0 Problem Identification Overview

Following the end of the First Opium War in 1841, the Qing Dynasty ceded Hong Kong (HK) to the United Kingdom (UK). After World War II, while still under British rule, HK emerged as a global financial center. Its population developed a hybrid culture, maintaining their Chinese ethos while adopting British principles, notably Common Law.

In 1984, the United Kingdom and China signed the Sino-British Joint Declaration, in which the UK agreed to cede Hong Kong back to China in 1997 under the principle of 'one country, two systems' (OcTs). The mutually agreed OcTs stipulated that from 1997 to 2047, Hong Kong would not participate in China's socialist system, and its capitalist system, Common Law, and way of life would remain unchanged. In 1997, the transfer was completed, and Hong Kong was handed back to China under OcTs.

In 2020, the National People's Congress of China unanimously passed the National Security Law (NSL), which, for simplicity, criminalizes secession, subversion of state power, terrorism, and collusion with foreign entities in Hong Kong. This law was not enacted by the Hong Kong Legislative Council, which, according to Article 23 of the Hong Kong Basic Law, is the governing body authorized to enact such legislation. This perceived discrepancy in legal authority led to notable protests in Hong Kong (HK Protests).

2.0 Generated Deliverables

This Natural Language Processing ("NLP") Data Science project uses the Data Science Method ("DSM") to identify variances in sentiment during the HK Protests using a hybrid of automatic & rules-based systems. The data source was obtained by scraping selected Chinese & International Newspapers & Twitter; the primary modules & tools for the DSM process are defined below:

- Bag of Words, BeautifulSoup, datetime, Emoji Dictionary, genism, matplotlib, NER, the nltk interface, os, Pandas, Regex, scikit-learn, seaborn, Spacy, statistics, Tokenization, twint, pickle, Word2Vec & WordCloud

The goal of the DSM is not to provide a solution to a geopolitical situation but to pragmatically present the facts as they exist. These facts, created by humans, are often found in unstructured text within newspapers and on Twitter. Therefore, the objective is to build...

- Sentiment Analysis & Topic Analysis

The goal of this project is not to establish a position on who is right. Instead, the objective is to utilize the DSM to understand where certain groups stand and on what basis.

The project generated three (3) deliverables:

1. The source code for the modeling developed to analyze the aforementioned problem ([link](#))
2. This document outlining the process
3. A PDF presentation with our findings ([link](#)) referenced

Data Pre-Processing Steps

3.1 Data Cleaning (Master):

1. The data is broken down into two (2) main groups defined below with explanations:
 - a. **News**, using *beautifulsoup4* ([link](#))
 - i. Thirty (30) News articles deliberating on the National Security Law & the respective protests
 - ii. The Articles consist of an equal split between China & HK Articles & International Articles [Appendix I](#)
 - iii. The ordering of the News Articles does not impact the findings & supported by no particular reason
 - iv. The data definitions & explanations are also found in [Appendix I](#)
 - b. **Twitter**, using *Twint* ([link](#))
 - i. 288,416 Tweets from Twitter were pulled from people submitting Tweets ("Tweeters")
 - ii. These cover a three (3) month period between 31 May to 29 Aug 2020
 1. The National Security Law was introduced on 30 June 2020
 - iii. They were pulled based on twelve (12) hashtags [Appendix II](#)
 1. For transparency purposes, these hashtags exclusively arise from HK & International Tweeters; Chinese social media's contribution is not present herein which will we aim to present in a fair manner
 2. The full dataset is found on the GitHub site under the data section ([link](#))

We will segment the final steps of Data Cleaning into their respective groups.

3.1.1 Data Cleaning (News):

1. No null values were presented
2. **Non-ascii Values** ([link](#)) presented the only cleaning step for the News; these presented themselves as "large apostrophes" (for lack of a better word) & thus, converted to normal English for NLP handling found in [Appendix III](#)
3. **No Duplicate** observations were presented
4. **Sentiment Intensity Analyzer ("SIA")** was then added found in [Appendix III](#)
 - a. The SIA is a text analysis method that detects polarity; e.g., a positive or negative opinion
 - b. The scores are composed of four (4) categories:
 - i. Compound (comp): computed by normalizing the other scores with a range of -1 to 1.
 - ii. Negative (neg): The allocation of negative to the Compound score; with a range of 0 to 1.
 - iii. Neutral (neu): The allocation of neutral to the Compound score; with a range of 0 to 1.
 - iv. Positive (pos): The allocation of positive to the Compound score; with a range of 0 to 1.
 - c. It's also known as opinion mining, deriving the opinion or attitude of the Tweeter. The probabilities will add up to 100%.
5. **Stop words** were then removed
 - a. Stop words are a set of commonly used words in a language that provide little value ([link](#))
6. **Stemming & lemmatization** were then done on the Articles & Titles. The outputs were assigned to their own variables to maintain the original Articles & Titles
7. **Term Frequency Inverse Document Frequency** ("TfidfVectorizer") a common algorithm to transform text into a meaningful representation of numbers which can be used to fit machine algorithms for prediction in the final step

3.1.2 Data Cleaning (Twitter):

1. Using a language variable obtained in scraping, the Twitter data came in x51 languages with 67% in English & 24% in Unknown. It was discovered that Unknown are Tweets with only hashtags or a link. In conjunction with other languages (~9%), Unknown observations were dropped resulting in a revised data frame of 194,087 observations ([Appendix IV](#))
2. ~30k duplicates were identified & then dropped resulting in a data frame of 163,699 observations
3. With the help of Regex, Mentions of and to Other Users in Tweets were then defined & dropped ([Appendix IV](#))
4. Regex was also used to remove links to websites within Tweets ([Appendix IV](#))
5. Emoji's are also found in Tweets. Using an Emoji dictionary ([link](#)), Emoji's were converted to words ([Appendix IV](#))
6. Profanity was converted to the word "NEGATIVE" so the SIA would work correctly ([Appendix IV](#))
7. The SIA was then added ([Appendix IV](#))
8. Stop Words were then removed from the Tweets
9. Stemming & lemmatization were then done & the outputs were assigned to their own variables to maintain the original Tweet
10. TfidfVectorizer was the final step

3.2 Exploratory Data Analysis (EDA) & Pre-processing:

The Exploratory data analysis (**EDA**) section is aimed to summarize the main characteristics of a News Article or Tweet & identify what the data may be telling us.

3.2.1 EDA & Pre-processing | News

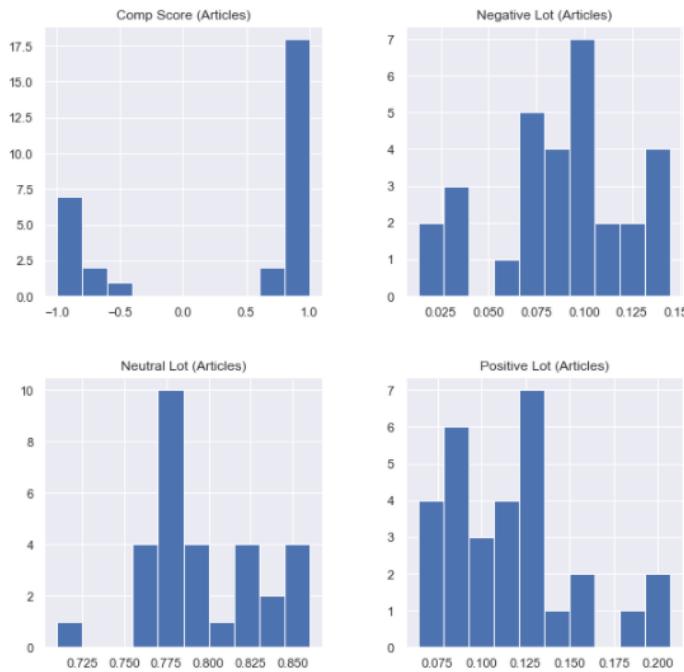
We split the analysis between the Titles & Articles; there was no split between Chinese & International news sources.

Titles | The sequential order of the process & their findings listed below:

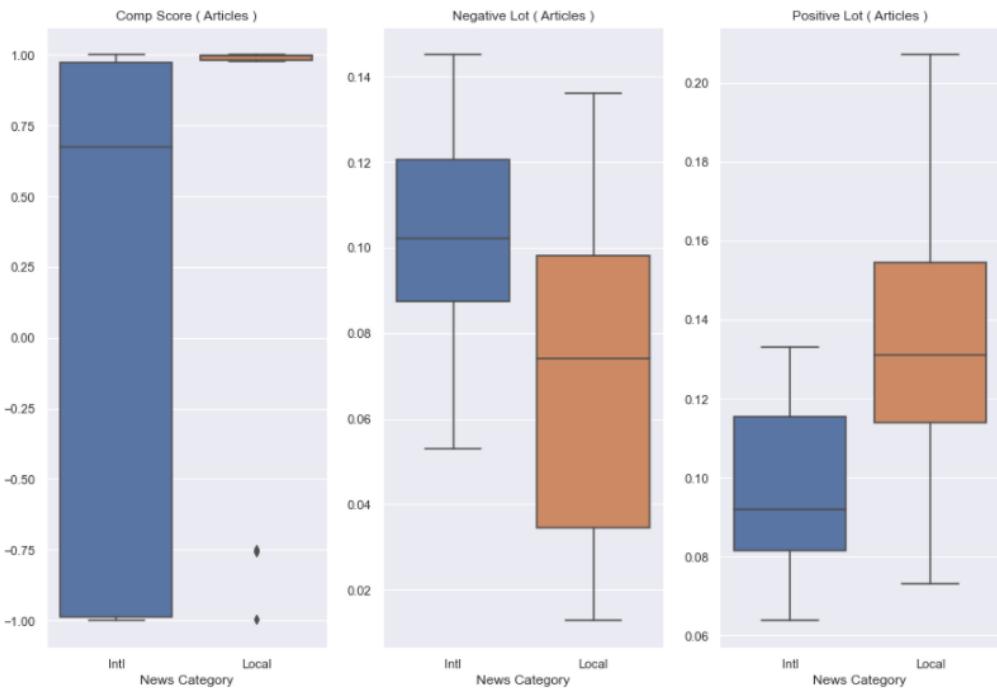
1. Distribution of the SIA scores via **Histograms**
 - a. Skewness observed to the Left on Comp Scores & Right on Negative & Positives Scores
2. Distribution of the SIA scores via **Box Plots**
 - a. **China** | The noticeable observation is the concentration of China's News Titles at Zero on the Negative category. The Compound score also showed outliers towards negative one (-1) while a predominate concentration towards one (1) on the Compound Score. This suggests that Chinese News are predominately positive with some outliers.
 - b. **International** | International News Titles were fairly concentrated in the middle with some outliers on the Positive side. No objective takeaway was received from these results.
3. A **Bar Chart** with the Bottom five (5) Comp scores was built
 - a. **Top 5**: These are titles suggesting positivity as they gravitate towards 1 on the Comp Score.
 - i. Chinese news dominated with a common thread that the NSL will protect democracy & freedom in HK & lead to stability & prosperity
 - b. **Bottom 5**: These are titles suggesting negativity as they gravitate towards -1 on the Comp Score.
 - i. International news held the majority with a common thread that the NSL is leading to anger & HK's future looks volatile
 - ii. Chinese News had a common thread of the international news being misinformed & biased
4. Visual representation of the most frequently used Nouns & Adjective / Verbs via WordCloud's
 - a. No substantial takeaway was achieved with the WordCloud's
 - b. Interesting observations were safeguarding, democracy, protests, books & freedom

The supporting charts & WordCloud's are not presented here as Titles had an average of 9.6 words; they can be found in [Appendix V](#).

Articles | The sequential order of the process remains the same albeit Articles contain 643 words on average; thus, we will include the EDA output here as well as [Appendix VI](#). We hope our findings can be easier to understand next to the charts & word clouds.

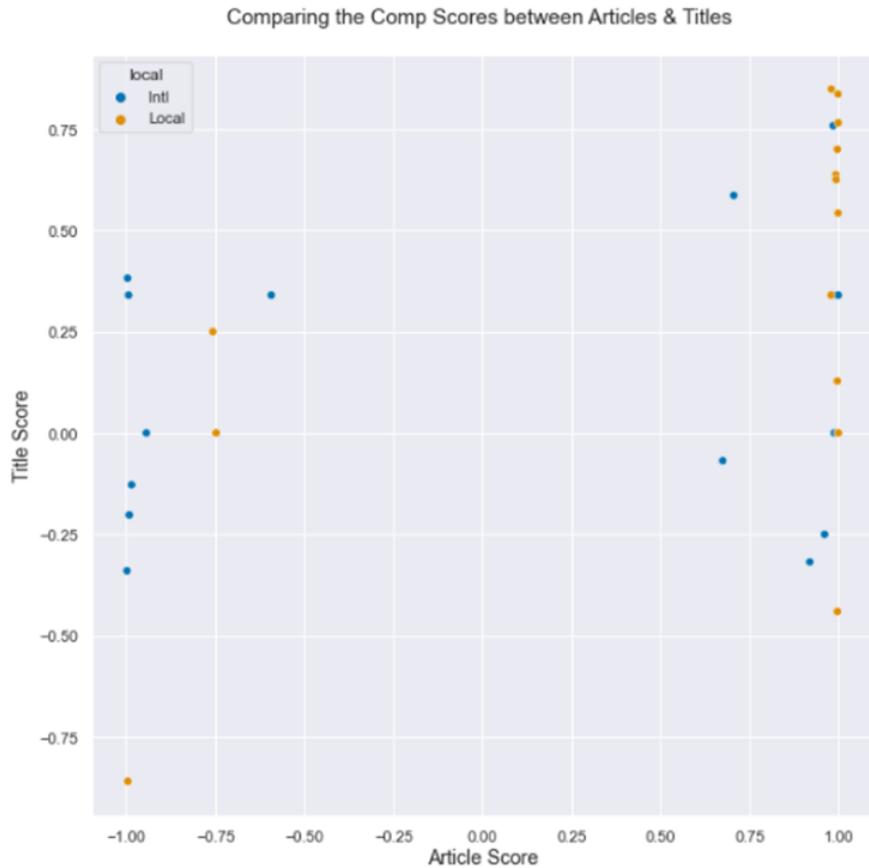


The most distinct observation on the distribution of the SIA in the histograms is the polarity in the Comp Scores. There does not appear to be a 'middle ground,' as the thirty (30) articles deviate to one side or the other; either one (1) or negative one (-1), representing Positive or Negative respectively. Furthermore, the Positive side of the equation dominates more than the Negative.



ranges deviate from near 1 to near -1. The key takeaway would be:

- Chinese News are primarily Positive, &
- International News are diverse



The Box Plots highlight a deeper understanding of how this polarity may be presenting itself.

From right to left, the Positive Lot appears to be supported by the Chinese New Articles. Its Median (~0.13) is above the upper quartile range of their international counterparts.

The Negative Lot, meanwhile, is more concentrated with the International Articles. Its median (~0.11) lays above the upper quartile range of their China counterparts.

The Comp Score, which is a combination of all scores, exhibits a high concentration of China News in the Positive section with some outliers in the Negative section below Zero.

International News appears more diverse in both Positive and Negative sections, as its upper and lower quartile

This observation inspired the construction of a scatter plot with Comp Scores of both the articles and titles on the x and y-axes, respectively.

The apparent concentration of China news on the positive side (upper right) is the main takeaway.

While nearly half of the Negative International News Articles had a Positive or Neutral Title.

Nevertheless, the breakdown is truly a ±50% on the Articles. The last takeaway from this section would be that while the China Articles dominate the Positive camp, they are not entirely dominant.

Conversely, the international articles dominate the negative camp, yet they are also not entirely dominant.

20 | Articles above 50%
10 | Articles below -50%

The breakdown between groups +50%:
China | 60.0 percent
Intl | 40.0 percent

The breakdown between groups -50%:
China | 30.0 percent
Intl | 70.0 percent

A clearer understanding of the titles for the positive and negative articles in the [Appendix](#) can be obtained, but a slightly deeper understanding of how those break down can be found after modeling. Key takeaways for the potential polarity are as follows:

- **International Negative** | political activists quitting, censorship in reading materials & confrontations with police
- **China Positive** | the Law protects & supports HK's democracy & freedom, will lead to prosperity & the wide support in HK for it
- **International Positive** | They don't convey much positivity
- **China Negative** | The BBC is misinformed & present a comprehensive & an objective report from the Chief Executive of HK

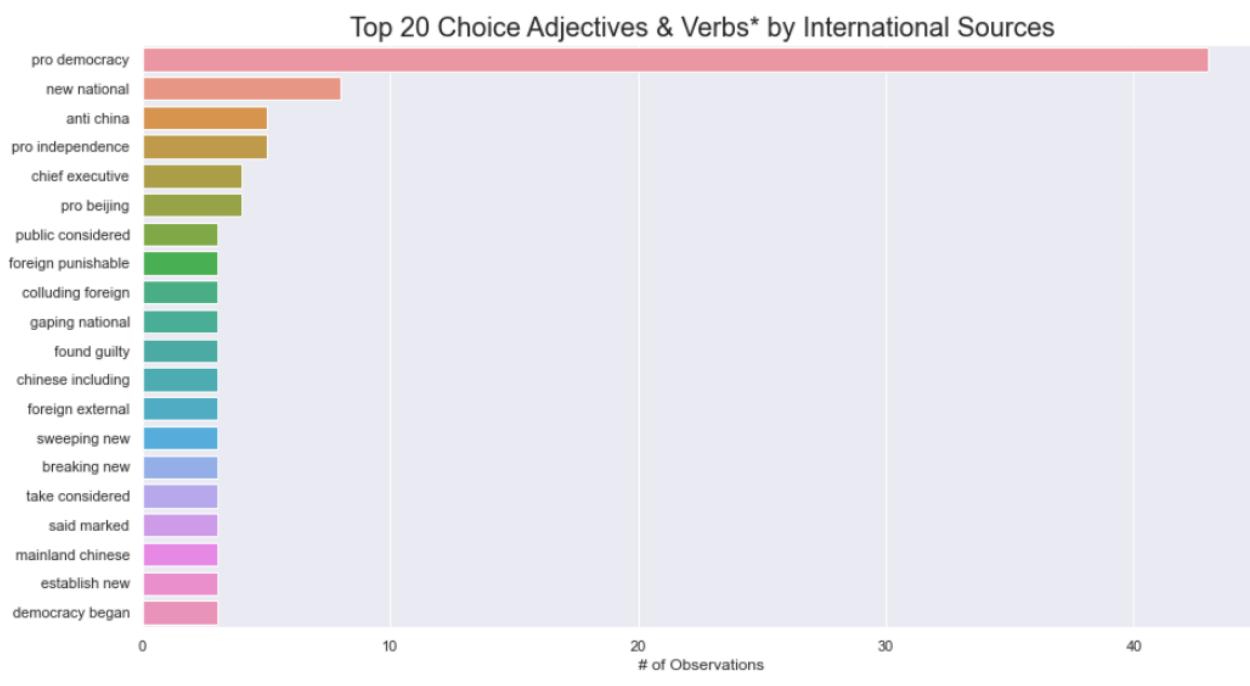
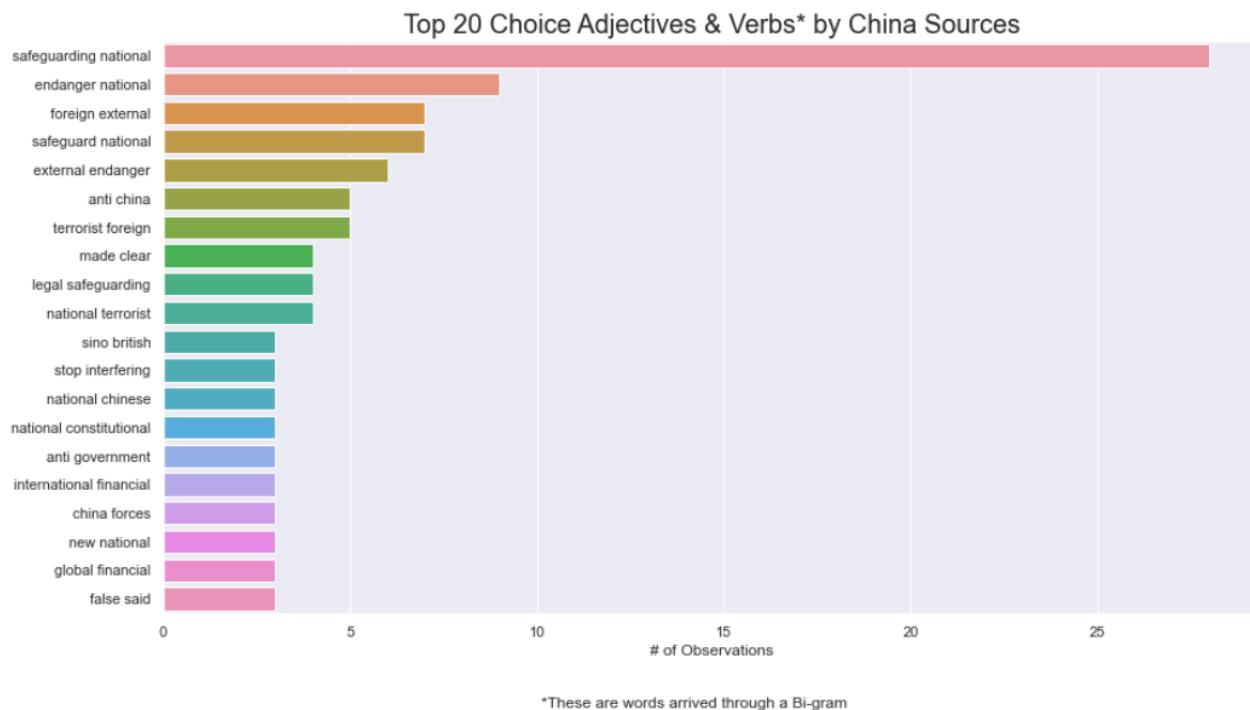
Moving over into the WordCloud's we can see what may be within this polarity. The categories were dissected to show what words apply to each category for a simpler side-by-side.



The WordCloud's are visually appealing but may be challenging to interpret. Below are some observations:

- China's use of words like stability and motherland conveys unity, while international articles' use of the word 'mainland' suggests disunity
- China's use of the words 'safeguarding' and 'peaceful' contrasts with the international articles' use of the words 'inciting' and 'arrested'
- International articles contained mentions of pro-democracy elements, which are not present in the China articles

Counting the frequency of bi-gram words with adjectives and verbs in each category further emphasizes the respective message of each category.



The concluding remarks for the News EDA are as follows:

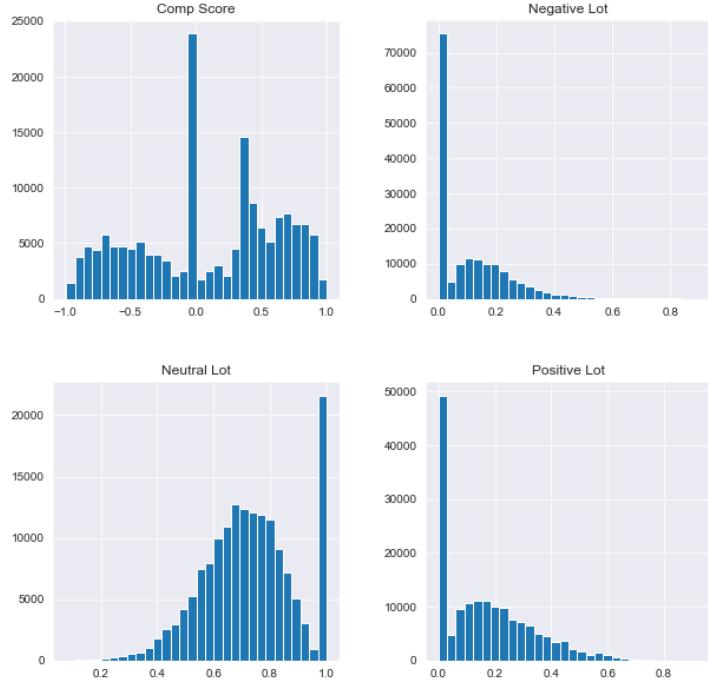
- **China Positive** | The intent of China and the Law is to protect and support the freedom and prosperity of HK as an integral part of the unified motherland
- **International Positive** | No clear indication of a positive position is evident at this stage; confirmation is anticipated in later stages
- **China Negative** | The West may be misinformed, and foreign influence is perceived as endangering HK's prosperity
- **International Negative** | There is concern over the freedom of the people of HK, especially the protestors

3.2.2 EDA & Pre-processing | Twitter

The Twitter EDA follows a similar approach to the News EDA, but it does not differentiate between Title or Article groups, nor between Chinese or International tweets.

As mentioned, it is prudent to assume that all tweets are not originating from within China and are likely to express dissatisfaction with the National Security Law (NSL). The exclusion of Chinese-based social media isn't intentional, but rather a consequence of unavailability. Additionally, it is suggested that the Chinese population may not frequently express political opinions on social media platforms.

All supporting charts and visuals will be included herein, with each located in [Appendix VII](#) for reference.



The first step of the EDA process involved investigating the Sentiment Intensity Analysis (SIA) using a histogram. Both the Negative and Positive Lots exhibit skewness, with the presence of a Neutral Low observed across all categories.

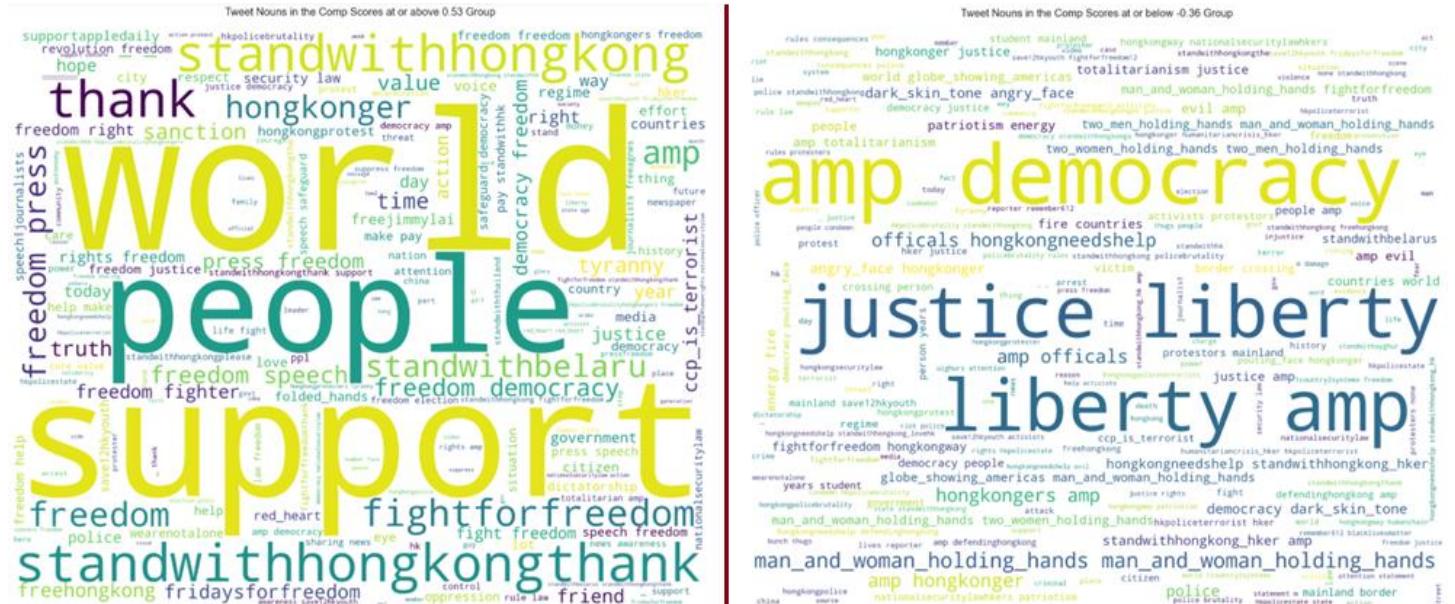
A notable observation is the bimodal distribution of the Comp Score itself, suggesting a grouping of positive and negative tweets. In other words, tweeters do not only convey negativity in their social media engagements. In fact, the number of positive tweets seems to outnumber the negative ones.

Within the bimodal nature of the Comp Score, we made the decision to investigate the optimal method for splitting the tweets into two categories: Positive and Negative.

Using descriptive statistics, we determined that tweets with a Comp Score at or above 0.539 are classified as Positive, while tweets with a Comp Score at or below -0.361 are classified as Negative.

count	163699.000000
mean	0.095108
std	0.534434
min	-0.990100
25%	-0.361200
50%	0.077200
75%	0.539900
max	0.998900
Name:	comp, dtype: float64

The WordClouds provide a fair introduction to the segments of the groups. Words like 'world,' 'support,' and 'standwithhongkong' align with positivity. However, an odd observation is that words like 'democracy,' 'liberty,' and 'justice' fall into the Below -0.36 camp, indicating negativity. Despite being typically associated with positivity, these words seem to carry a negative connotation in this context.



The further examination of these groups can be observed through the bigrams of the top 30 words, with the findings for each group detailed in its respective appendix:

- Positive | Comp Score at or Above 0.53 | [Appendix XII](#)
- Negative | Comp Score at or Below -0.36 | [Appendix VII](#)

We decided to save the bigrams for the appendix to conserve space. The key observations of the bigrams used for each group are listed below:

- **Negative Summary:**

- Human Rights
- Discontent for the CCP
- References to Freedom / Democracy
- Police Brutality
- Fighting
- Holdings Hands (🙏)

- **Positive Summary:**

- Thanks much / support
- Human Rights
- Free World
- Please standwithhongkong / support
- folded_hands (🙏)
- freedom press / democracy

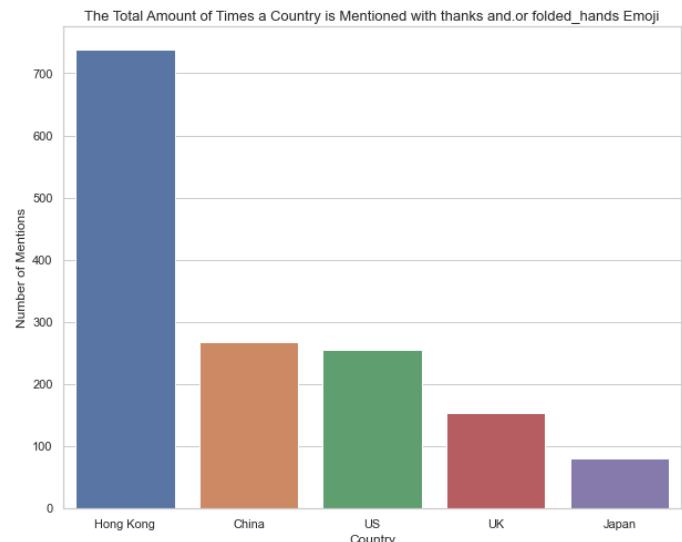
We also examined notable mentions to geopolitical entities associated with 'thanks' and 'folded_hands,' (🙏); inspired by an interest in determining the referent of the term 'Free World.'

We believe that most of the tweeters are from Hong Kong, with China coming in second place based on our observation.

We examined tweets containing the word 'China' and determined that they may contain sarcasm, as well as mentions of the international community.

It is ironic that the next top countries mentioned in the tweets were the US, the UK, and Japan, considering that these were the same countries used to pull news from. There was no planning or intention associated with this outcome.

Mentions of the US were also examined, suggesting that it may be one of the countries referred to as the Free World.



Examples of observations with both thanks & folded_hands for China are below.

```
Thank #StandWithHongKong !!! We sincerely hope free world stand firm Communist China's human rights abuses Hong Kong. Many thanks folded_hands light_skin_tone
```

```
Deeply touched heartfelt thanks done #HK folded_hands light_skin_tone folded_hands light_skin_tone folded_hands light_skin_tone Always grateful international support fighting evil #CCPChina regime. #StandWithHongKong
```

```
Thank much #StandWithHongKong . folded_hands Although don't know actually plans, still thanks UK helps. #newwestberlin #5DemsNot1Less #BoycottChina
```

Examples of observations with both thanks & folded_hands for the US are below.

```
Heartfelt thanks standing solidarity Hongkongers folded_hands Pls consider implementation #MagnitskyAct sanction CCP & HK officials violate "1country2systems" & "high autonomy" promises Joint Declaration fire Let JUSTICE done UK #StandwithHongKong
```

```
_nozomi Thank much US UK,thanks always supportive us red_heart folded_hands light_skin_tone #StandWithHongKong
```

```
As hongkonger, cannot save home without help US. We believe democracy freedom important everywhere world. HKers appreciate please see help ~ please save US HK folded_hands light_skin_tone #freehongkong #thanksTrump #thankUS
```

The concluding remarks for the Twitter EDA are as follows:

- Positivity | Thanks much / support, Free World, help & folded_hands (🙏)
- Negativity | Discontent for the CCP, Police Brutality, Fighting & Holdings Hands (🙏)
- Mentioned in both | Human Rights & freedom press / democracy
- There appears to be a Pro-China or Pro-HK split
- Investigated links to geopolitical entities as well as potential sarcasm directed towards them
 - Positive mentions of the US were noted, while mentions regarding China may carry a sarcastic tone

4.0 Model Description

The modeling approach for both Twitter and News (both Titles and Articles) is identical; they both utilize Latent Dirichlet Allocation (LDA) to classify text in the News and Tweets into particular topics.

4.1 Pre-LDA

Before applying LDA, both Twitter and News underwent another 'cleaning' process, some steps of which were repetitive but done for reassurance. The pre-LDA process is outlined below, with examples provided for each step:

- **Lemmatization**
 - The process involves grouping together the inflected forms of a word so they can be analyzed as a single item identified by the word's lemma or its dictionary form
- **Stop Word Removal**
 - Stop words refer to a set of commonly used words in a language. English examples include 'a,' 'the,' 'is,' 'are,' 'and,' etc. These words do not contribute significantly to NLP tasks; therefore, they are removed
- **Bag of Words**
 - A bag of words is a representation of text that describes the occurrence of words within a document. It's called a 'bag' because it disregards the order or structure of the sentence; only the occurrence of the word matters
- **Bigrams & Trigrams**
 - Bigrams and trigrams are sequences of two (2) or three (3) words, respectively. Identifying common occurrences of groups of words that appear together is more efficient using these methods

```
# Title / Before Lemmatization
print(df_clus['title'][15][0:21])
```

Newly passed national

```
# Title / After Lemmatization
print(lemmatized[15][0:19])
```

newly pass national

```
# Before Stop Word Removal
print(df_clus['title'][4][0:47])
```

Teenage arrests, blank protest signs, and a key

```
# After Stop Word Removal
print(data_words[4][0:6])
```

['teenage', 'arrest', 'blank', 'protest', 'sign', 'key']

```
print(corpus[4][0:2])
```

[(1, 9), (11, 5)]

```
# below is a bigram & trigram
print(data_bigrams_trigrams[16][0:2])
```

['hong_kong', 'national_security_law']

```
# Below is the word
# assigned to the number
# in the bag of words
word = id2word[[4][:][0]]
print(word)
```

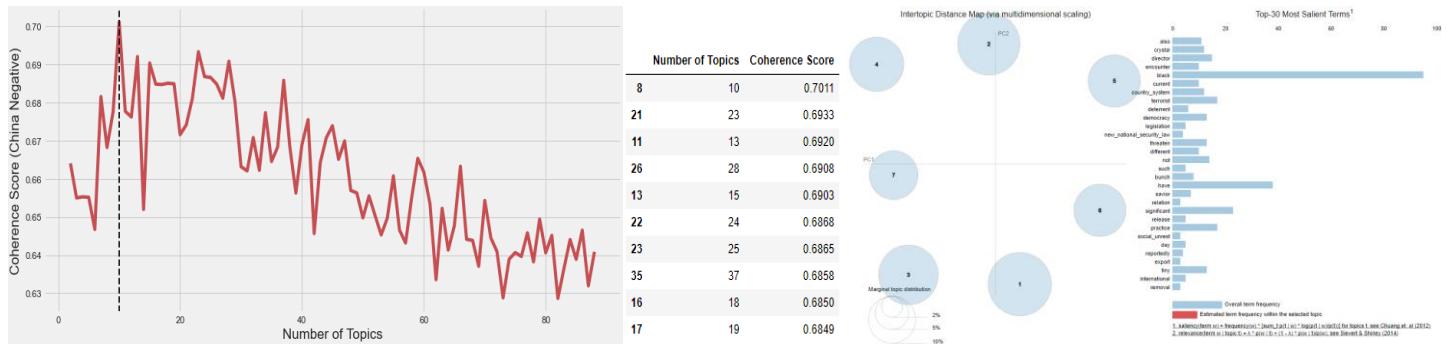
affect

4.2 LDA Model

Upon completion, the data was processed using LDA and subsequently visualized with pyLDAvis, an interactive tool for topic model visualization. pyLDAvis aids in the interpretation of topics within a topic model by providing a visual representation of the text data corpus.

LDA and pyLDAvis provide an initial overview of the number of topics and the words associated with them. To determine the optimal number of topics within the documents, a gensim Coherence Score was calculated. This score evaluates the degree of semantic similarity between high-scoring words within a topic, indicating how coherently the topic's words support each other.

Once the Coherence Score is determined, the LDA and pyLDAvis processes are repeated, followed by a detailed investigation of each identified topic. This final step, referred to as 'Reading between the Lines' (RBL), involves a comprehensive analysis of the topics.



5.0 Model Findings

The following section outlines the process and output of the models for both the News Articles and Tweets, as described previously. These models will be treated separately until the subsequent section, where their integration will be discussed.

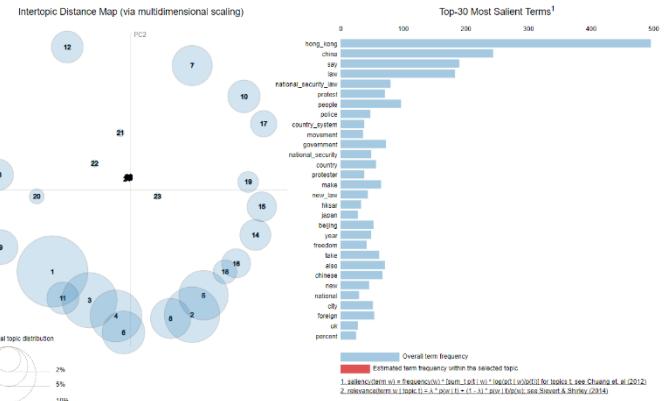
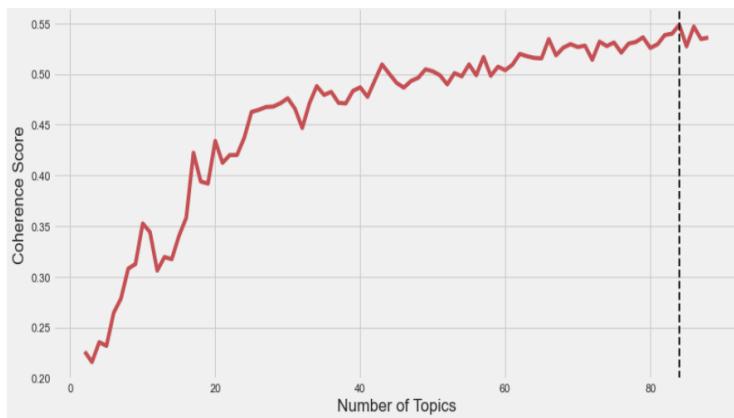
Reiterating, the News Articles are evenly sourced from both Chinese and International outlets, aiming to provide a balanced spectrum of opinions. Furthermore, it is reasonable to anticipate that Twitter Tweets predominantly express anti-NSL sentiments.

5.1 Model Findings | News

The coherence score for the 30 news articles revealed eighty-four (84) topics, as detailed in Appendix VIII; summarized below:

- The sizes vary in size
- The distance from the center suggests that many are distinct, while 21+ are clustered around the center
- There was a significant overlap observed

While removing the 21 topics due to their proximity to the center and size is one option, an alternative approach was chosen to optimize the LDA modeling process for the News Articles.



Number of Topics	Coherence Score
82	0.5486
84	0.5469
81	0.5399
80	0.5385
77	0.5363
86	0.5361
85	0.5346
64	0.5346
71	0.5320
76	0.5317

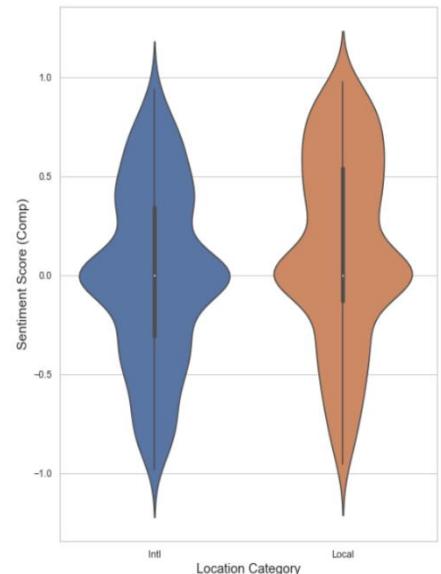
The decision to break down the articles into sentences and subsequently into the four groups outlined in Section 3.2.1 EDA & Pre-processing Article's was made.

The rationale behind splitting into sentences was supported by how well the data frame was handled in LDA.

This resulted in ~24.6% of the sentences as having a Comp Score of Zero or deemed as Neutral. They were investigated but considering we would still have a total number of observations of 1,023 if they were dropped, we dropped them.

The analysis resulted in a balanced representation of both Chinese and International news sources. Subsequent sections will detail the process for each, aiming to refine the number of topics for better coherence scores.

Category	Percentage	Topic Type
Negative International	18.01%	Negative International
Negative China	19.51%	Negative China
Positive China	34.73%	Positive China
Positive International	27.76%	Positive International



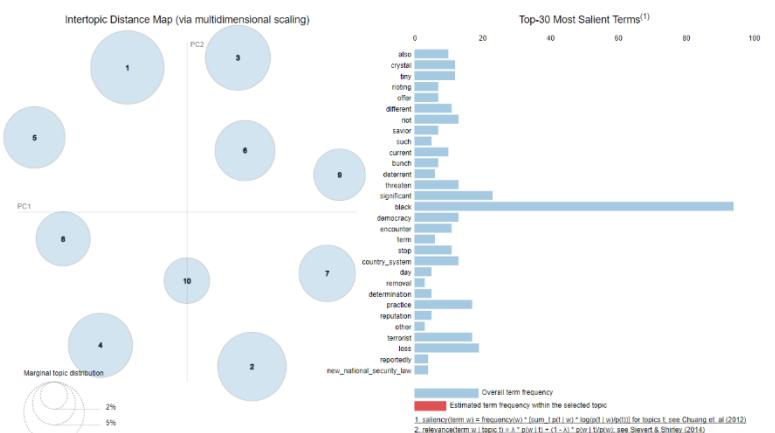
News RBL | China Negative

We will commence with an examination of the negative sentiment expressed in the News Articles sourced from Chinese outlets. A comprehensive breakdown of the following analysis is available in [Appendix VIII](#).

There were ten (10) topics which were reviewed individually.

The summary is highlighted below:

- 10: Discontent of protestors & their civil disobedience
- 9: BBC is misinformed
- 8: Discontent of the US for meddling in HK affairs
- 7: Attempts to split HK & China's unity by foreigners
- 6: NSL is to punish those threatening National Security
- 5: NSL's intent is to heal HK from previous violence
- 4: The US should look at the law objectively
- 3: HK has become highly politicized & violent
- 2: The NSL intents is to target a small criminal group
- 1: Protestors criminal activity



For further details on supporting sentences, please refer to the source code of this project. We acknowledge the abundance of topics within each category but assure you that our objective is to streamline the content in this report.

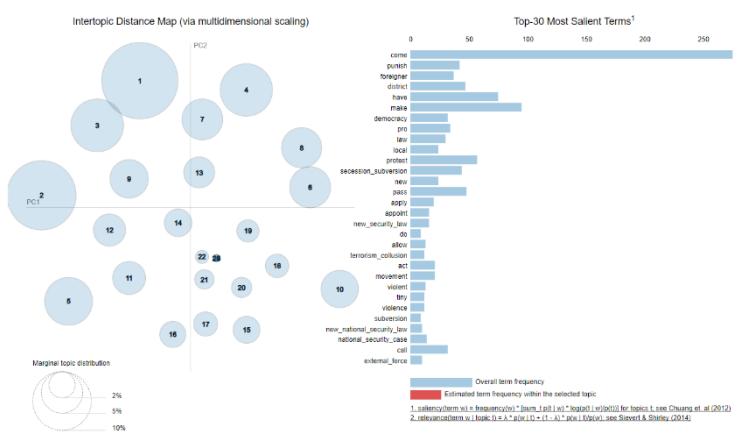
News RBL | International Negative

The following section presents the negative sentiment expressed in News Articles from International sources. A more comprehensive breakdown of the content below can be found in [Appendix VIII](#).

Initially, there were forty-seven (47) topics identified, but those above 28 were deemed small and located near the center, thus considered less significant. Topics with seven (7) or more observations were shortlisted, resulting in a final selection of ten (10) topics.

The summary is highlighted below:

- 13: Prosecution of those carrying on in exile
- 4: The NSL is vaguely worded
- 42: The NSL may be a human rights violation
- 34: Tactics of the protestors
- 1: More tactics of the protestors
- 29: Acknowledges China's position on the NSL
- 27: The NSL undermines the OcTs system
- 8: Possible suppression of free speech
- 18: NSL may go against common law & may threaten HK's freedom
- 12: Outlining various potential arrangements for being sentenced to prison



If you wish to review all supporting sentences, they are available in the source code for this project. We trust that you understand the abundance of topics within each category, and assure you that we've made our best objective judgment to simplify them in this report.

News RBL | China Positive

The News Articles deemed as positive from Chinese sources is now presented. A detailed breakdown of the below can be found in [Appendix VIII](#).

Forty-eight (48) topics identified. The Top 25% of the contributors were shortlisted resulting in twelve (12) topics. The summary is highlighted below:

- 38: West doesn't have a good human rights track record
- 24: The NSL will only apply to a small group of offenders
- 39: The NSL is about safeguarding national security
- 22: Rejoiceful mood on HK's return to China
- 46: The NSL has nothing to do with freedom of speech
- 48: The UK needs to stay out of China's affairs
- 44: The NSL will not infringe on OcTs
- 42: Support from Carrie Lam for the NSL
- 45: HK has autonomy & enjoyed prosperity under OcTs
- 1, 47 & 43: *Do not present anything new*

If you wish to view all supporting sentences, they are in the source code for this respective project. We trust you understand there are a lot of Topics within each category but we are making our best objective judgement for simplifying it in this report.

News RBL | International Positive

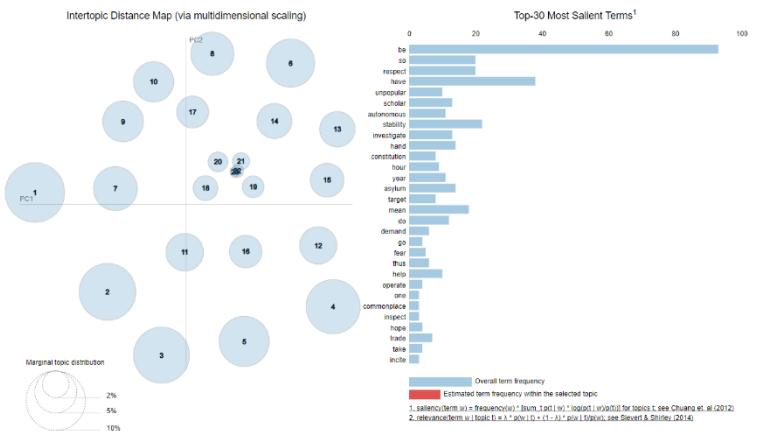
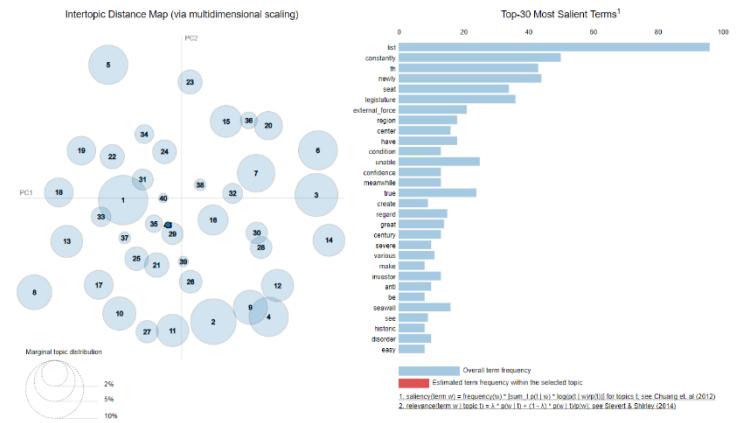
The News Articles deemed as positive from International sources is now presented. A detailed breakdown of the below can be found in [Appendix VIII](#).

Twenty-three (23) topics were initially identified. Seventeen (17) topics were shortlisted with ten (10) or more observations.

The summary is highlighted below:

- 5: Usage of positive words
- 23: More usage of positive words
- 3: More usage of positive words
- 14: Positive mentions towards supporters
- 9: More positive mentions of the protestors
- 20: Less support for protestors seen in HK
- 15: China & Japan's diplomatic ties improving
- 11: Comradery amongst the Tweeters
- 4: Mentions of Beijing's position of safeguarding security
- 21: China's courts are effective
- 1, 8, 12, 13, 10, 18 & 22: *Nothing decisive*

If you wish to view all supporting sentences, they are in the source code for this respective project. We trust you understand there are a lot of Topics within each category but we are making our best objective judgement for simplifying it in this report.

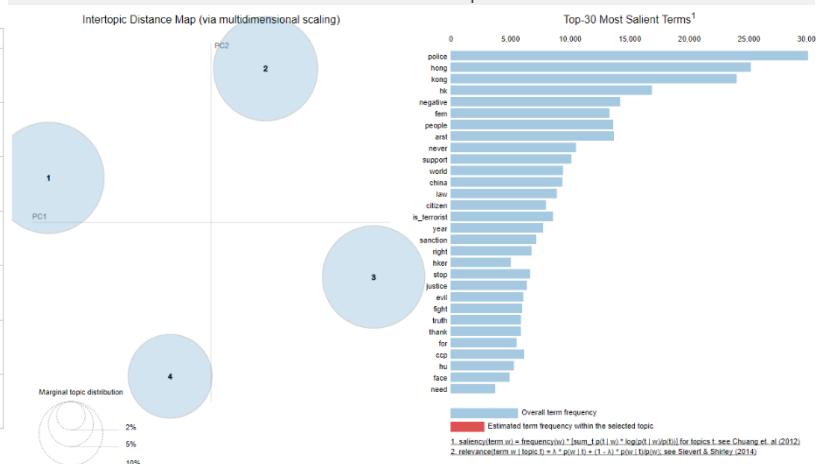
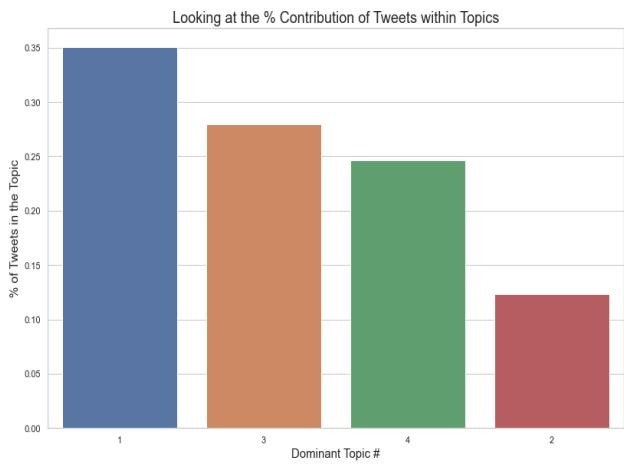
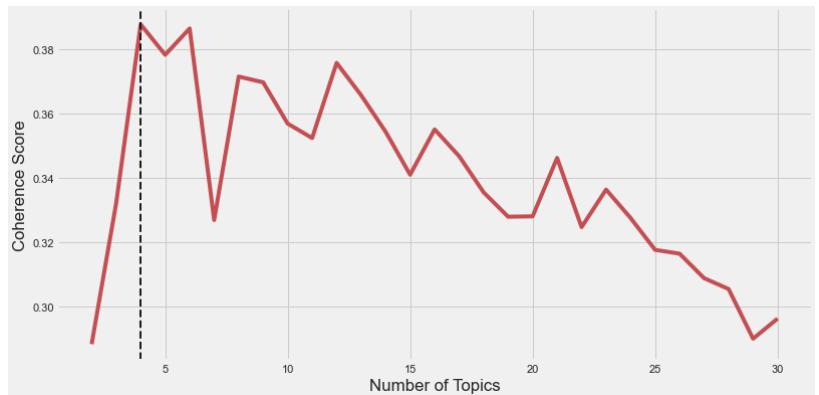


5.2 Model Findings | Twitter

The Coherence Score on the 163,699 Tweets presented four (4) Topics; we will outline what was seen:

- The sizes look to be reasonably similar
- The distance between the center for all indicates they are distinct
- The top words & trigrams for each topic for each presented below:
 1. police, arst, law & is_terrorist
 2. negative, people, never, world & China
 3. support, justice, evil, fight, truth & thank
 4. need, time, protest & puppet

The contribution for each topic ranged from ~15-35%.



The real meaning of what these top words convey does not present itself clearly until we dig deeper. The RBL section is just that, we read the full sentences; in this case, Tweets.

We could not read all the Tweets so we plotted it on a histogram by their contribution & took a section of the top & bottom of the contribution percentages. This works off a modius operandi that if the top & bottom contributors of the topic are aligned, then the middle will most likely be aligned as well.

The RBL is truly a fraction of the total number of Tweets in each topic. Topic 1, for example, had 57,394 Tweets in its set while 80 Tweets were moved to RBL; thus 0.01% of the set.

Twitter RBL | Topic 1

A more detailed breakdown of the below can be found in [Appendix IX](#).

The summary is highlighted below:

- An appreciation for support from the world for helping fight for freedom, democracy & human rights
- Mentions of the free world which may be classified as the UK, Australia, Taiwan & the USA with personal mentions towards:
 1. rep riggleman
 2. sec pompeo
 3. Aderholt
 4. rep gooden
 5. sen haley

Twitter RBL | Topic 2

The summary is highlighted below:

- A sense of comradery towards their fight
- Conveying an urge to not give up on their fight
- The usage of positivity to achieve the aforementioned goals:
 1. Candle
 2. musical_notes / sing hallelujah
 3. folded_hands
 4. Different configurations of people holding hands

Twitter RBL | Topic 3

The summary is highlighted below:

- Tweeters vocalize their negative opinion towards what they believe China's goal may be; notably:
 1. May treat HK the way they believe China treats Tibet & Xinjiang (the Uighurs)
 2. Limitations towards freedom & Press Freedom
 3. The suppression of democracy
 4. Political suppression via arresting protestors
- Belief that the HK police are puppets

Twitter RBL | Topic 4

The summary is highlighted below:

- Confrontations with the police with notable mentions of
 1. People being arrested & sentenced
 2. Hurting police with a laser pointer
 3. Beatings at various locations
 4. Assaulting a police officer by kicking their back
 5. A lady carrying a US flag in a shopping mall
 6. Possession of kg ketamine
- Confrontations with legal authorities with charges of:
 1. Attempting to split the nation via posts on Facebook
 2. Banning of books
 3. Possession of a flick knife deemed to be an offensive weapon
 4. Gatherings banned
 5. A judge sentenced an old teacher for assaulting a police officer
- Police left while gangsters came in
- The protestors belief that the media confuses their intentions
 1. They believe they aren't asking for violence; they are asking for justice & the protests are one way to vocalize this intent for making a change

The compressed Tweets are found on the respective GitHub account; selected sentences of the four (4) topics above in [Appendix IX](#).

6.0 Reading Between the Lines

We will outline the key findings for both separately & then finish with an overall summary of the Sentiment & Topic Analysis for the HK NSL found in the thirty (30) News Articles & 163,699 Tweets.

News | The findings for each of the four (4) categories on the equally split News is below:

- **China Negative** | 10 Topics
 - The violence of protestors
 - Foreign interference in China & HK's internal affairs
 - A misunderstanding of the pure intent of the NSL by the West
 - China's firm belief that the NSL will lead to long term stability & prosperity in HK
 - *China believes the West is ignoring & misunderstands the NSL's intent*
- **International Negative** | 10 Topics
 - Their belief of the NSL's infringement on Common Law
 - Their credence towards the vagueness of the language used in the NSL
 - Their position on the NSL's potential ramifications
 - *They outline China's opinion as well*
 - The actions & tactics of police & protestors respectively
- **China Positive** | 11 Topics
 - The NSL is for safeguarding the majority of HK people
 - *While the West is making false accusations, Carrie Lam, HK business & 53 countries are in support of the NSL*
 - The HK people are open to the NSL & celebrating it
- **International Positive** | 17 Topics
 - Dominated with mentions of China's opinion & words which may be classified as Positive
 - Support for the NSL from HK's legislator & the public
 - China's diplomatic ties with Japan have improved
 - Solidarity amongst protestors

We will outline the four (4) sub-categories all together in a few sentences for each:

- **China Positive**
 - China believes that the NSL will safeguard the majority of the people & bring long-term prosperity to HK as well. The HK govt & businesses support the NSL as well as the HK people who are celebrating it
- **China Negative**
 - The International community both misunderstands the purity of the NSL & are interfering in China's internal affairs
- **International Negative**
 - They believe the NSL infringes on Common Law & written in a vague enough to potentially serve other intentions
- **International Positive**
 - The International News mentions China's position & a great number of positive words are used; thus, they will come up as a positive sentence albeit are not interpreted as positive when reading. The objectively positive comments are mentions of the protestor's solidarity as well as mentions of the HK govt's support for the NSL

Finally, a few sentences for the two (2) main categories:

- **China News** believes the NSL will safeguard the majority of the people & bring long-term prosperity to HK; these are things the HK govt, HK businesses, & 53 countries support; as well as the HK people who are celebrating it. The West misunderstands China's intentions & China wishes for the West to stay out of China's internal affairs
- **International News** believes the NSL infringes on Common Law & written in a vague enough to potentially serve other intentions. Aside from mentioning China's position & the HK govt's support for the Law, there was not much positivity towards the NSL itself

Twitter | The 163,699 Tweets fell into four (4) categories listed below:

- Appreciation for the support coming from abroad
- Comradery towards their fight against the NSL & perceived ramifications of the it
- Distrust towards China & their perceived intentions for the NSL
- Dissatisfaction of how the police & the HK gov't are handling it

Finally, a few sentences to summarize the Tweets:

- Tweeters believe that China may one day use the NSL to treat HK in a way similar to Tibet, Xinjiang (the Uighurs). To mitigate this perceived risk, they appreciate the support of the free world, which may be classified as the UK, Australia, Taiwan & the USA. The Tweeters believe they should band together in unity to overcome this perceived risk

The International News & Tweets Connection

As mentioned in the beginning of this report, the Tweeters are expected to be almost exclusively against the NSL. Their alignment with their categories & those seen with the International News was expected & outlined below:

- They both mention the comradery of the protestors in a positive manner
- They believe that the NSL infringes on Common Law & may infringe on the freedom of the HK people
- Tweeters explicitly express distrust towards China & their potential intentions of the NSL while the International News alludes to this idea by mentioning the vagueness in which it was written
- Tweeters mention the protestors engagement with police more than the International News

Reading Between the Lines for Both

The narrative which connects them all may be summarized below:

- China believes that the NSL will safeguard the people of HK & bring long-term prosperity to HK while conversely the International community, including the Tweeters, believe the NSL infringes on Common Law & may infringe on the freedom of the HK people
- China identifies the International position but believes they have a misunderstanding of the pure intent of the NSL. International News also mentions China's position albeit believe China incorporated vague wordage to possibly serve other intentions. The Tweeters believe that certain media groups misjudge their intentions & believe protests are their only way to achieve the society they wish for
- China believes that the International community should stay out of Chinese affairs while the Tweeters are thankful for the engagement / support from the International community
- China's position on police engagement is justified given the actions of the protestors. International News highlights the engagements while Tweeters convey a belief that the police are going above their call of duty

Please note, this Data Science project was completed in September 2021 but the data is from June - Aug 2020. Much may have changed but that would fall outside the scope of this project.

7.0 Next Steps

Throughout the process there were a number of things I either wanted to change or add. I will outline those below between Twitter, the News or both:

- **Twitter**
 - Translation. Google Translate sent a notable amount of errors. Given time constraints I had to limit the data frame to English.
- **News**
 - There were some inclusions of text not applicable to the News including references to another article & formatting text such as “/n” or “/t”. I do not believe the latter presents an issue on the Sentiment scores but removing these would benefit the professional nature. References that are not applicable to the Topic are present but don’t contribute enough to throw the process offline.
- **Both**
 - The Count Vectorizer data was not used a great deal. Thus, re-examining the data frames with attention to this may help.

Appendix I

	file_name	date	source	country	local	title		article	word_count
0	bbc_1	2020-06-30	BBC	UK	Intl	Hong Kong security law: What is it and is it w...	China has passed a wide-ranging new security l...	15490	
1	bbc_2	2020-07-01	BBC	UK	Intl	Hong Kong's new security law: Why it scares pe...	China has introduced a new national security l...	6021	
2	nytimes_3	2020-06-28	NY Times	US	Intl	What China's New National Security Law Means f...	Chinese lawmakers have approved a national sec...	4028	
3	forbes_4	2020-07-01	Forbes	US	Intl	Hong Kong Makes First Arrests Under Beijing's ...	Share to FacebookShare to TwitterShare to Link...	4408	
4	insider_5	2020-08-02	Insider	US	Intl	Teenage arrests, blank protest signs, and a ke...	Thursday, July 30, marked one month since Chin...	6326	
5	abc_6	2020-07-01	ABC News	US	Intl	What's in Hong Kong's new national security la...	The full details of the controversial national...	2420	
6	cnn_7	2020-07-03	CNN	US	Intl	Hong Kong's security law could have a chilling...	London (CNN Business)Hong Kong insists its vib...	5683	
7	nypost_8	2020-07-01	NY Post	US	Intl	Hong Kong police arrest over 300 in first prot...	Hong Kong police arrested more than 300 people...	1712	
8	nippon_9	2020-08-14	Nippon	Japan	Intl	Hong Kong's Security Law: How Should Japan Res...	Growing Private and Governmental Support for H...	6367	
9	bbc_10	2020-06-30	BBC	UK	Intl	Hong Kong security law: Anger as China's Xi si...	The UK, EU and Nato have expressed concern and...	11881	
10	bbc_11	2020-06-30	BBC	UK	Intl	Hong Kong security law: Minutes after new law...	On Tuesday morning, the news started to break ...	4712	
11	bbc_12	2020-07-08	BBC	UK	Intl	Hong Kong security law: Beijing security offic...	A new national security office has been offici...	3238	
12	bbc_13	2020-07-05	BBC	UK	Intl	Hong Kong security law: Pro-democracy books pu...	Books by pro-democracy figures have been remov...	4325	
13	bbc_14	2020-06-30	BBC	UK	Intl	Hong Kong security law: Life sentences for bre...	People in Hong Kong could face life in jail fo...	6500	
14	theDiplomat_15	2020-07-01	the Diplomat	US	Intl	Hong Kong Through Water and Fire	Credit: AP Photo/Kin CheungAdvertisementIt has...	9868	
	file_name	date	source	country	local	title		article	word_count
15	peoples_daily_1	2020-07-03	People's Daily	China	Local	Newly passed national security law a seawall s...	The Law of the People's Republic of China on S...	3486	
16	peoples_daily_2	2020-07-02	People's Daily	China	Local	Hong Kong national security law helps ensure l...	On June 30, the Standing Committee of the 13th...	8028	
17	peoples_daily_3	2020-07-02	People's Daily	China	Local	Law and order dawns in Hong Kong as new law ta...	-- The festive mood across Hong Kong on the 23...	9627	
18	peoples_daily_4	2020-07-02	People's Daily	China	Local	National Security Law paves the way for more p...	Hong Kong, the popular Asian city, returned to...	9498	
19	peoples_daily_5	2020-07-02	People's Daily	China	Local	HKSAR national security law to put HK back on ...	Zhang Xiaoming, deputy director of the Hong Ko...	6744	
20	globaltimes_6	2021-04-19	Global Times	China	Local	Biased tone, misinformation 'major mistakes' b...	Victor Gao (center), chair professor of Soocho...	16593	
21	globaltimes_7	2020-07-06	Global Times	China	Local	London's measures meaningless, 'bluff rather t...	A Huawei store stands next to a Globe Telecom ...	2960	
22	globaltimes_8	2020-06-30	Global Times	China	Local	National Security Law to protect HK democracy...	Hong Kong citizens on Tuesday gather to suppor...	3711	
23	min_foreign_aff_9	2020-07-20	Ministry of Foreign Affairs	China	Local	Ambassador Liu Xiaoming Gives Exclusive Live I...	On 19 July 2020, H.E. Ambassador Liu Xiaoming ...	5324	
24	min_foreign_aff_10	2020-07-01	Ministry of Foreign Affairs	China	Local	Foreign Ministry Spokesperson Zhao Lijian's Re...	In recent years, the US government has placed ...	18122	
25	xinhua_11	2020-05-16	Xinhua	China	Local	IPCC's report comprehensive, objective, fact-b...	Video PlayerClose\n\n\nCarrie Lam, chief exe...	806	
26	xinhua_12	2020-07-01	Xinhua	China	Local	China adopts law on safeguarding national secur...	Video PlayerClose\n\n\nLi Zhanshu, chairman...	4315	
27	theStandard_13	2020-08-26	the Standard	China	Local	State media says Hong Kong has a toxic 'Apple'	State media People's Daily today published an ...	3079	
28	china_daily_14	2020-06-20	China Daily	China	Local	Wide support for proposed national security law	Residents sign to support the national securit...	4294	
29	hkgovt_15	2020-06-30	Hong Kong Gov't	Hong Kong	Local	CE welcomes passage of The Law of the People's...	In response to the passage of The Law of the P...	6143	

([back](#))

Appendix I

Column	Description
0	file_name File name (csv) which can be found in the data section of GitHub
1	date UTC time when the News was reported.
2	source The News source of the article.
3	country Where it News was reported; i.e. the country of the News source.
4	local The differentiator between Chinese & International news
5	title The Title of the News source.
6	article The body of the News.
7	word_count The total number of words before regex.

([back](#))

Appendix II

	hash	created_at	username	tweet	language	replies_count	retweets_count	likes_count	reply_to	hashtags
7	#FightForHongKong	2020-08-23	cipopolitik	China will never stop. #HongKongProtest #Figh...	en	0	0	0	□	['hongkongprotest', 'fightforhongkong', 'prayf...
8003	#HongKongProtest	2020-06-04	paulisally	Hong Kong Police is MURDERER!!!!!! 총총 경찰은 살인범...	ja	0	0	1	□	['policebrutality', 'hongkongpolice', 'hongkon...
8503	#PrayForHongkong	2020-06-30	cartwheelwombat	Please pray for Hong Kong. You can follow him...	en	1	2	2	□	['prayforhongkong', 'standwithhongkong', 'hong...
9025	#WeAreNotAlone	2020-07-04	whats_a_gurg	There's not much more satisfying than seeing o...	en	0	0	0	□	['wearenotalone', 'questioneverysthing']
9307	#nochinaextradition	2020-05-31	techno_tech4u	'Remove China Apps' crosses 1 million download...	en	0	0	0	□	['china', 'chinaapp', 'antichina', 'nochinaext...
24003	#standwithhongkong	2020-08-17	minsuga1993309	Please #StandWithHongKong!	en	0	0	1	□	['standwithhongkong']
175007	#hkprotests	2020-08-24	juniushogodie	It's also the 1st time MTR closed its station ...	en	0	7	17	□	['hkprotests']
180023	#freehongkong	2020-08-27	pppongo	@StateDept @SecPompeo Thank you U.S so much fo...	en	0	0	0	□	['screen_name': 'StateDept', 'name': 'Departm...', 'standup4humanrights', 'standwithhongkong', ...]
260001	#hkpolicebrutality	2020-06-16	akaribug	They keep telling us to trust a liar while tur...	en	0	1	0	□	['hkpolicebrutality', 'xinjiang', 'standwithho...
280017	#hkpolicestate	2020-06-14	ylye33	A 17 years old girl was attacked by the #HKpol...	en	0	0	3	□	['hkpolice', '612protest', 'hkpolicebrutality']
288002	#hkpolicererrorism	2020-06-08	leung18188868	@foxxthepopoo @koshi2008 They are not police. ...	en	0	1	0	□	['screen_name': 'foxxthepopoo', 'name': 'ianfh...', 'hkpolicebrutality', 'hkpolicererrorism', 'hk...
284002	#HKpolicererrorist	2020-07-25	bethenewyorkers	@PENamerica Journalists are always the target ...	en	0	2	2	□	['screen_name': 'PENamerica', 'name': 'PEN Am...', 'hkpolicererrorist', 'nationalsecuritylaw']

Column	Description
0	hash
1	created_at
2	username
3	tweet
4	language
5	replies_count
6	retweets_count
7	likes_count
8	reply_to
9	hashtags

([back](#))

Appendix III

[-- Non-ascii & Unclean Values | Conversion --]

```
df_news_title.title[27]
'State media says Hong Kong has a toxic 'Apple'

df_news_title['title'] = df_news_title['title'].str.replace(r'\'', '\\\'')
df_news_title['title'] = df_news_title['title'].str.replace(r'\\\'', '\'')

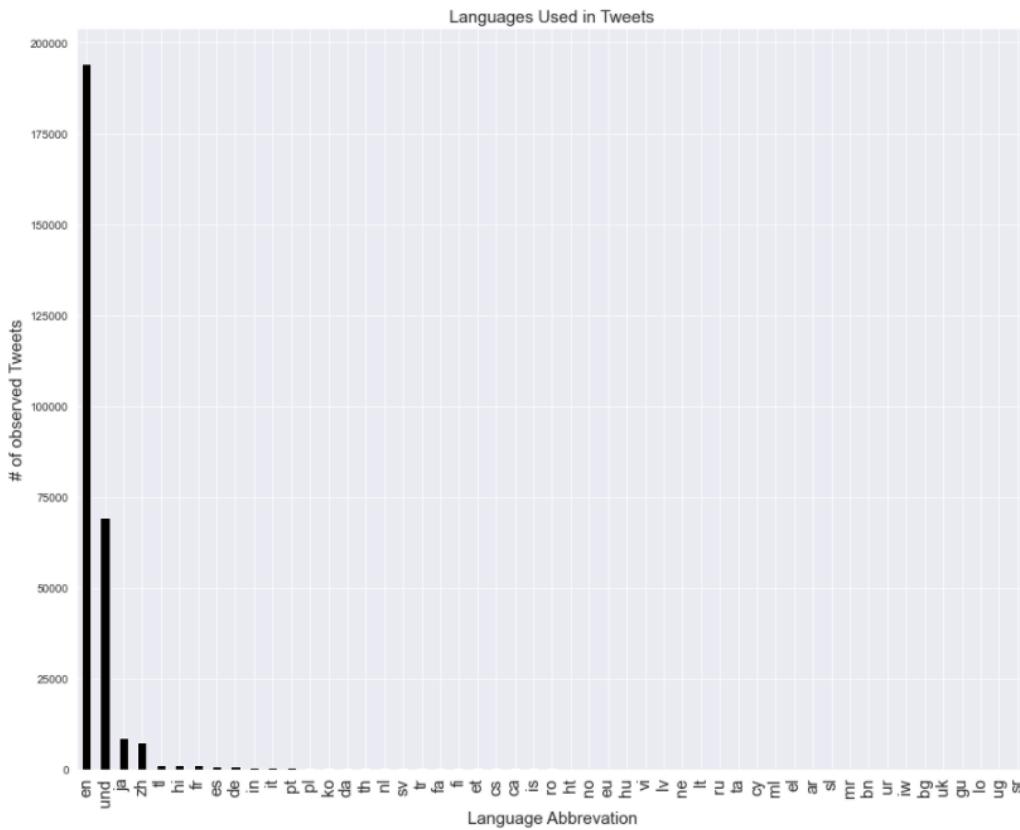
df_news_title.title[27]
"State media says Hong Kong has a toxic 'Apple'"
```

[-- Sentiment Intensity Analyzer, News Title's & Article's | Statistics --]

	comp_title	neg_title	neu_title	pos_title		comp_article	neg_article	neu_article	pos_article
count	30.000000	30.000000	30.000000	30.000000	count	30.000000	30.000000	30.000000	30.000000
mean	0.204997	0.093133	0.688767	0.218067	mean	0.338153	0.087933	0.795733	0.116567
std	0.428156	0.145032	0.150645	0.157375	std	0.897364	0.035946	0.034230	0.036774
min	-0.859100	0.000000	0.432000	0.000000	min	-0.997900	0.013000	0.710000	0.064000
25%	-0.051450	0.000000	0.593500	0.125750	25%	-0.754575	0.068500	0.772500	0.089000
50%	0.295000	0.000000	0.675000	0.197000	50%	0.979150	0.093500	0.785500	0.115500
75%	0.575000	0.198000	0.784000	0.317500	75%	0.996675	0.110000	0.822750	0.132500
max	0.848100	0.568000	1.000000	0.535000	max	0.999600	0.145000	0.860000	0.207000

([back](#))

Appendix IV



```

hash           12      en    194087
created_at     91      und   69375
username      45111    ja    8715
tweet        221205    zh    7327
language       51      tl    1254
replies_count  217     hi    1207
retweets_count 881     fr    1046
likes_count    1110    es     908
reply_to       27555    de     892
hashtags      77715    in     507
dtype: int64
                                         Name: language, dtype: int64
                                         Name: language, dtype: float64

```

```

df_tweets_w_dup[df_tweets_w_dup['language'].str.contains('und')]['tweet']

9      https://t.co/8lgfzmGtav #lukashenko #Tikhan...
17     #FreeAgness #FightForFreedom #StandWithHongKon...
18     #Hongkongers #hongkong #beijing #china #HongK...
20     #boycottchina #hongkong #freehk #boycottmulan ...
21     https://t.co/B5KWeYZE6t #boycottchina #hongko...
...
288397  #HKPoliceState #HKPoliceBrutality #HKTotallita...
288402  @IndyWorld #HKPoliceState #HKPoliceTerrorism
288406  #香港警察 #港警是施虐者 #hkpolicebrutality #HKPoliceTerr...
288408  @SpokespersonCHN #ICantBreathe #Icannotbreath...
288415  #HongKongProtest #StandwithHK #HKPoliceTerrori...
Name: tweet, Length: 69375, dtype: object

```

([back](#))

[-- Mentions to other Users, Removal--]

df[['hash', 'created_at', 'tweet']].head(1)			
hash	created_at	tweet	
0 #FightForHongKong	2020-08-28	@benedictrogers @NOW4humanity Thanks for speak...	
df['tweet'] = df['tweet'].str.replace("@[A-Za-z0-9]+", "")			
df[['hash', 'created_at', 'tweet']].head(1)			
hash	created_at	tweet	
0 #FightForHongKong	2020-08-28	Thanks for speaking up for us #fridaysforfre...	

[-- Links to Website, Removal --]

```
df['tweet'][9]
'Joshua Wong: 'Forms of resistance need to be fluid and flexible' #FightForHongKong #HongKongProtest https://t.co/COPnczKp4'

df['tweet'] = df['tweet'].str.replace(r'http\S+', '')

df['tweet'][9]
'Joshua Wong: 'Forms of resistance need to be fluid and flexible' #FightForHongKong #HongKongProtest '
```

[-- Emoji, Conversion --]

```
df.tweet[12]
'Heartbreaking...😢 we have to do whatever we can do to #FightForHongKong #StandWithHongKong'

df['tweet'] = df.tweet.apply(lambda x: convert_emojis_to_word(x))

df.tweet[12]
'Heartbreaking... loudly_crying_face we have to do whatever we can do to #FightForHongKong #StandWithHongKong'
```

[-- Profanity, Handling --]

```
df.tweet[58]
' CORRUPT AS NEGATIVE - [ ] #PL #PremierLeague #PremierLeagueIsCorrupt #NUFC #NUFCTakeover #Hongkongprotest #Uighurs #budfoo
tball #BudweiserUK #Nike #nikefootball #CarlsbergUK #AveryDennison #OfficialPanini #CocaCola_GB #CocaCola #barclaysuknews
#BarclaysFooty #EA #EASPORTS #TAGHeuer '
```

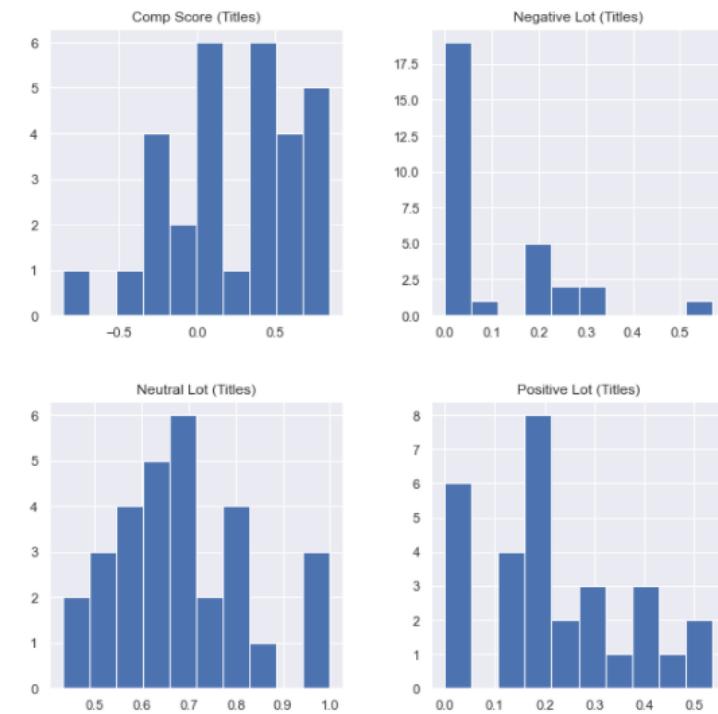
[-- Sentiment Intensity Analyzer, Twitter | Statistics --]

	comp	neg	neu	pos
count	163699.000000	163699.000000	163699.000000	163699.000000
mean	0.094896	0.102728	0.728009	0.169262
std	0.534622	0.124993	0.164952	0.161322
min	-0.990100	0.000000	0.078000	0.000000
25%	-0.361200	0.000000	0.616000	0.000000
50%	0.077200	0.065000	0.725000	0.144000
75%	0.539900	0.179000	0.835000	0.270000
max	0.998900	0.897000	1.000000	0.922000

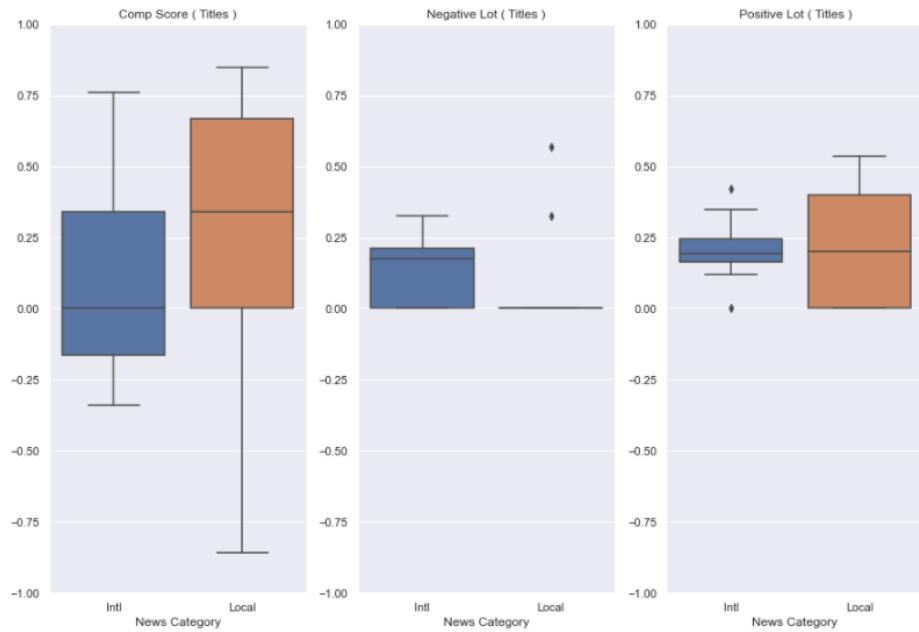
([back](#))

Appendix V

[Sentiment Intensity Analyzer Histogram, Titles]

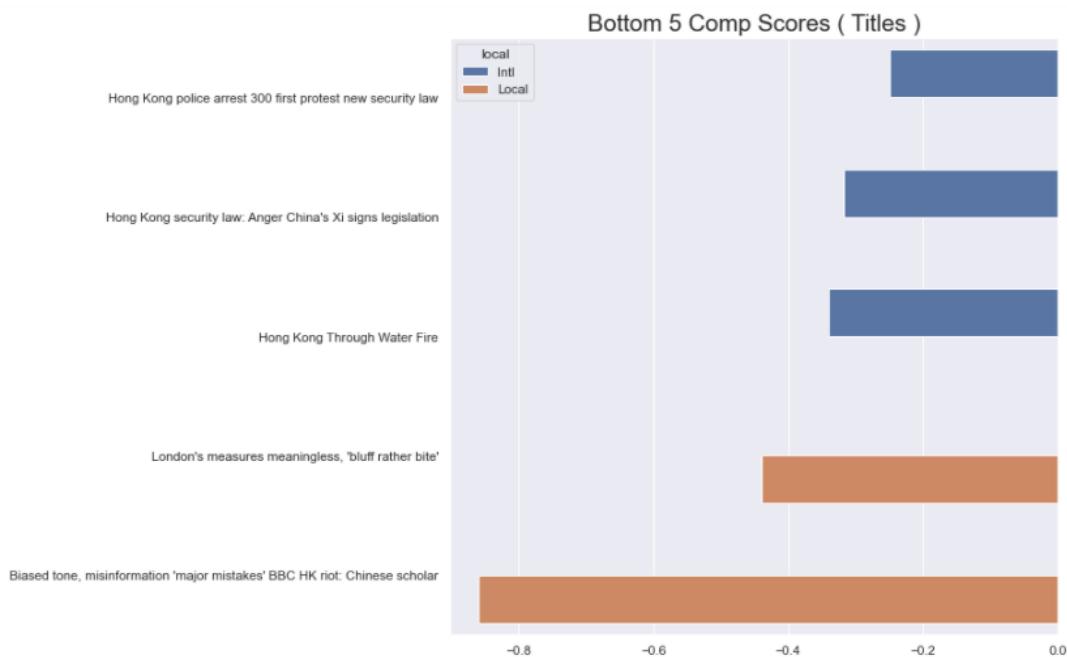
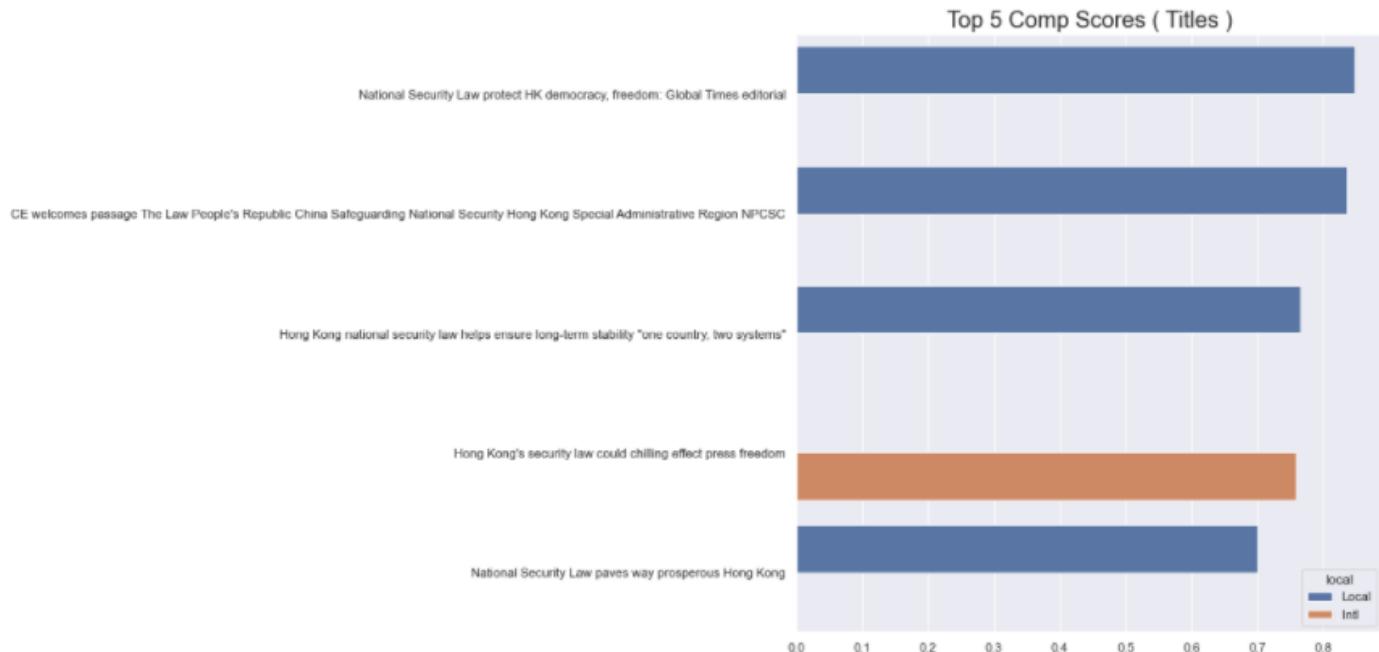


[Sentiment Intensity Analyzer Box Plot, Titles]



([back](#))

[Sentiment Intensity Analyzer Bar Charts, Titles]



([back](#))

[Word Clouds, Titles]

Nouns in the Titles



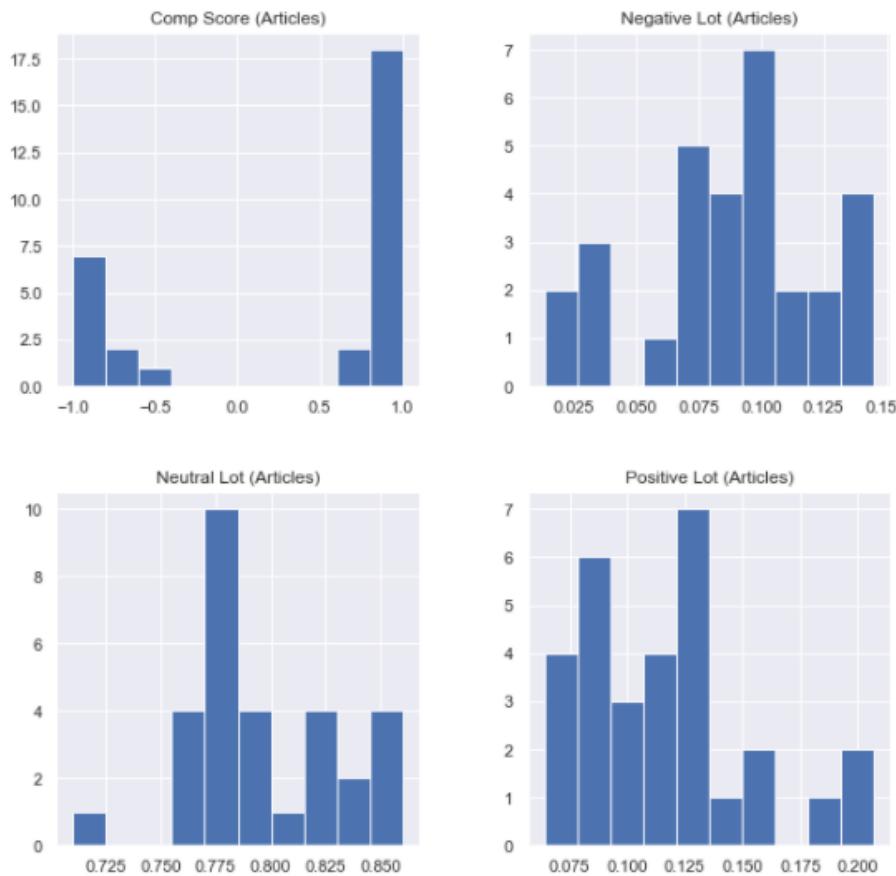
Adjectives & Verbs in the Titles



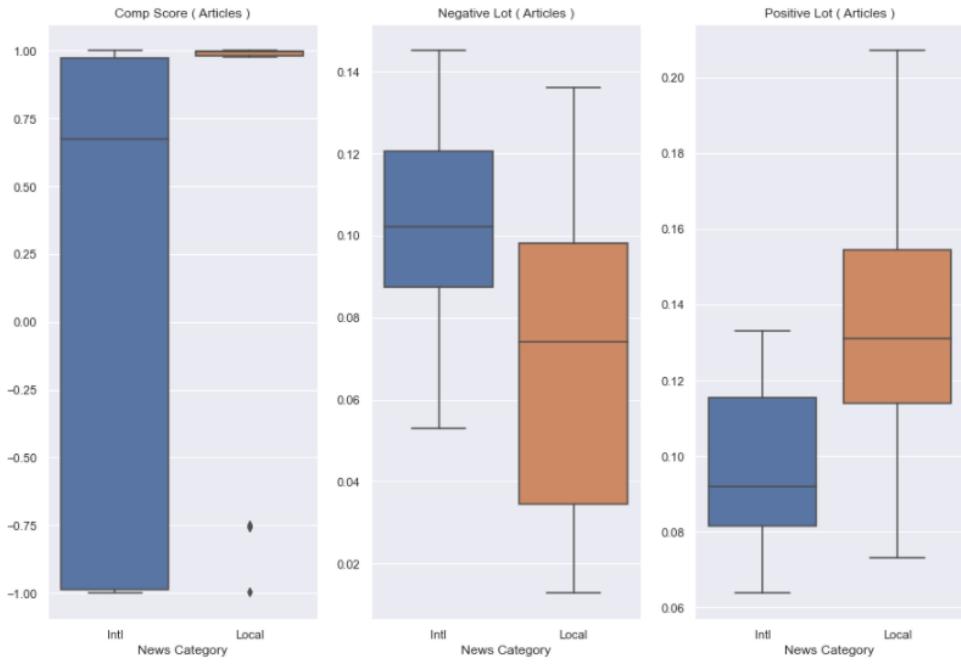
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Appendix VI

[Sentiment Intensity Analyzer Histogram, Articles]



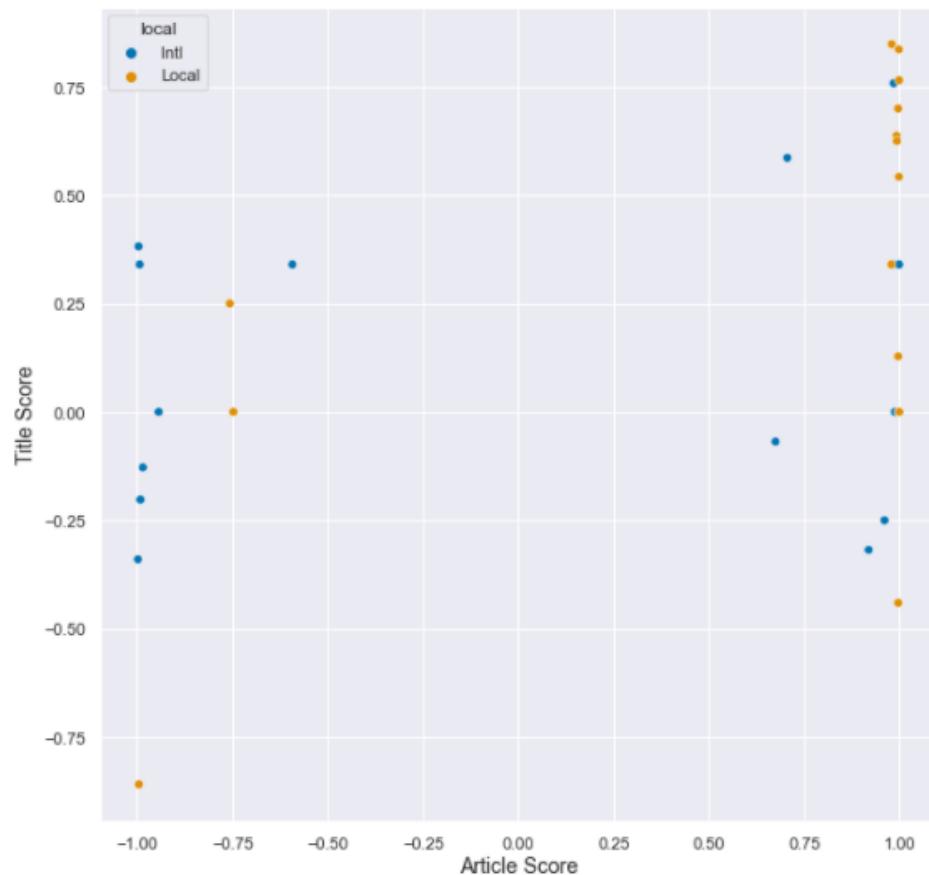
[Sentiment Intensity Analyzer Box Plot, Articles]



([back](#))

[Sentiment Intensity Analyzer Scatter Plot, Articles]

Comparing the Comp Scores between Articles & Titles



[Sentiment Intensity Analyzer Breakdown, Articles]

20 | Articles above 50%
10 | Articles below -50%

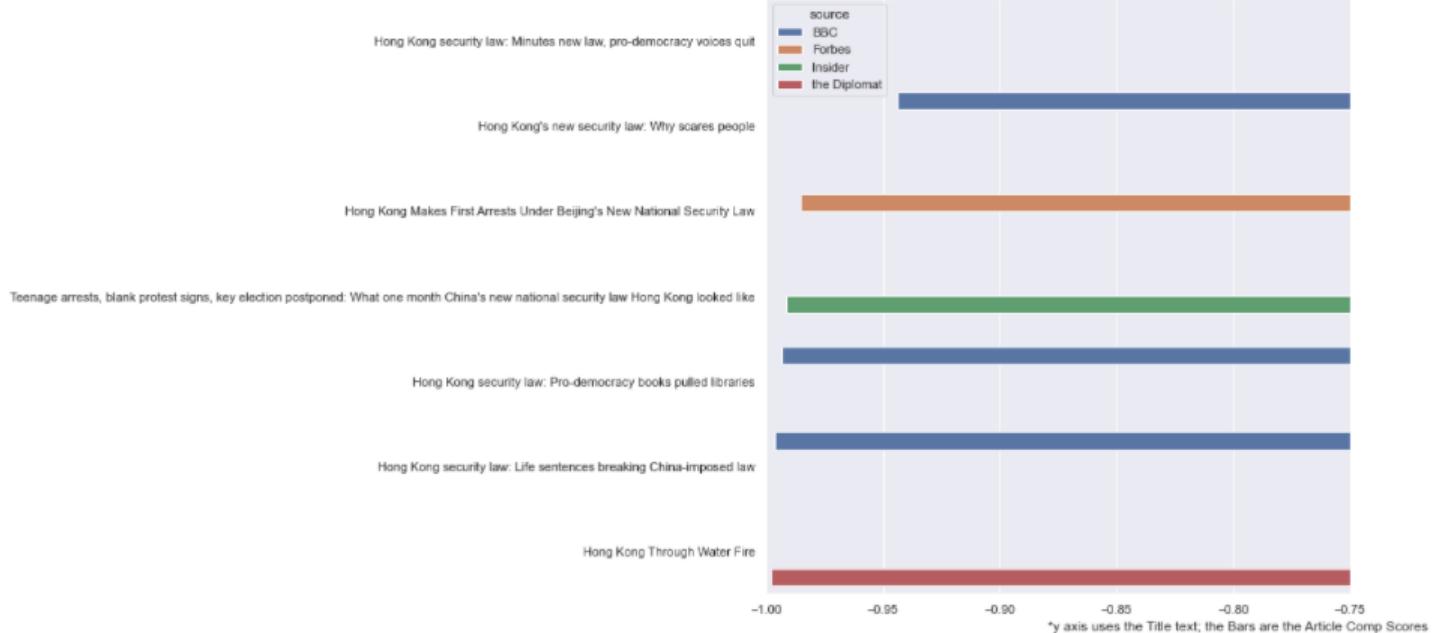
The breakdown between groups +50%:
China | 60.0 percent
Intl | 40.0 percent

The breakdown between groups -50%:
China | 30.0 percent
Intl | 70.0 percent

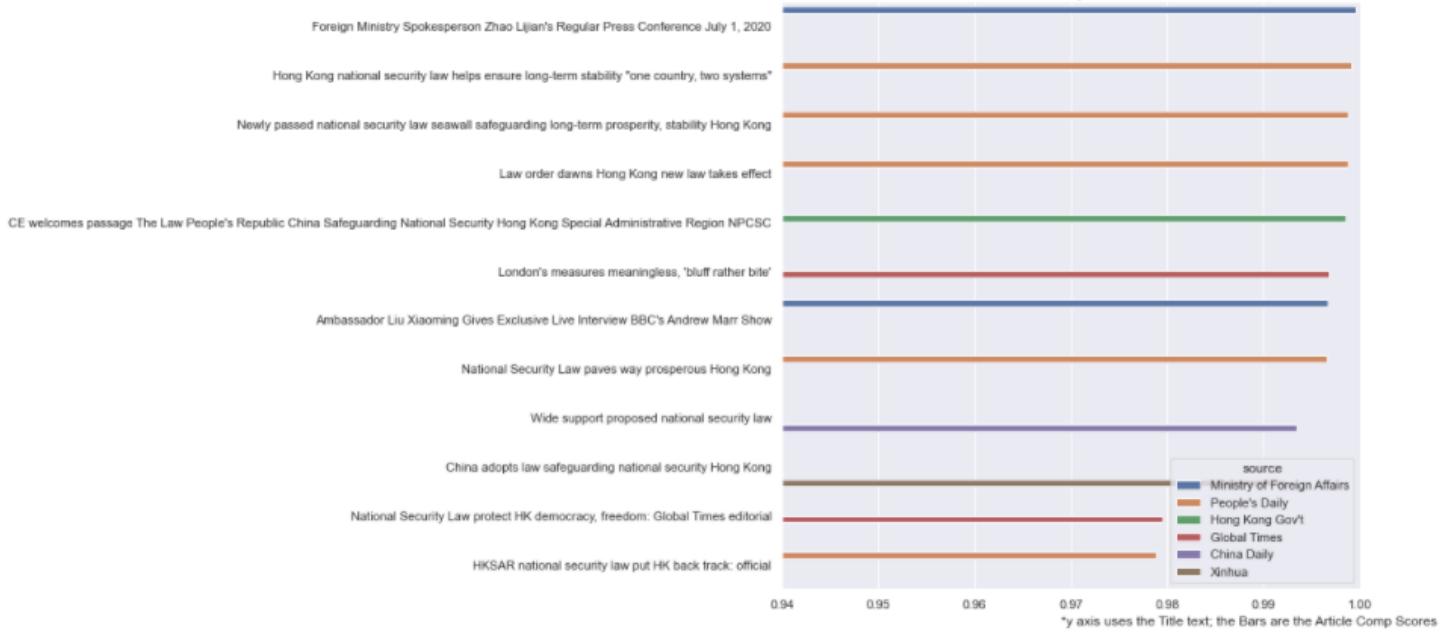
([back](#))

[Sentiment Intensity Analyzer Bar Charts, Articles]

Negative Articles by Int'l Sources



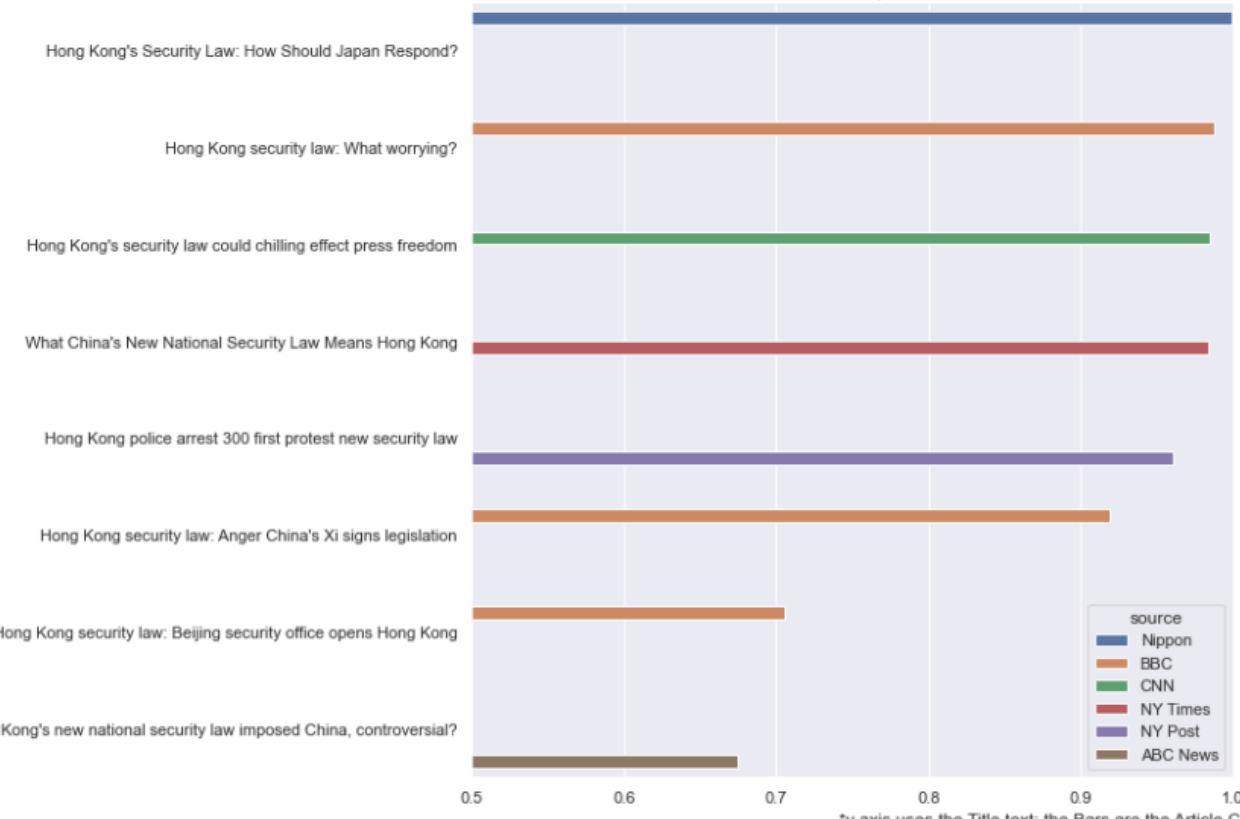
Positive Articles by China Sources



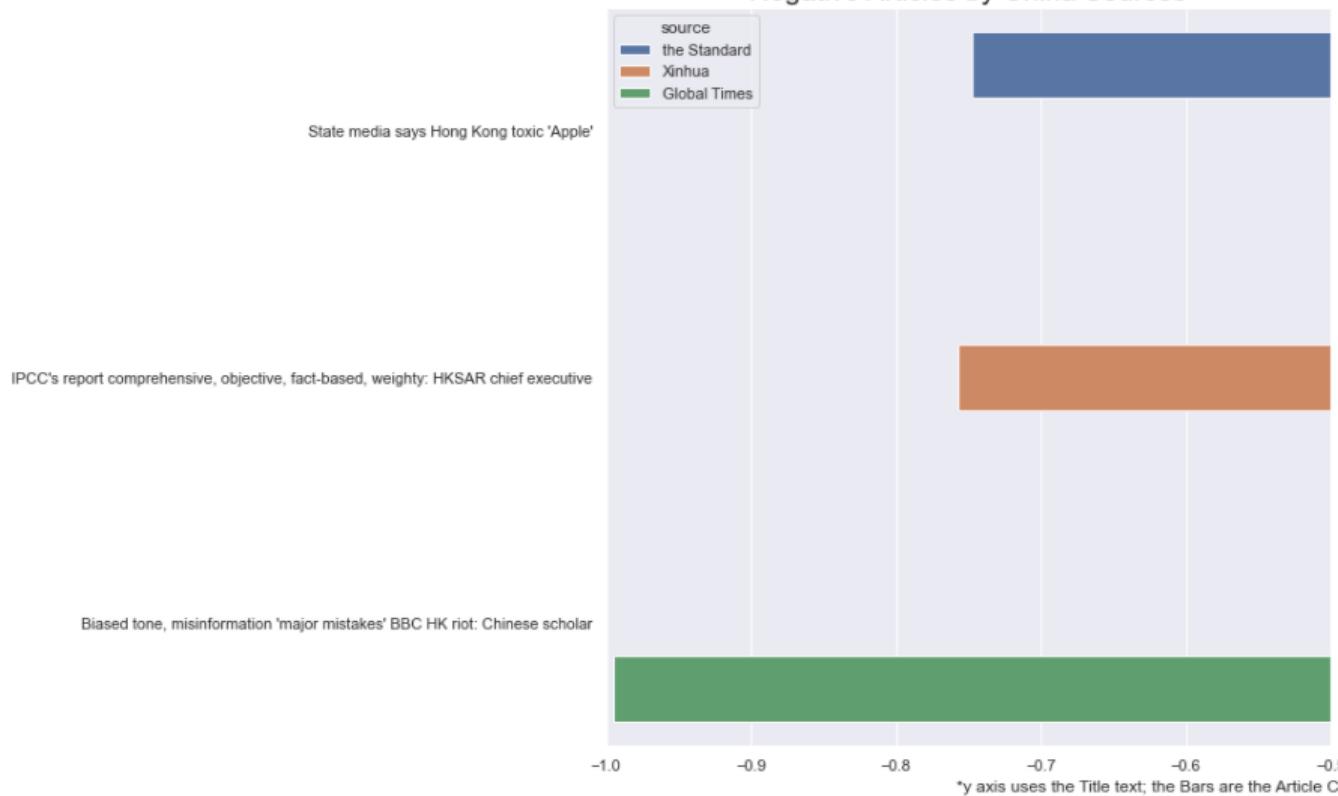
([back](#))

[Sentiment Intensity Analyzer Bar Charts, Articles]

Positive Articles by Int'l Sources



Negative Articles by China Sources



[\(back\)](#)

NLP Topic & Sentiment Analysis on the HK National Security Law, by Rand Sobczak Jr.

[Word Clouds, Articles]

Nouns in the Articles



Adjectives & Verbs in the Articles



([back](#))

[Word Clouds, International Articles]

Adjectives & Verbs in the International Articles



Nouns in the International Articles

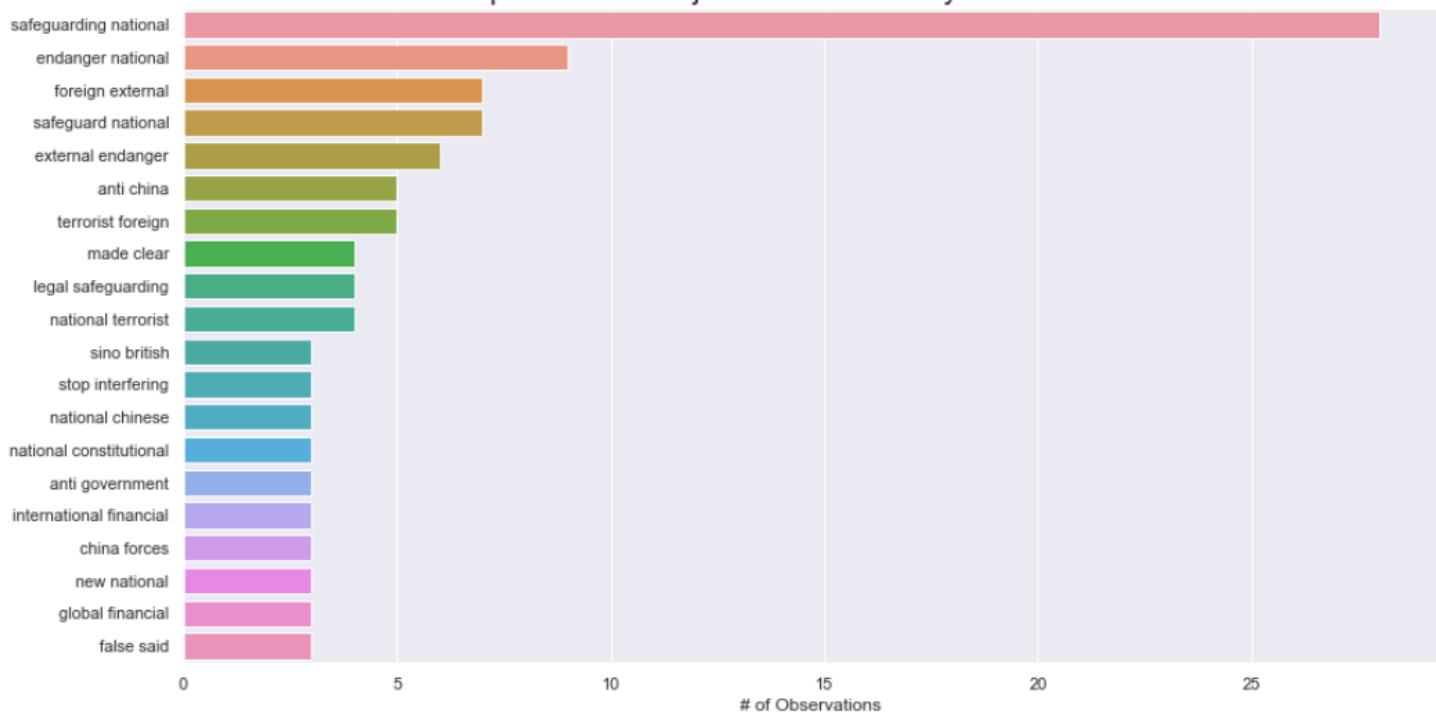


(back)

NLP Topic & Sentiment Analysis on the HK National Security Law, by Rand Sobczak Jr.

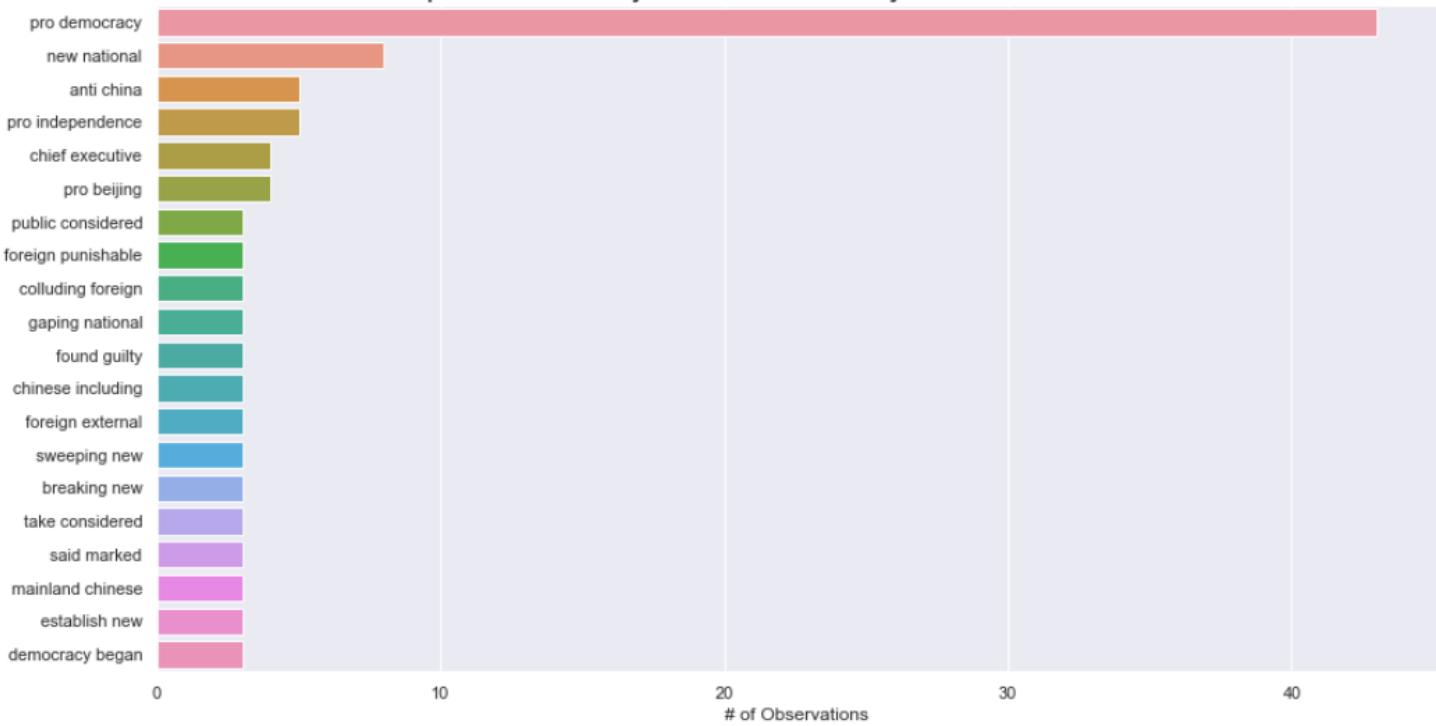
[Choice Words, Articles]

Top 20 Choice Adjectives & Verbs* by China Sources



*These are words arrived through a Bi-gram

Top 20 Choice Adjectives & Verbs* by International Sources

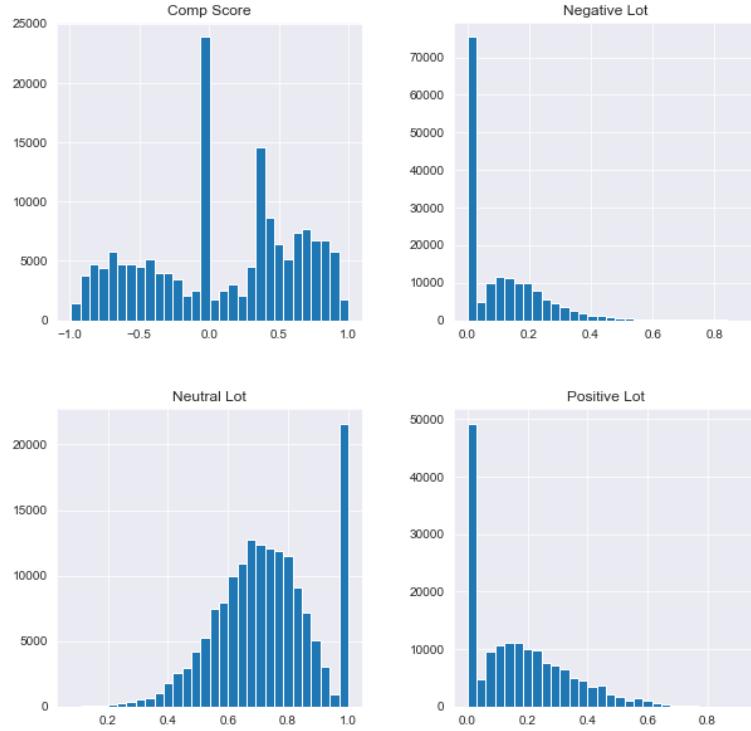


*These are words arrived through a Bi-gram

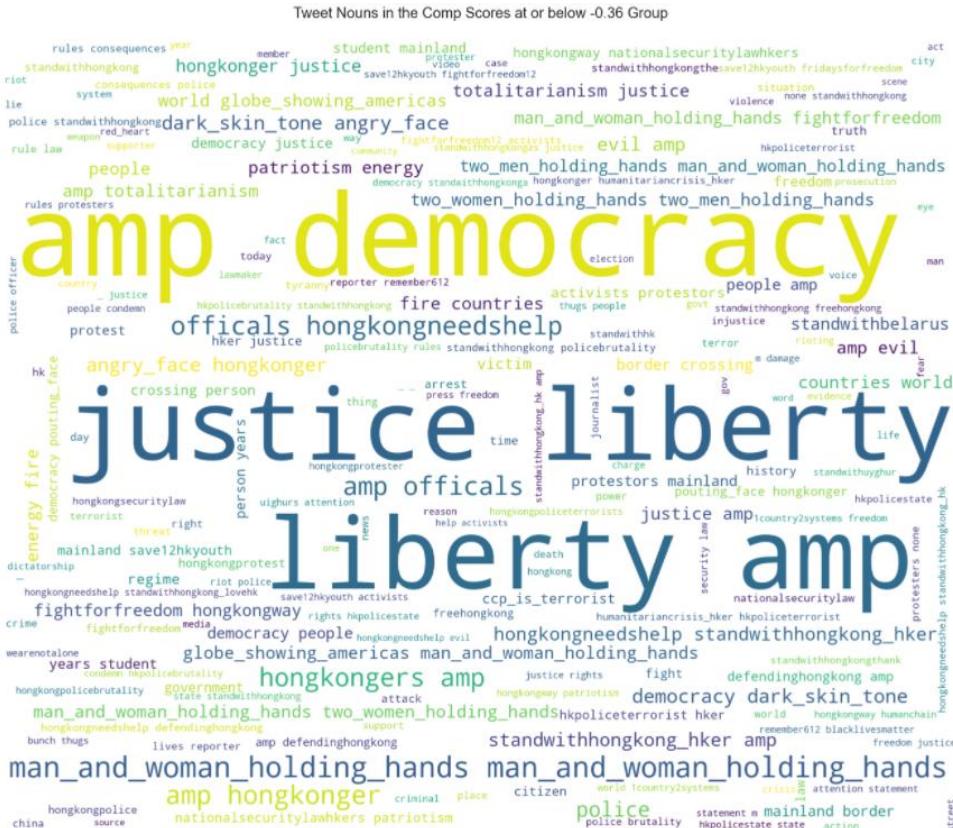
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Appendix VII

[Sentiment Intensity Analyzer Histogram, Tweets]

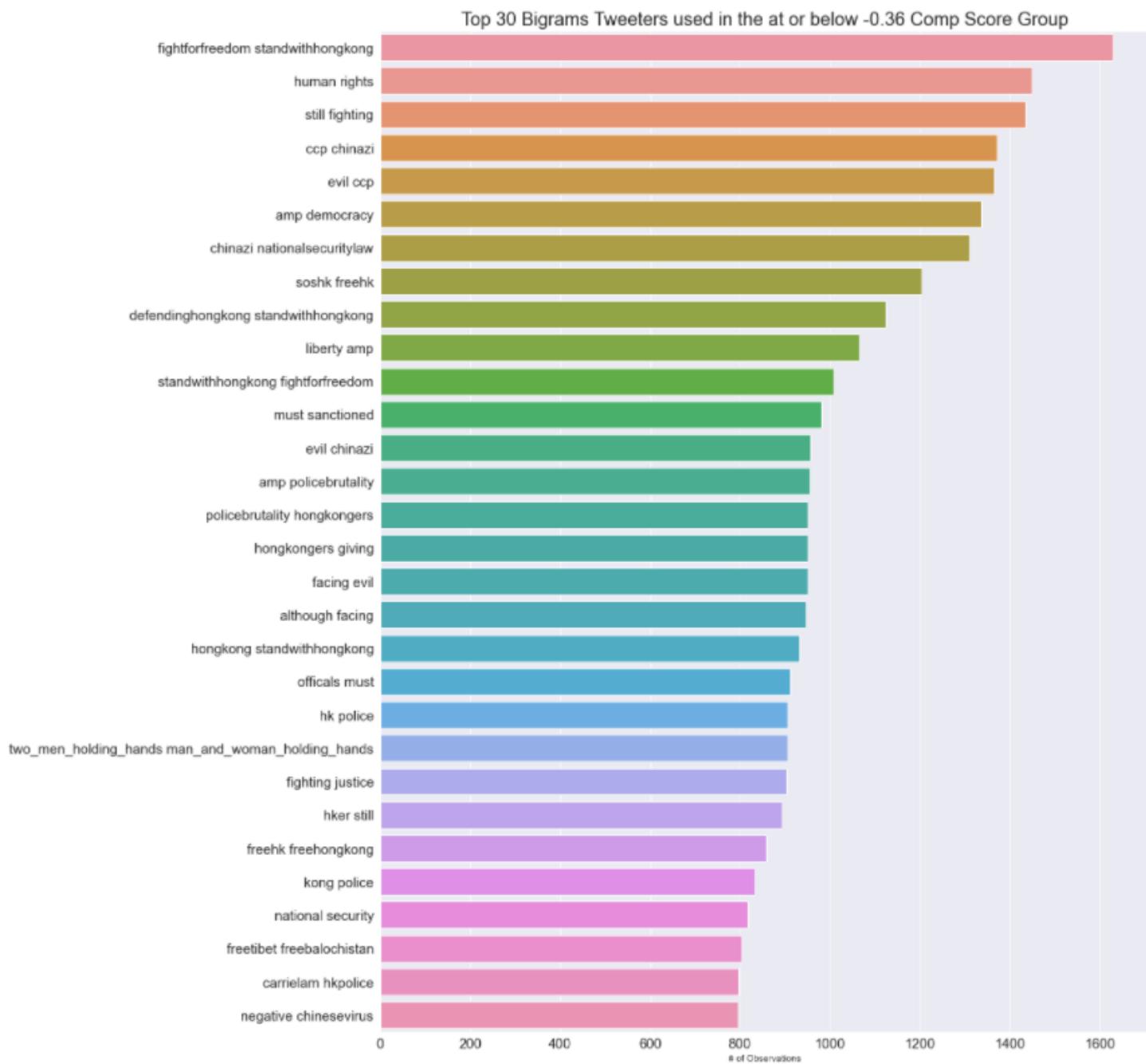


[Word Clouds, Tweets at or Below a -0.36 Comp Score]



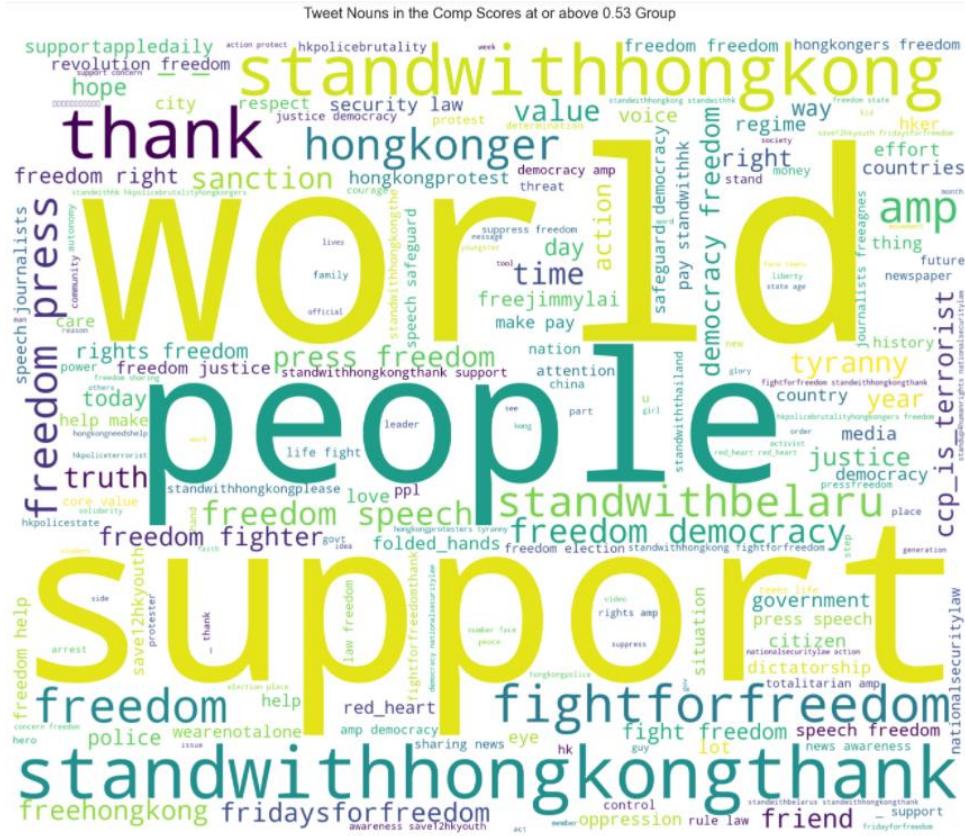
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[Choice Words, Tweets at or Below a -0.36 Comp Score]



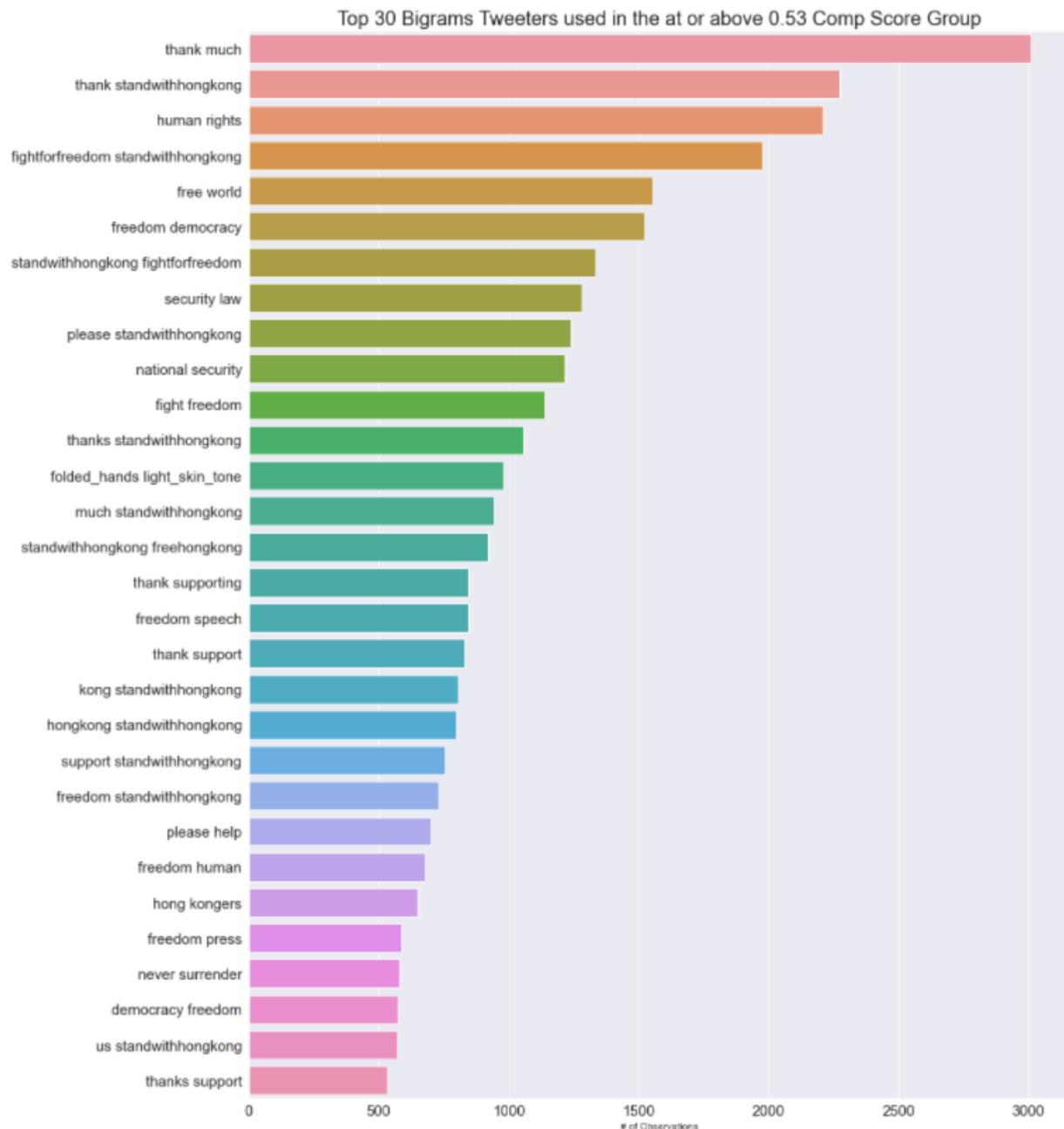
([back](#))

[Choice Words, Tweets at or Above a 0.53 Comp Score]



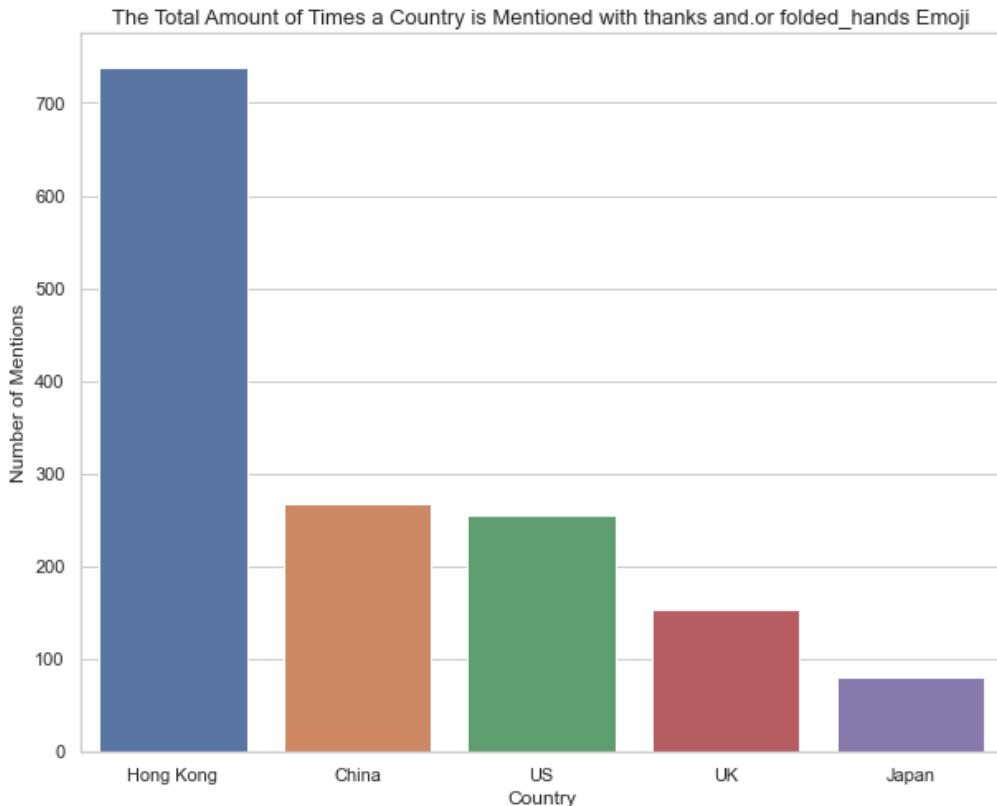
([back](#))

[Choice Words, Tweets at or Above a 0.53 Comp Score]



([back](#))

[Bar Chart, Tweets with use of the folded_hands Emoji]



[Tweets with use of the folded_hands Emoji & Mentions of China or USA]

Examples of observations with both thanks & folded_hands for China are below.

Thank #StandWithHongKong !!! We sincerely hope free world stand firm Communist China's human rights abuses Hong Kong. Many thanks folded_hands light_skin_tone

Deeply touched heartfelt thanks done #HK folded_hands light_skin_tone folded_hands light_skin_tone folded_hands light_skin_tone Always grateful international support fighting evil #CCPChina regime. #StandWithHongKong

Thank much #StandWithHongKong . folded_hands Although don't know actually plans, still thanks UK helps. #newwestberlin #5De mandsNot1Less #BoycottChina

Examples of observations with both thanks & folded_hands for the US are below.

Heartfelt thanks standing solidarity Hongkongers folded_hands Pls consider implementation #MagnitskyAct sanction CCP & HK officials violate "1country2systems" & "high autonomy" promises Joint Declaration fire Let JUSTICE done UK #StandwithHongKong

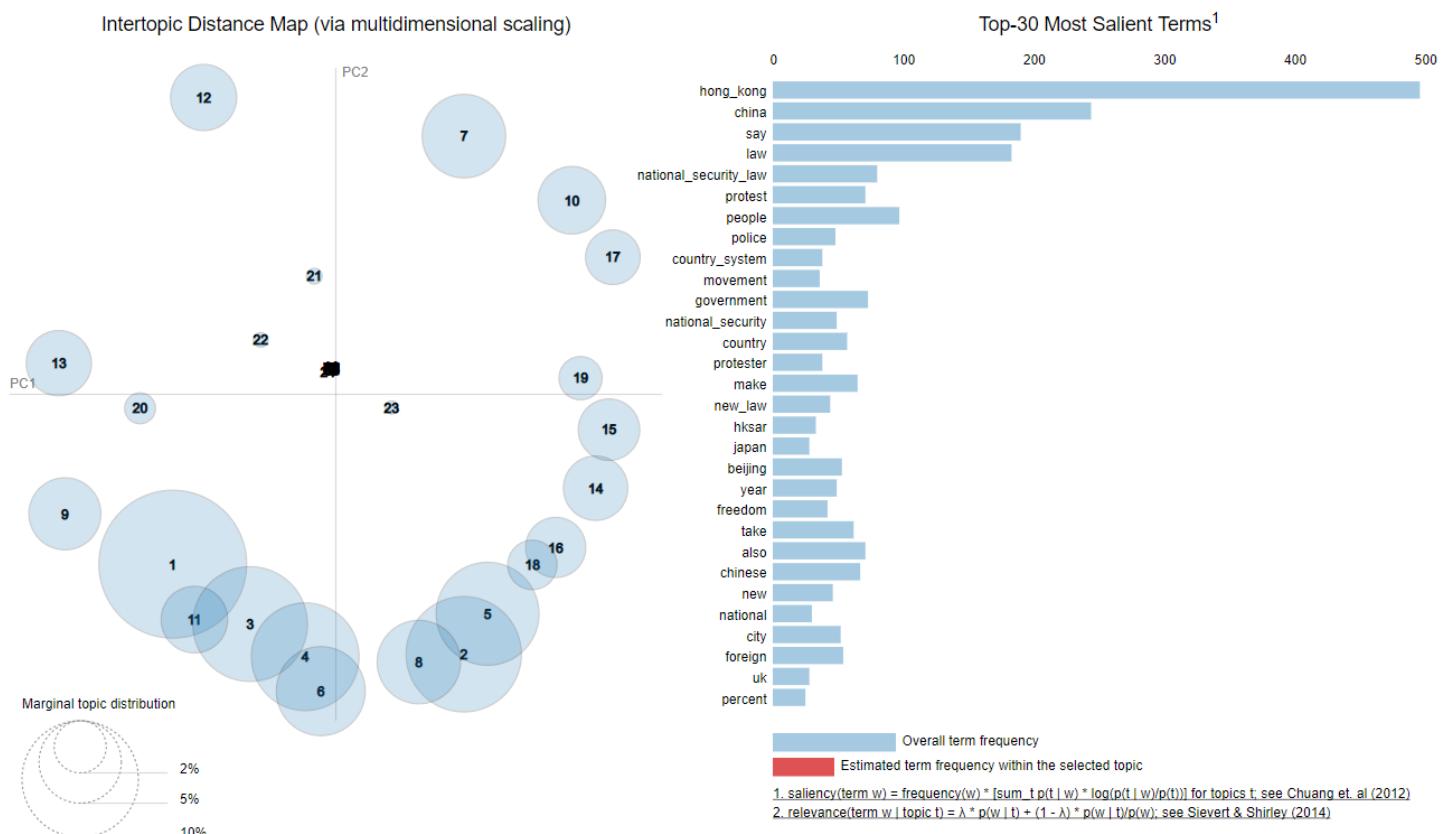
_nozomi Thank much US UK,thanks always supportive us red_heart folded_hands light_skin_tone #StandWithHongKong

As hongkonger, cannot save home without help US. We believe democracy freedom important everywhere world. HKers appreciate please see help ~ please save US HK folded_hands light_skin_tone #freehongkong #thanksTrump #thankUS

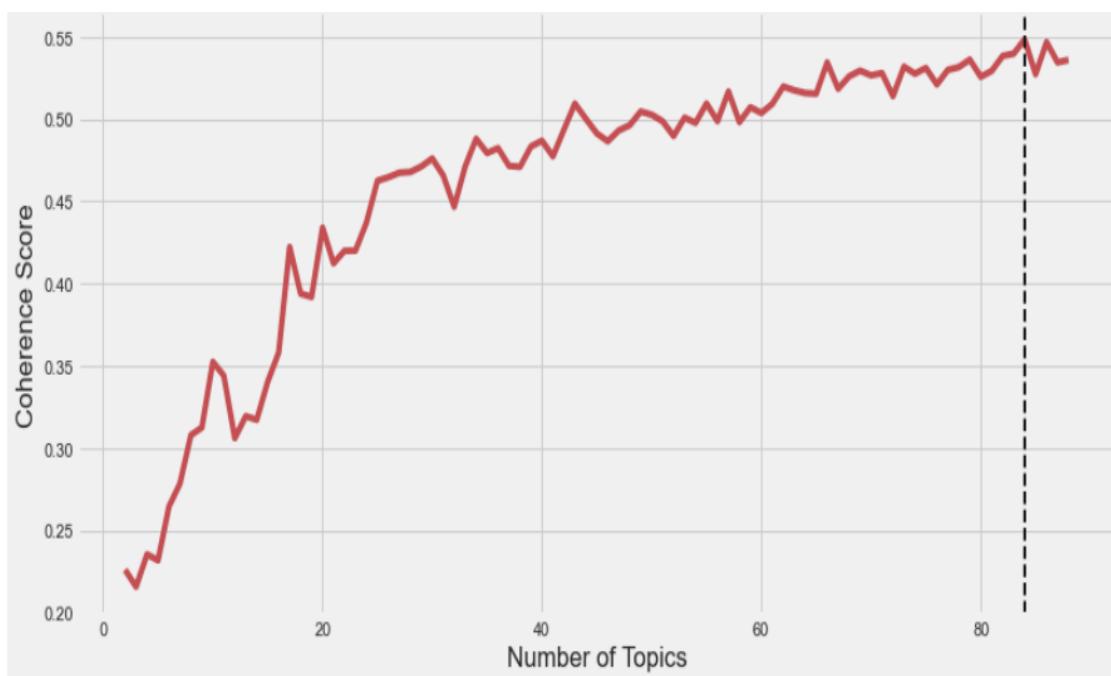
([back](#))

Appendix VIII

[pyLDAvis, News Articles]

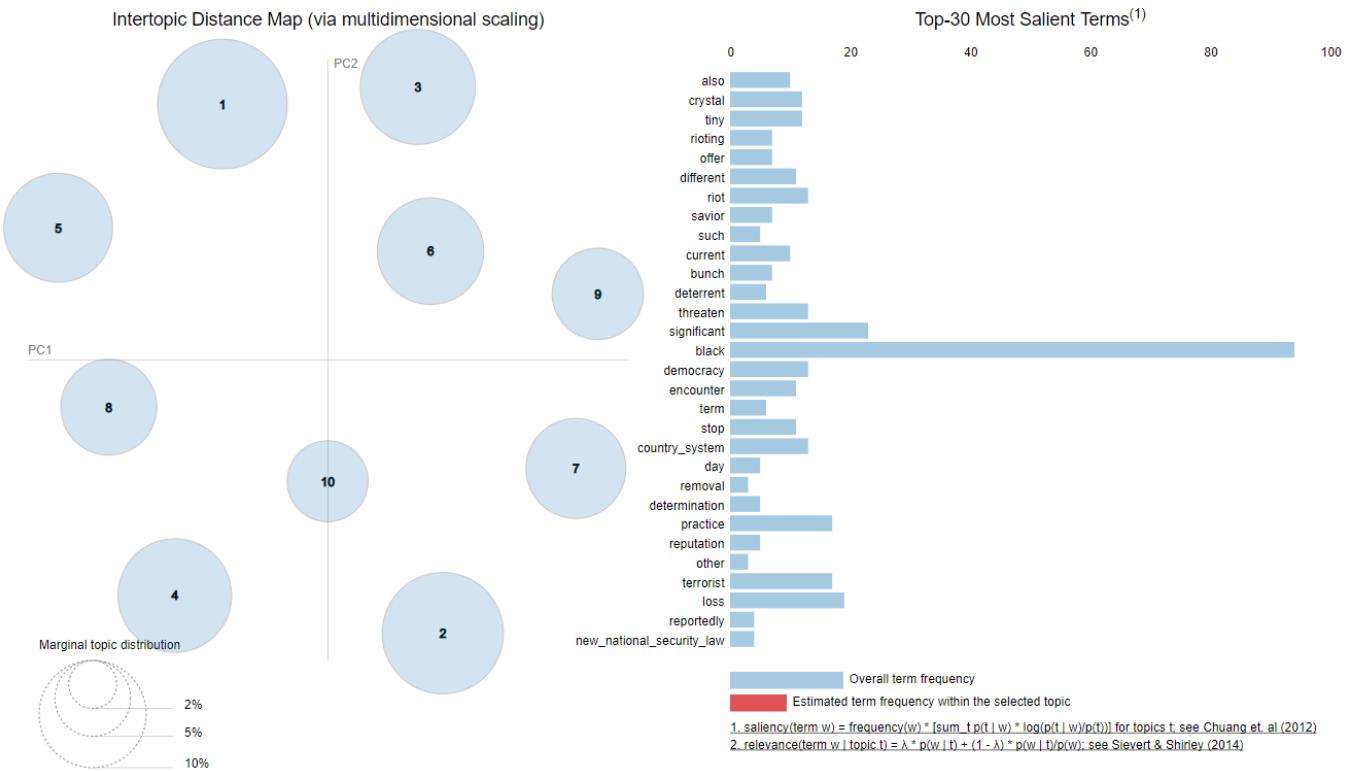


[Coherence Score, News Articles]

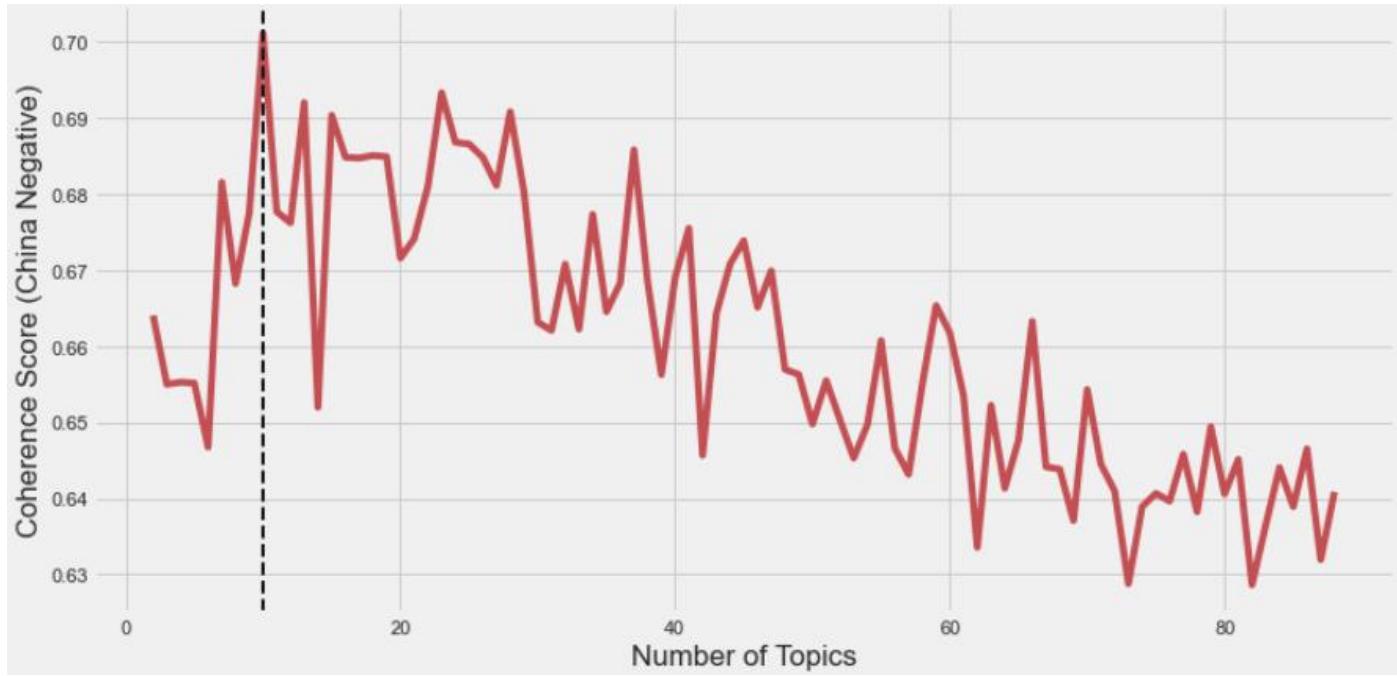


(back)

[pyLDAvis, News Articles, China Negative]

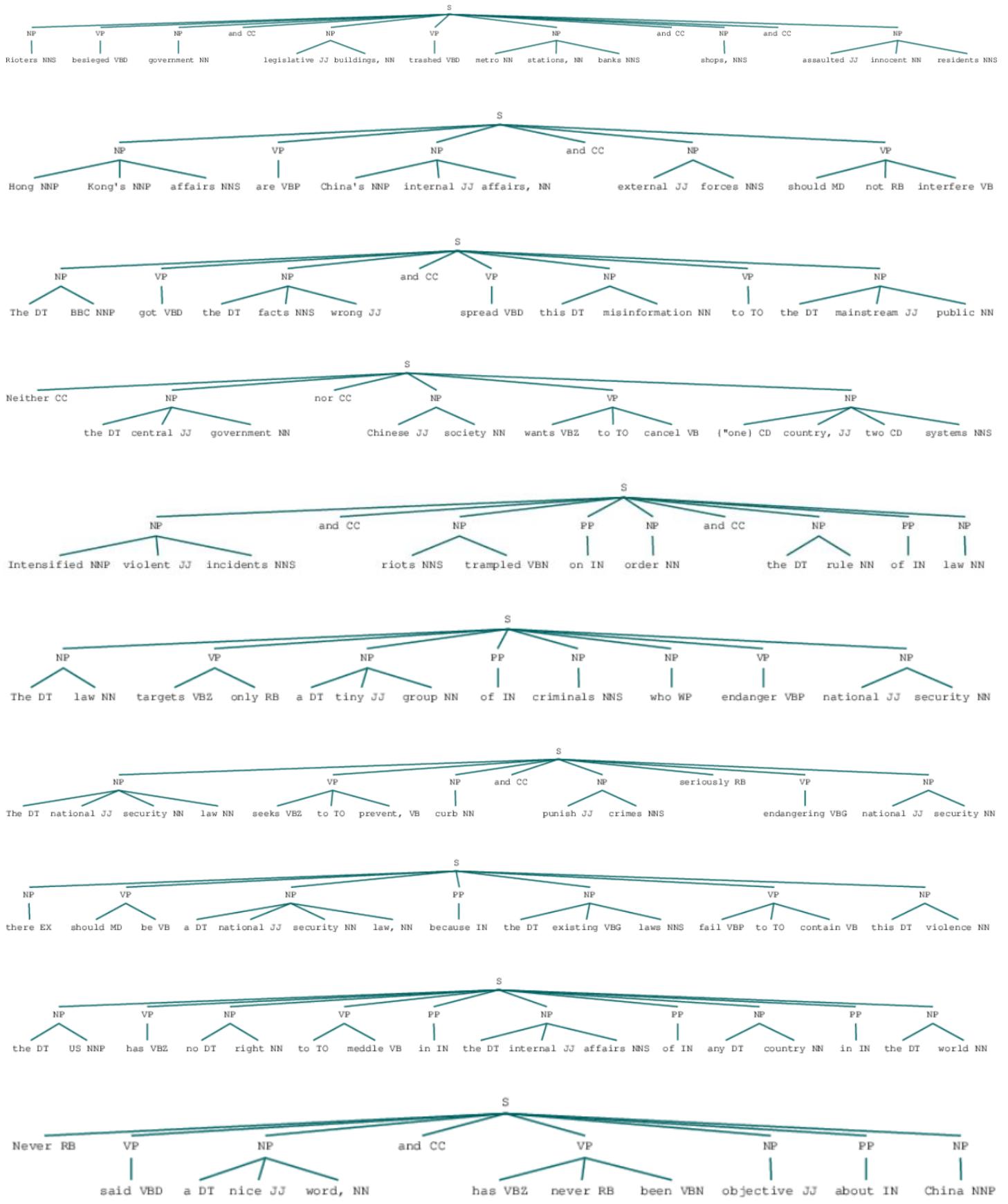


[Coherence Score, News Articles, China Negative]

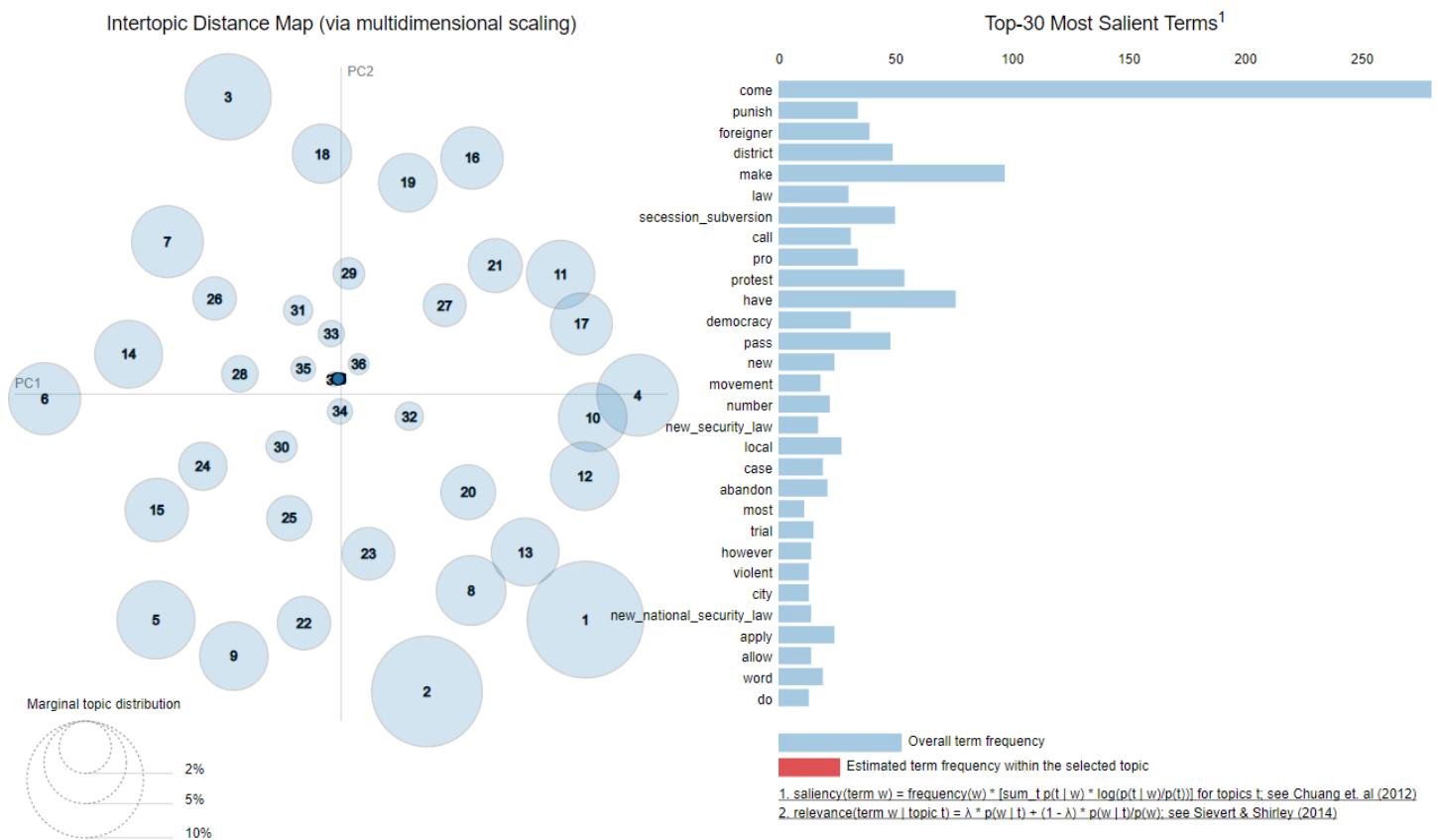


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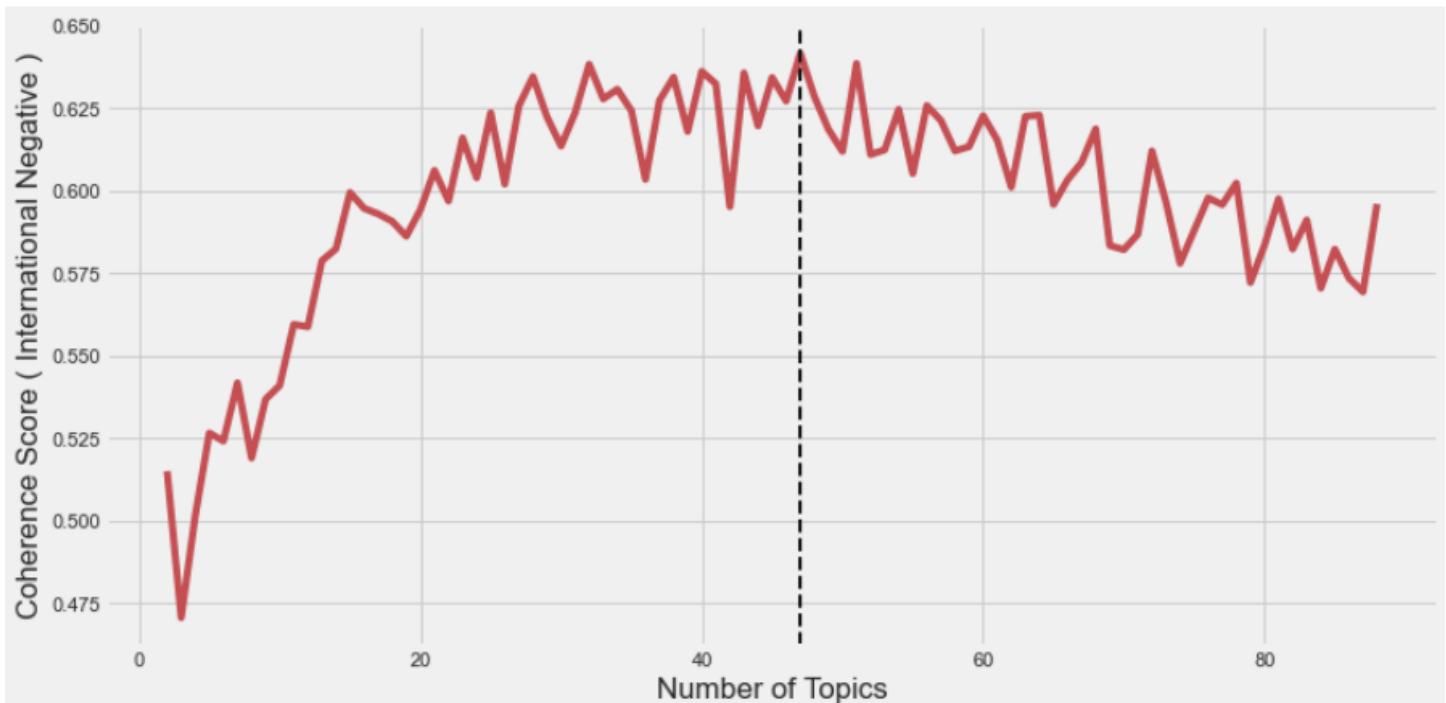
[Selected Sentences, News, China Negative]



[pyLDAvis, News Articles, International Negative Initial]

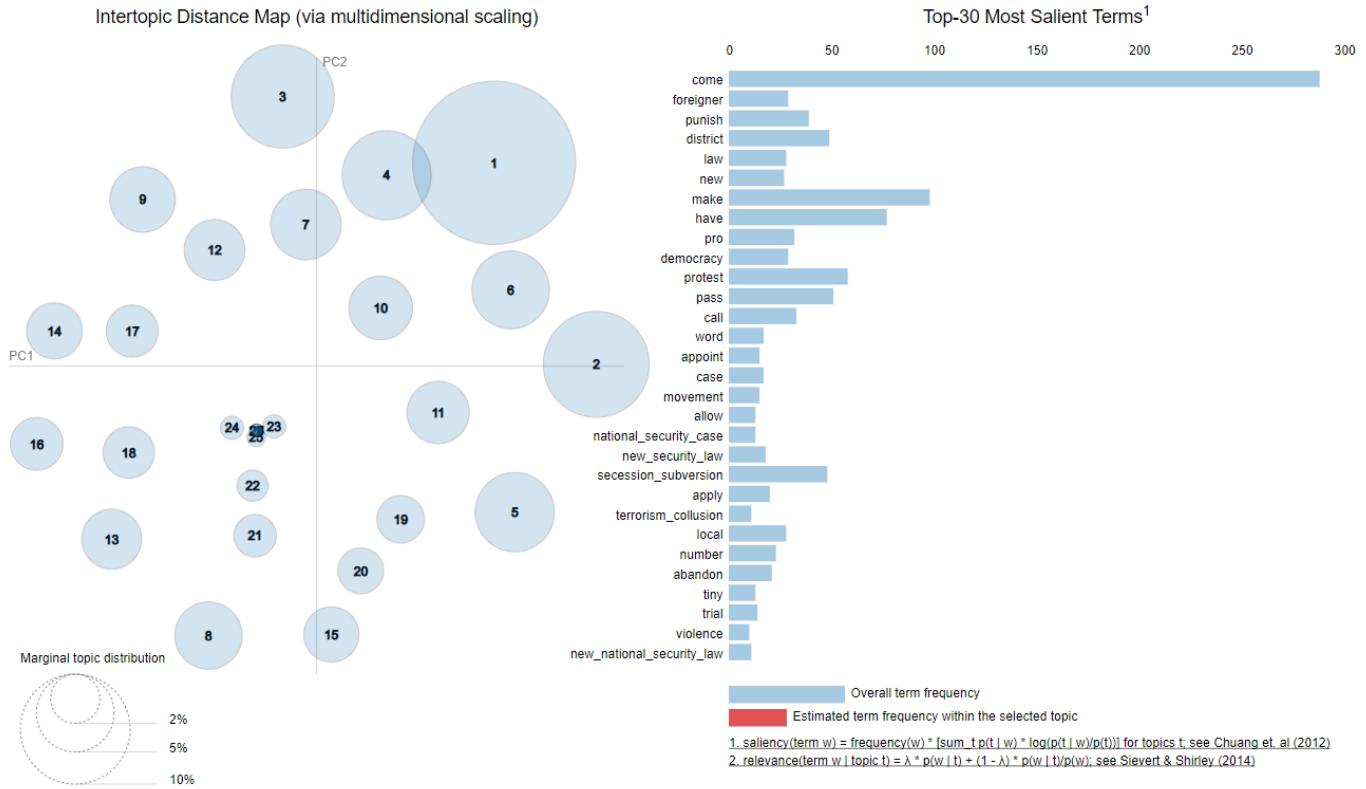


[Coherence Score, News Articles, International Negative]

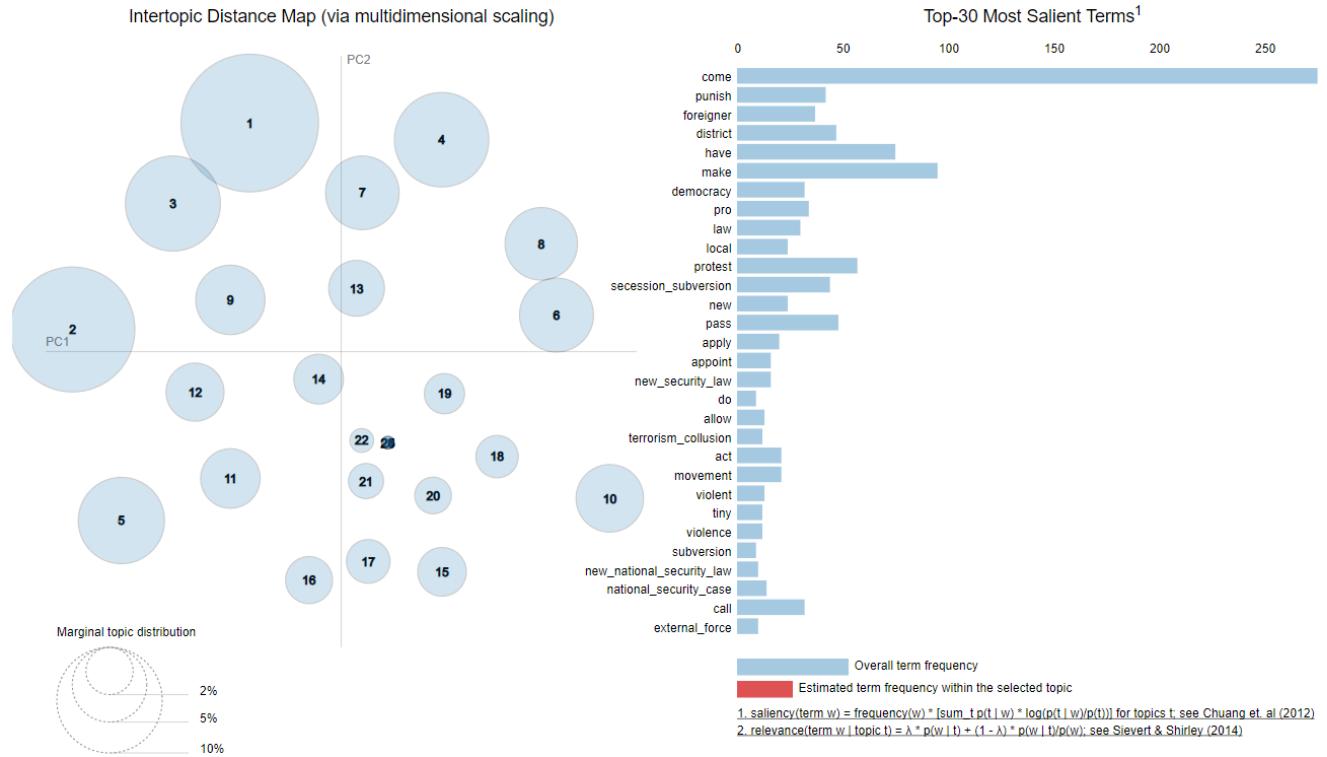


([back](#))

[pyLDAvis, News Articles, International Negative cut to 28]

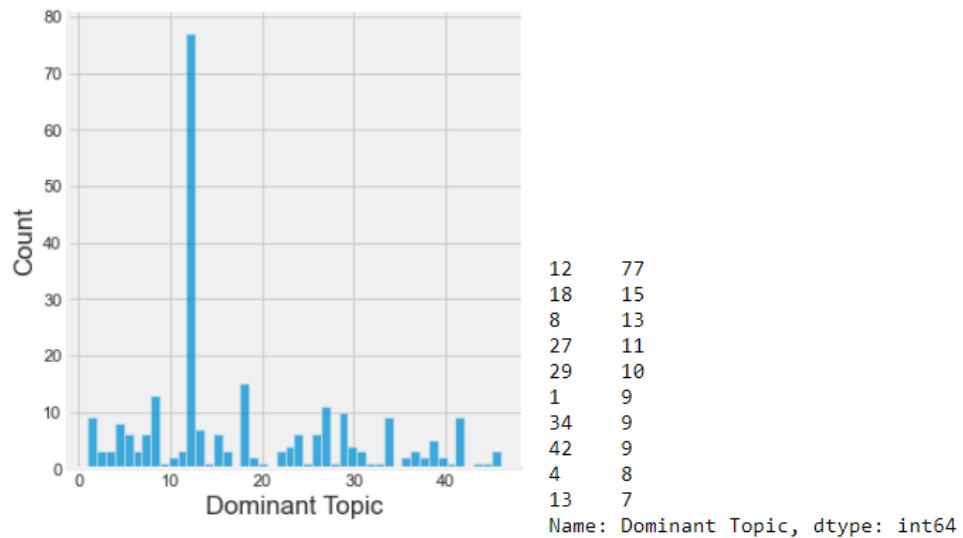


[pyLDAvis, News Articles, International Negative cut to 20]



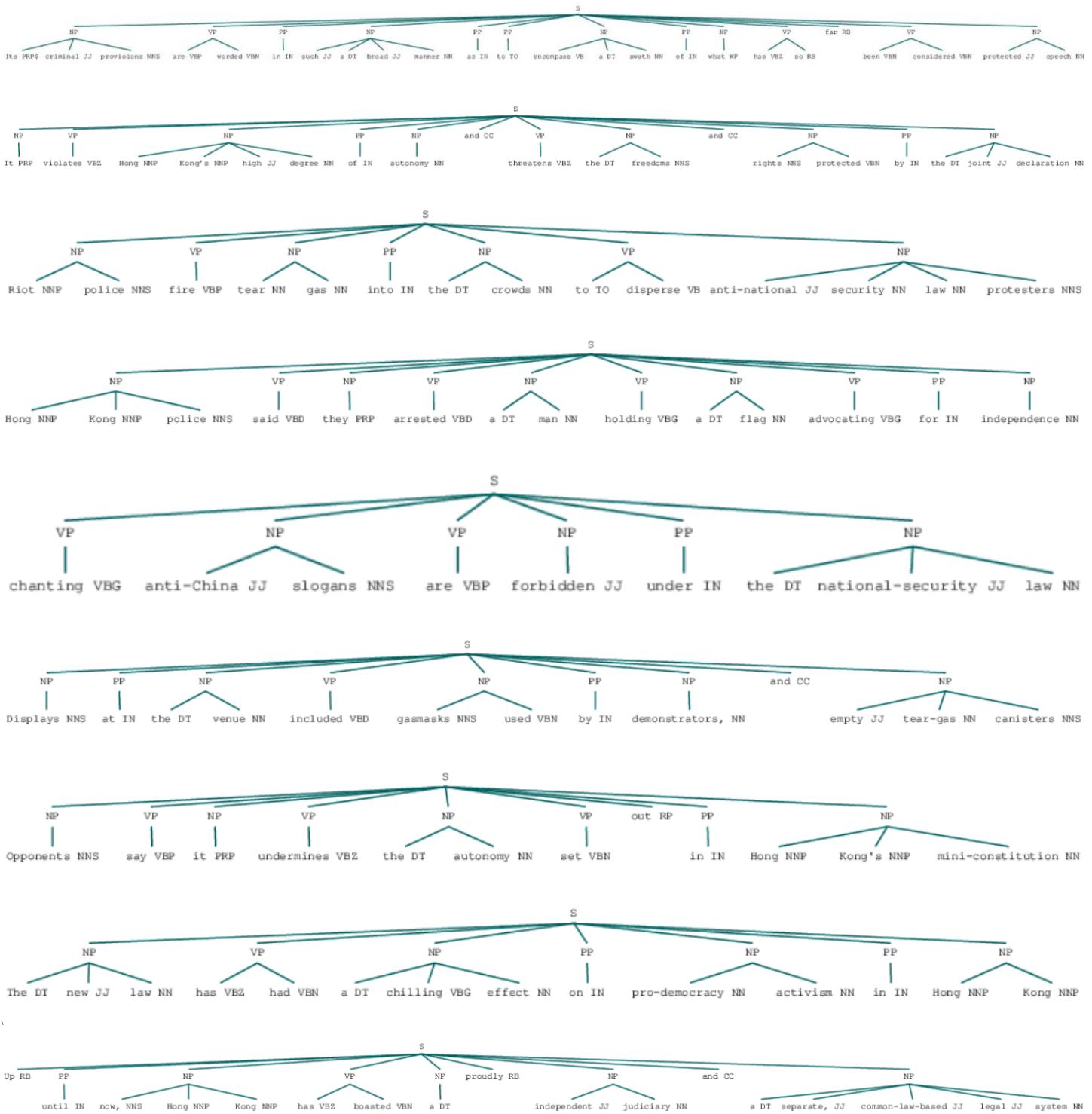
([back](#))

[Number of Observations in Each Topic, International Negative]

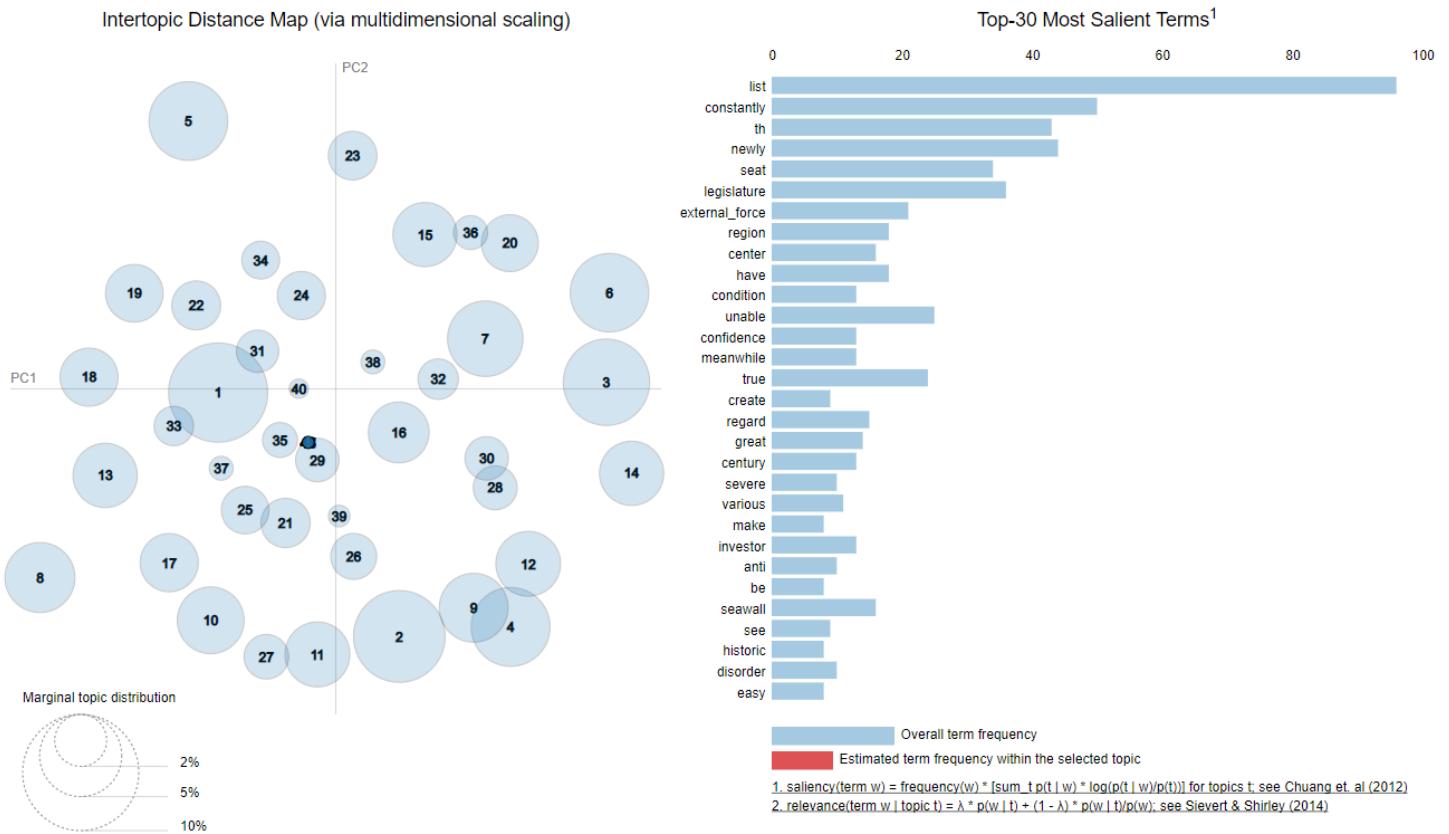


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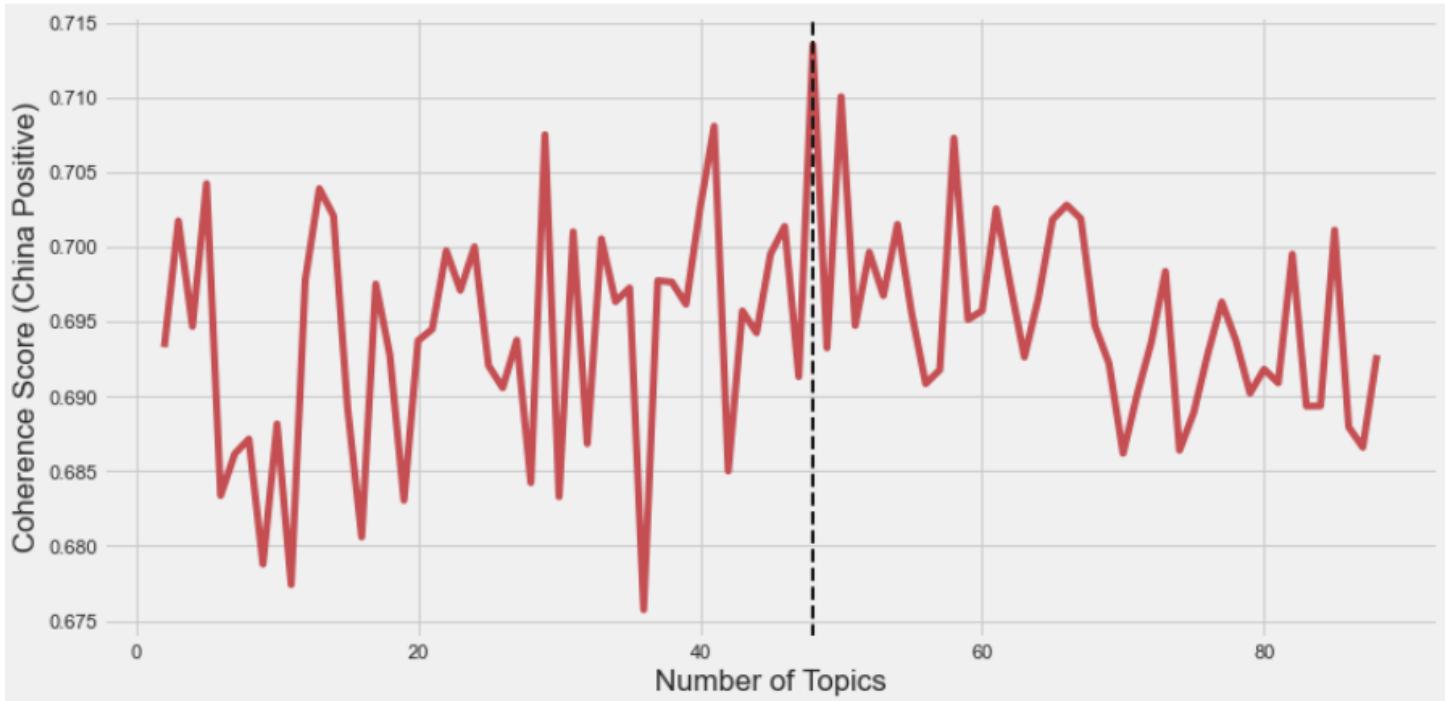
[Selected Sentences, News, International Negative]



[pyLDAvis, News Articles, China Positive]

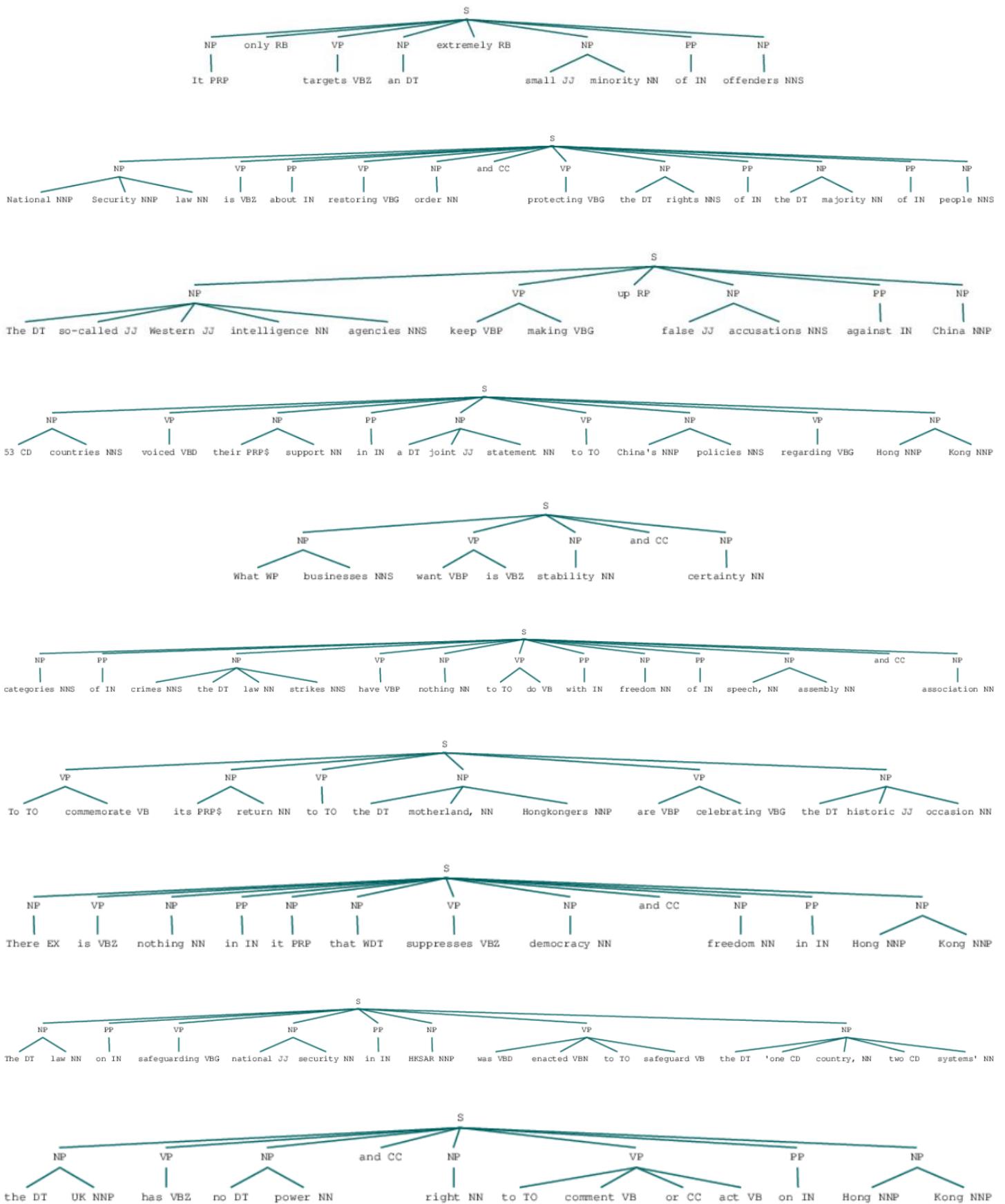


[Coherence Score, News Articles, China Positive]

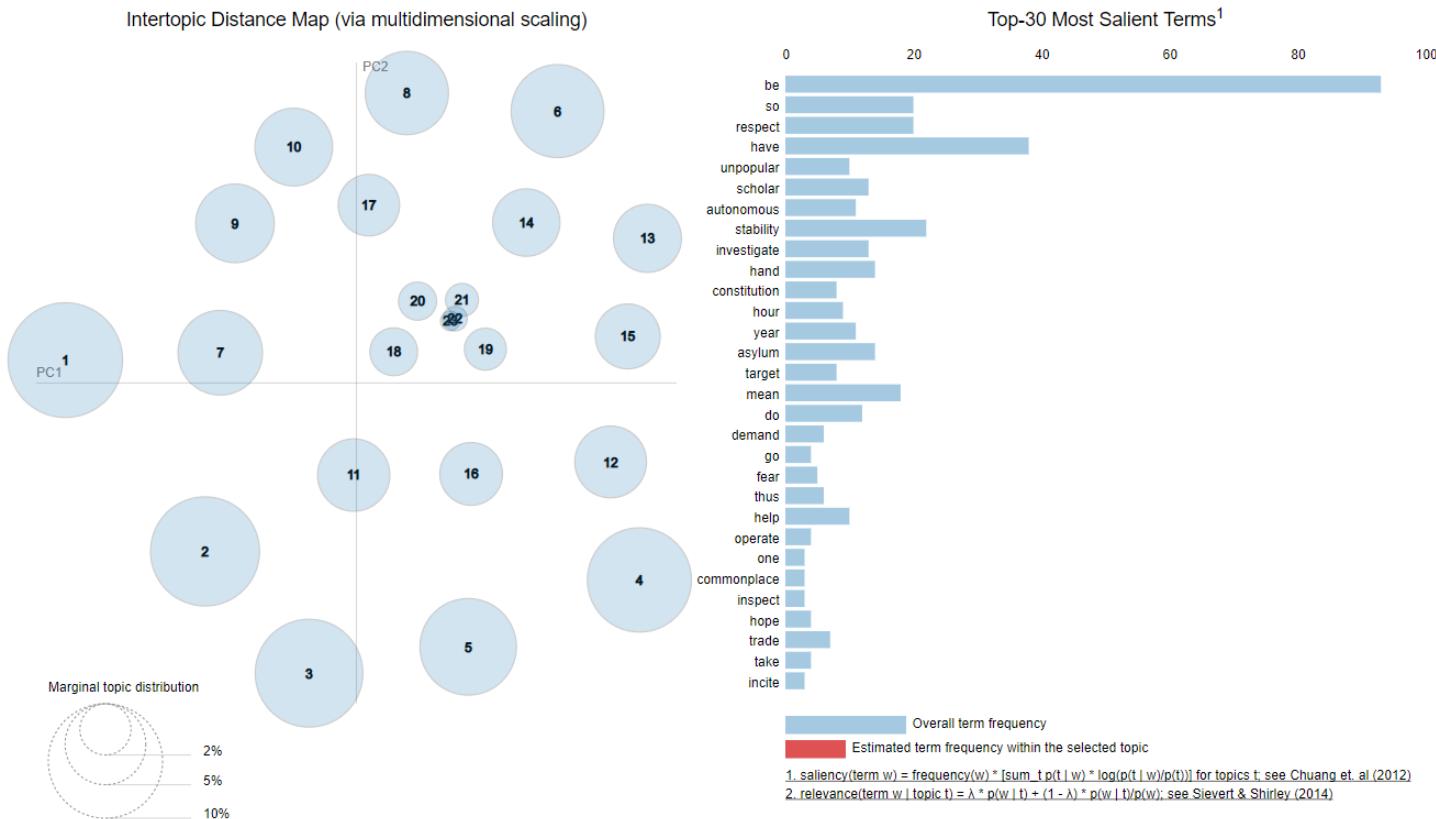


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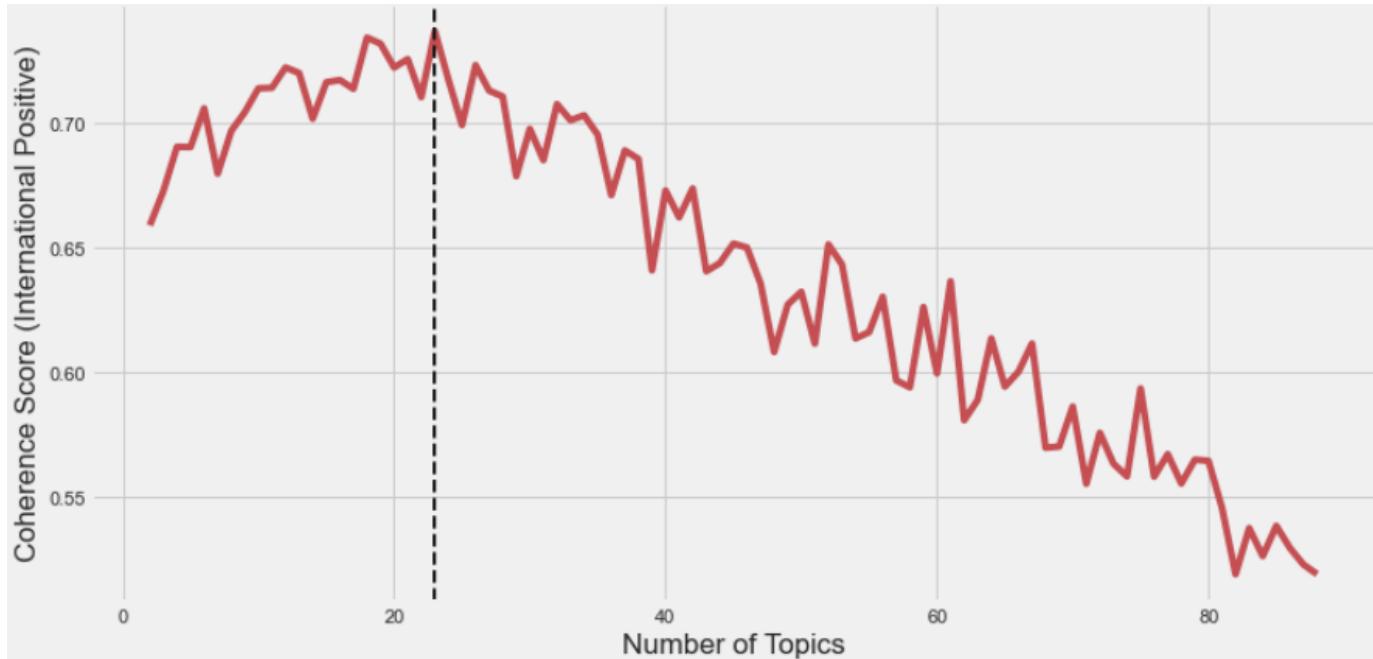
[Selected Sentences, News, China Positive]



[pyLDAvis, News Articles, International Positive]

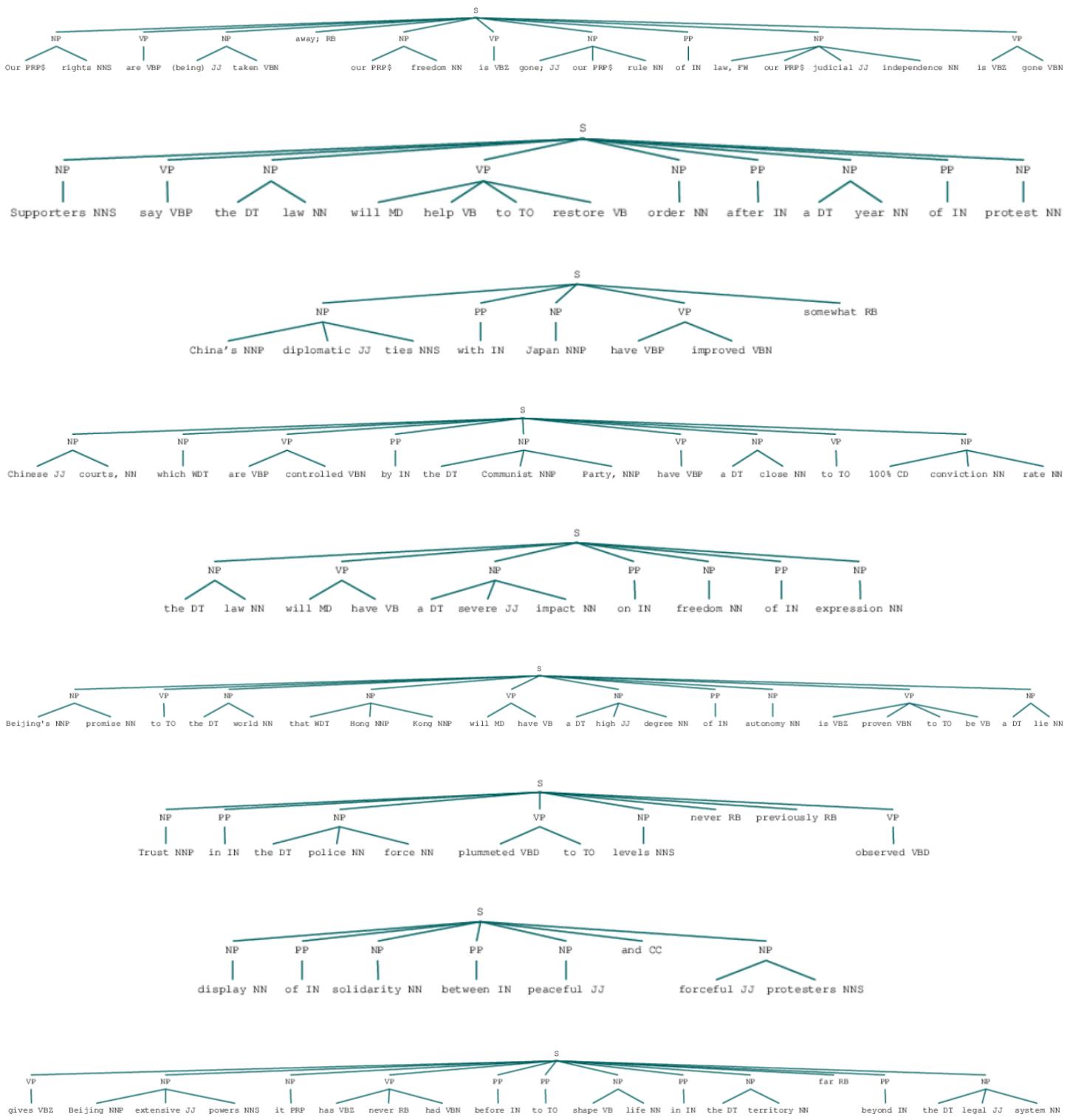


[Coherence Score, News Articles, International Positive]



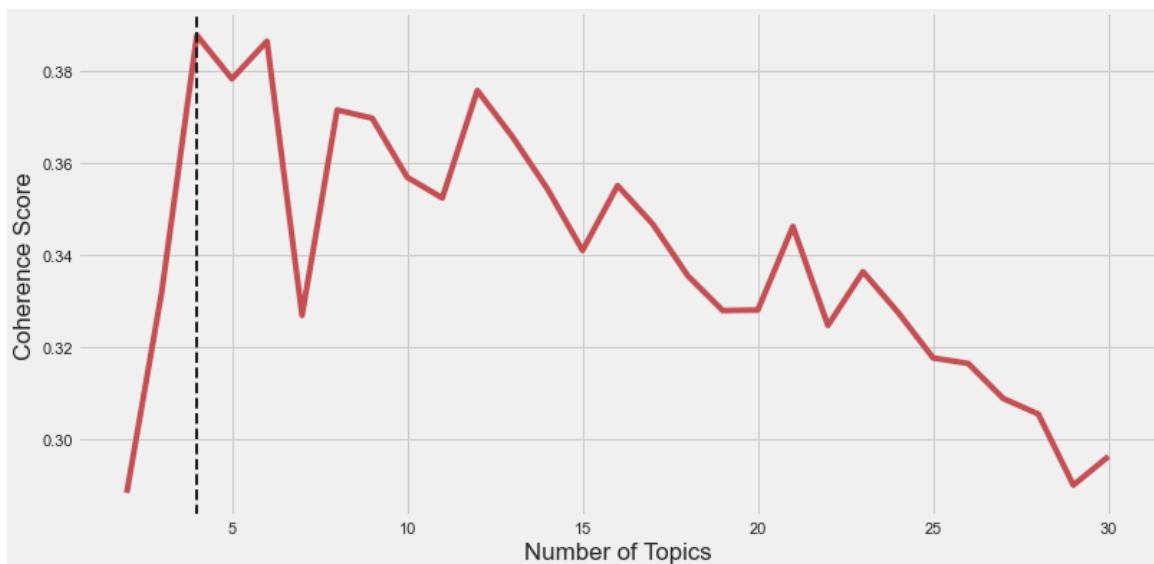
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[Selected Sentences, News, International Positive]

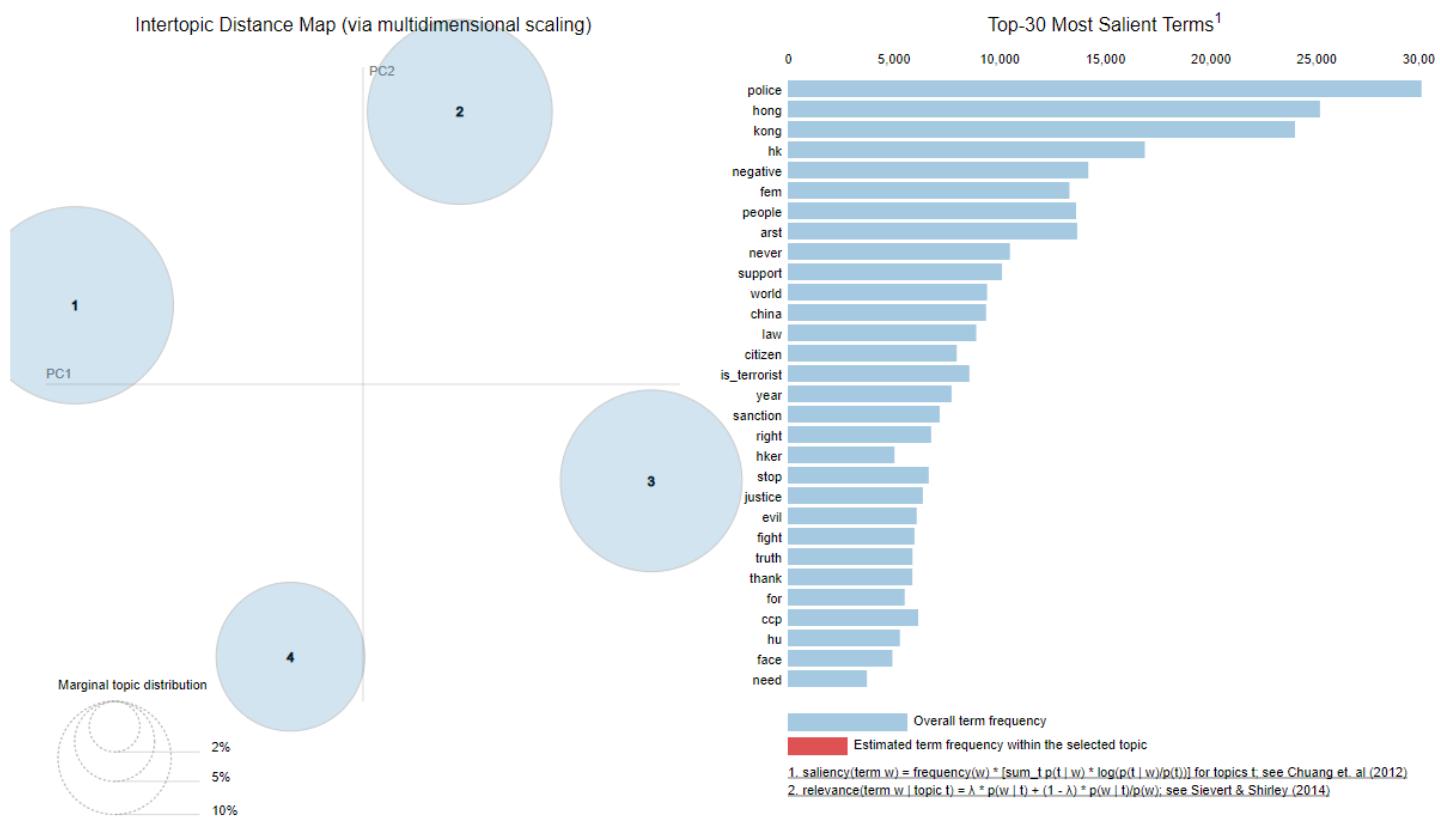


Appendix IX

[Coherence Score, Tweets]



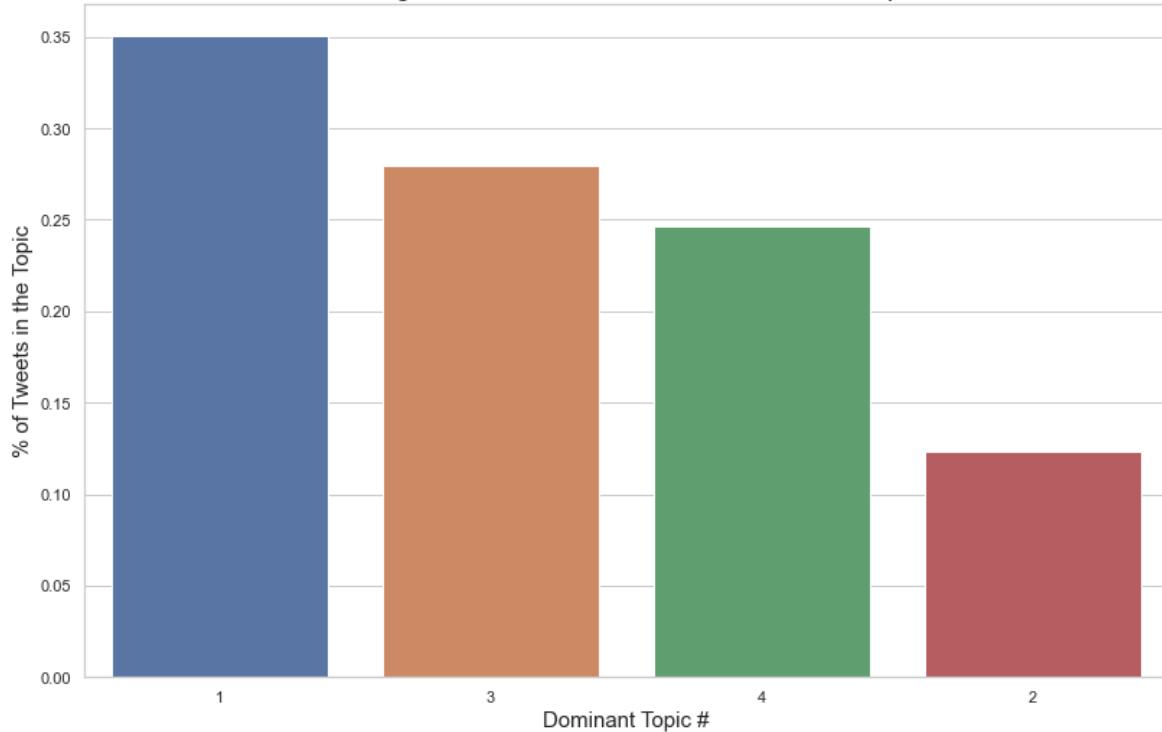
[pyLDAvis, Tweets]



([back](#))

[Coherence Score Contribution, Tweets]

Looking at the % Contribution of Tweets within Topics



([back](#))

[Topic 1, Tweets]

4520 thank sir supporting hongkongers defending freedom humanrights hong kong defending core value free world please
5078 thank continuous great effort thank ben joining speak hong kong we stand together freedom
5116 thank ipac support support democracy freedom we really appreciate continued strong support continue fight now we see strength unity enormous
5176 thank standing hong kong because continuous support antichina alliance stronger ever lets keep working freedom democracy hong kong together
8871 thanks persistent effort fight freedom brave young man thank sir standing hong kong too grazie signore
12654 thank your support means lot us hongkongers suffering limited freedom we sincerely hope free world work together stop chinas oppression many thanks
13981 _aderholt _ thank sir supporting cause defending freedom defending core value free world please continue hope would
15149 thanks liberatehongkong follow you telling world injustice anywhere threat justice everywhere free hong kong together support global vs amp
15836 _with_hk _wonghki thank folded_hands everyone realize freedom free we stand together fight autonomy freedom
18382 _ballester thank support i hope move let people barcelona know situation hq lets fight freedom human rights together flexed_biceps light_skin_tone please stay
safe
20829 _news please keep supporting freedom hong kong thank you freedom free we need fight safeguard
24284 _aderholt thank sir supporting hongkongers defending freedom humanrights hong kong defending core value free world please continue hope would
25179 thank supporting hk fire hongkonger give up we keep fighting totalitarianism please keep spreading hk situation japanese we need support
25279 thank president tsai speaking hope stand united fight freedom democracy folded_hands thumbs_up red_heart
30752 thanks ttdog follow you telling world hong kongerinjustice anywhere threat justice everywherehuman rights advocatean eggdog lover together support global vs
amp
30934 thanks sec pompeo the solidarity among freedomloving nations support hong kong heartening lets stay strong keep fighting triumph democracy comes
31176 thanks ka hing follow you telling world fight freedom stand hong kong together support global vs amp
32829 thank american we touched under launched little now cautious now sincerely appreciate great brave move done us support human rights issues
40814 _with_hk _wonghki never give fight freedom flexed_biceps thanks support flexed_biceps in hk like human voice support hope world
42882 thanks dobbey elf face_with_medical_mask follow you telling world dobbey free elf thought_balloon one dreamers we fight democracy amp human rights speaking_he
d yellow_heart stand hong kong oncoming_fist light_skin_tone fight freedom together support global vs
52645 ive urgent appeal we need support continue standing hong kong campaign donate support great cause _watch
60080 we stand fight freedom democracy we never surrender we never defeated we we front free world we hongkongers
60973 oh its touching heartfelt heartfelt thanks red_heart yellow_heart green_heart blue_heart purple_heart ribbon we never give fight freedom flexed_biceps fle
xed_biceps flexed_biceps
60974 oh its touching heartfelt heartfelt thanks red_heart yellow_heart green_heart blue_heart purple_heart ribbon we never give fight freedom flexed_biceps fle
xed_biceps flexed_biceps
60975 oh its touching heartfelt thanks french fellows red_heart yellow_heart green_heart blue_heart purple_heart ribbon we never give fight freedom flexed_bicep
s flexed_biceps flexed_biceps
61463 _with_hk _angioi _hk as hongkokers touching see ppl around world voicing support hong kong fight against tyranny thanks
63823 thank speaking hong kong senator kitching injustice anywhere threat justice everywhere free world lock arm speak human rights hong kong
63860 thank australia defending freedom human rights hong kong defending core value free world hongkongers urge free world
70293 thanks standing hong kongit would tough battle hongkongers never surrender yet international support crucial us too
71777 thank eu telling hongkongers alone fight defending freedom humanrights hong kong defending core value free world please
72119 thank all free nations need stand together fight democray democray human right freedom suppressed ccp everywhere
75485 thank senator housakos speaking hk we never surrender fight please continue the world needs united fight
76840 thanks continuous support sir but hong kong loses freedom democracy us please take action support freedom fighters stop chinas aggression bastion free world
81431 thank sen haley hong kong aspiring predatory fascistic s statement intent get away atrocities one stop anymore the socialimperialisticis waging war free world
amp theus
81436 thank rep riggleman hong kong aspiring predatory fascistic s statement intent get away atrocities one stop anymore the socialimperialisticis waging war free w
ord amp theus
82390 _news _watch world lets stand behind brave fighting tyranny freedom justice democracy stop fight freedom
82673 thank rep gooden hong kong aspiring predatory fascistic s statement intent get away atrocities one stop anymore the socialimperialisticis waging war free worl
d amp theus
87768 _watch thank senator we come back keep fight freedom plz let world connect together protect world future
88165 _watch _with_hk _us from heart thanks support help we want live fear thanks speak us i love red_heart red_heart red_heart red_heart red_heart red_heart sunflow
er sunflower sunflower rainbow rainbow rainbow folded_hands folded_hands folded_hands folded_hands folded_hands _is_terrorist
92488 red_heart red_heart red_heart taiwan freedom human rights democracy the free world proud taiwan
99093 _with_hk _liesin_ppl thank brother fight lot need support world we need fight believe values
102183 its time tell free world embrace liberty amp democracy universal values injustice anywhere oppression freedom amp autonomy hong kong way
tolerable
104258 britian showing world fulfilling historical responsibility hong kong showing world fighting must safeguard democracy human rights
104768 thank senators while hong kong people greatly appreciate us providing refuge place earth truly free long exists aspiring predatory nationalistic tyrannical cc
p hk frontlinis to

(back)

[Topic 2, Tweets]

3766 i pray everyday safe return i wish someone could help them folded_hands folded_hands crying_face crying_face crying_face loudly_crying_face loudly_crying_face broken_heart broken_heart broken_heart _is_terrorist
6269 _hker help kids pls no matter evil no matter brutal still fighting justice liberty amp democracy pouting_face giving up
7469 who serve evil who betray people hsbc bear results _is_terrorist
8337 _kwai i really love song loudly_crying_face folded_hands hkers inexhaustible patriotism energy fire unite countries world globe_showing_americas one double_exc
lamation_mark may negative bless hk hkers folded_hands two_men_holding_hands man_and_woman_holding_hands two_men_holding_hands man_and_woman_holding_hands two_men_holding_hands
man_and_woman_holding_hands two_women_holding_hands two_men_holding_hands man_and_woman_holding_hands two_men_holding_hands man_and_woman_holding_hands
8840 _hker_alfieri no matter evil no matter brutal still fighting justice liberty amp democracy flexed_biceps dark_skin_tone angry_face giving up
10685 _hker_hk no matter evil no matter brutal still fighting justice liberty amp democracy flexed_biceps dark_skin_tone angry_face giving up
11706 _craymer_hker no matter evil no matter brutal still fighting justice liberty amp democracy flexed_biceps dark_skin_tone angry_face giving up
12561 _hk_craymer no matter evil no matter brutal still fighting justice liberty amp democracy flexed_biceps dark_skin_tone angry_face giving up
13242 _sit_hker no matter evil no matter brutal still fighting justice liberty amp democracy flexed_biceps dark_skin_tone angry_face giving up
33272 _news_good news need more usa british need sanction people evil
35663 _news_hker no matter evil no matter brutal still fighting justice liberty amp democracy flexed_biceps dark_skin_tone angry_face giving up
37261 pope blind chi na hk negative show justice evil acts
37626 _hk_hker no matter evil are brutal is wont give up still fighting justice liberty amp democracy help pls
52494 what happened night never forgotten people behind never forgiven
55540 _hker_china_talk no matter evil are no matter brutal is giving up still fighting justice liberty amp democracy join us
58624 _adonis_hker no matter evil no matter brutal still fighting justice liberty amp democracy flexed_biceps dark_skin_tone angry_face giving up
61627 _hker_polumbo no matter evil are no matter brutal is giving up still fighting justice liberty amp democracy join us
61697 _hk_hker no matter evil are no matter brutal is giving up still fighting justice liberty amp democracy join us
64655 musical_notes sing hallelujah lord sing hallelujah lord musical_notes
65804 _spalding_hker no matter evil no matter brutal is giving up still fighting justice liberty amp democracy pls help
79586 _hk_hk no matter evil no matter brutal is giving up still fighting justice liberty amp democracy pls help
80839 help help help help help _is_terrorist
93297 never forget never forgetnever forget never forget never forget never forget never forget never forget never forget
93592 govh also trustworthy opportunity na sana like could benefit potential exodus hkg
95378 good song sharing thumbs_up light_skin_tone facing enemy cooperate other
113932 candle
candle
123431 all freedomlovers around world would abominate cruelty barbaric acts ccp
131400 folded_hands light_skin_tone please true folded_hands light_skin_tone please true folded_hands light_skin_tone please true folded_hands light_skin_tone please
true
132369 lmaoo joke i remember happy nba back nba association clause contracts forcing everyone stand anthem not a single nba player took a knee during the anthem
132426 what nobodys free everybody free
132427 sad watermelon noises and sad hkers noises too _____
132433 threat democracy world globe_showing_europeafrica _is_terrorist
142748 hong kong people street national security law clearly ccp broken joint declaration
145736 press freedom but condition police good friends thugs allow
146455 hong kong great threat now please stand us strike freedom
146811 this brave hearts taught pla lesson never forget
149150 leung ling kit the first man suicided hong kong antiextradition movement conveying strong will lives light eyes tyrants heavy nation lets death pain remain hea
rt carry on
157937 already enough rapists murderers
Name: Tweets, dtype: object

(back)

[Topic 3, Tweets]

328 us condemns prodemocratic media tycoon jimmy lai asks china restore hong kongs rule law indiablooms first portal digital news management jimmy lai
2137 hong kong police definitely rubbish totally control hold weapon hong kong longer safe city hong kong country seeking freedom
12062 hk gov shows china style rule law is law weapon suppress prodemocracy camp law protect citizens equality law joke no justice hong kong anymore
21203 it end it obviously political prosecution ccp adopting strong strategies silence opposition voices undermine hong kongs democracy amp rule law tool ccp arrest
prodemocracy people please
25833 _hk ccp uses suppress press freedom hong kong hk police puppet political tool ccp only dictatorial regime would afraid press freedom it shows clearly ccp regime_is_terrorist
25910 it ccps show order put white terror hongkongers hk police puppet political tool ccp only dictatorial regime would afraid press freedom it shows clearly ccp regime_is_terrorist
26419 prodemocrats hong kong deeply concerned press freedom afte jimmy lai arrested monday colluding foreign powers offense new controversial chinese security law via
26508 the enactment tool ccp supress freedom press hong kong it shows ccp afraid power press put white terror hk hk police puppet ccp _is_terrorist
27746 _hk after effective unlawful evil national security law hong kong freedom press freedom speech freedom election terminated hong kong longer suitable place live
please
29611 how police broke media office morning they destroying reputation freedom speech makes public lives white terror more people deserve sanctioned
35711 hong kongs rule law nonexistent the city totally seized authoritarian rule now govt everything silence democracy activists hk always asset globe us
41785 from arrest student activists yesterday dq prodemocracy candidates today hong kong suffering fullon political suppression prosecution china hong kong govt the
world must implement sanctions authoritarians now
42632 from arrest student activists yesterday dq prodemocracy candidates today hong kong suffering fullon political suppression prosecution china hong kong govt the
world must implement sanctions authoritarians now
42638 from arrest student activists yesterday dq prodemocracy candidates today hong kong suffering fullon political suppression prosecution china hong kong govt the
world must implement sanctions authoritarians now
42819 china care rule law autonomy hk they shows us clearly accept dissent so china turned hong kong dictatorship pls continue we urge world hold ccp accountable
44095 from arrest student activists yesterday dq prodemocracy candidates today hong kong suffering fullon political suppression prosecution china hong kong govt the
world must implement sanctions authoritarians now
44099 from arrest student activists yesterday dq prodemocracy candidates today hong kong suffering fullon political suppression prosecution china hong kong govt the
world must implement sanctions authoritarians now
44221 from arrest student activists yesterday dq prodemocracy candidates today hong kong suffering fullon political suppression prosecution china hong kong govt the
world must implement sanctions authoritarians now
44637 the national security law totally brings threats freedom speech hong kong hong kong longer hong kong anymore she like province china
45288 i believe law regulation revised clearly like people violated chinas national security law extradited as long everyone understand ns law means china deprive others freedom
63186 the free world recognize ambition this authoritarian regime respect international order amp honor commitment ccp incapable become democratic regime what happens
5 hong kong waken world
63188 the free world recognize ambition this authoritarian regime respect international order amp honor commitment ccp incapable become democratic regime what happens
5 hong kong waken world
64677 the situation hk worrying sweeping powers granted citys police threatening personal safety local residents there hope us would continue enforce sanctioning regime
ime china
78669 china accept hong kong hong kong want us china city lack open mind narrow ego this act covidvirus make everyone world hate china
81269 china passes controversial hong kong national security law a national security law imposed hong kong process nobody hong kong control over
81961 today pass law without affected knowing even contents inside article next day pass decision void international agreements treaties they simply treat lives matte
r but
83887 ccp compelling national security law forcefully turns international business centre ant random china city unwise uniqueness hk gone democracy
84403 the new laws take direct aim political dissident rather national security threats restricting freedom speech political expression hong kong

Name: Tweets, dtype: object

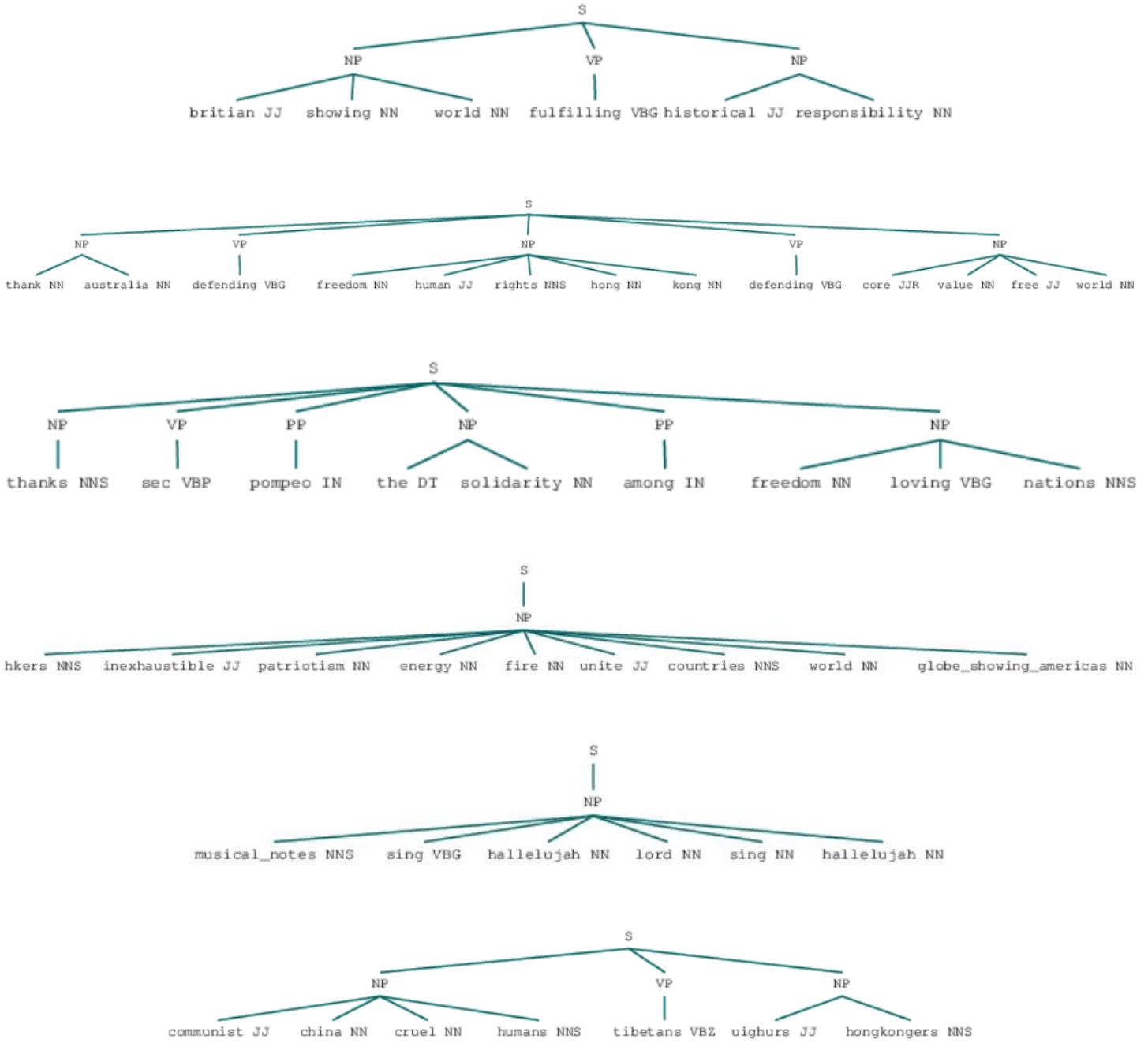
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[Topic 4, Tweets]

180 victim criminal on august arrested related yuen long attack protest tuen mun july including prodemocracy legislators journalist
566 roger fisher wrote getting yes amp said separate people problem focus interests positions cant build online forums that we start brainstorming likely shared op
posing interest conflict
567 _thaler roger fisher wrote getting yes amp said separate people problem focus interests positions cant build online forums that we start brainstorming likely s
hared opposing interest conflict
591 trying hard avoid officially locking city the idea carrie law refuses give style twisted ideas words just like responded antielab
822 protester burned flag regime prodemocracy protests becomes second person see sentence upped jail time
862 a lady sentenced jail months assault police laser pen no laser pen found arrested popo submit another laser pen exhibit pro ccp negative judge still accept ev
idence _is_terrorist
1870 yrsold pakistani plead guilty assaulting occasioning actual bodily harm assaulting probeijing man dec mong kok he detained days sentenced months probation or
der conditions
2444 great news stop chinese propaganda and im coming see top fans emotionally vulnerable spamming nmsl comment below lol
4296 i sure probeijing sent create facts calvin in worst case may create evidence riot him this familiar with
6945 similar ccp lies tiananmen massacre hongkong government try fraudulent history incident police disappeared hours let gangsters attack protesters
7539 they lie us know theyre lying know theyre lying keep lying us keep pretending believe them elena gorokhova a mountain crumps
9612 when think worst thing ever happen beginning as matter fact plan hk since _is_terrorist sources
17903 when cant get real record make up like case woman convicted hurting police w laser pointer laser pointer ever found police showed court similar laser pointer h
e brought
25232 _hk media first target activists second one ongoing now used working also arrested w whatever made reason
31979 aged passing crossroad charged excise wearing mask wht obviously aged mask why charged even insulted street sanction hkpolic
39167 index_pointing_up index_pointing_up index_pointing_up she children too when asked family r uk passport holders lan refused answer to protect family will uk p
rotect dictators family will uk allow mugabes family hold uk passports
42111 months ago riot police beaten passengers prince edward station arbitrarily it suspected passengers beaten death related cctv disclosed till now
44860 the chinese secret police arrest everyone want our safety threatened we need care worse situation _is_terrorist
45534 illegal thing say also group students arrested charge attempting split yhe nation posting facebook post
53562 time refresh memory we still remember collude triad clearlythey totally sided tyranny suppress thusthey innocent thoughts
58536 many government secretaries families living uk aus magnisky act must need put sanction let families enjoy live ccp governance
61089 thats keep recording important proccp thugs pretend anything blame they familiarity abuse trust kind people
63390 a yrsold clerk plead guilty assaulting police officer for kicking officer back nov causeway bay sentenced hrs community service source media hk
64009 the first time ever primary election held weekend amp have banned kinds protest amp voting protest were left now please view hk
66150 dead no evidence witness judge said community service orders may applicable here still judge chose imprisonment no guilty proven
67288 the difference media hk west hk call peaceful protestors rioters west call rioters peaceful protestors
67433 this lady carried us flag shopping mall n dragged n arrested by many riot po_ice here obviously nation flags r
69397 the party people one sounds like religious testimony ccp tries replace religion itself a concept always failed babylon moscow
69576 on contrary hkgov made books famous now more people going find ways read them like mainlders used come hk read banned books
69829 vetting necessary kick ccp supporters hk gov officials hk police away british they deserve live british
71786 an yrsold plead guilty possession offensive weapon a flick knife nov chai wan sentenced months probation order source youarenotalonehk_live
72368 oh liberate hk revolution time liberate hk revolution time liberate hk revolution time liberate hk revolution time liberate hk revolu
tion time
77551 a man arrested becoz hv flags bag insane next time foreigner walk street police may arrest himher foreigner hv different nationality hidden head
85428 a uni student possession pipe month sentence a girl related possession kg ketamine walk away with absolutely nothing
86700 a yrsold gaffer plead guilty possession offensive weapon public places intent commit arson oct tseung kwan o sentenced yrs imprisonment
86767 an yrsold plead guilty assaulting police officer nov tseung kwan o sentenced months probation order probation officers guidance source youarenotalonehk_liv
e
90270 arrested youth lynched police can charged assaulting police not guilty magistrate said polices unreliable witness
92830 we also claim say along ladakh we needs understand publishing providing fake news info media create confusion succeed
99033 have seen police could rush station indiscriminately attack people shown difference terrorist attack what ridiculous faced consequences
99376 the people not asking violence asking justice these protests one ways use voices make change made difference before everything power make sure happens again
99710 when dare mention they know could likely cause death have stopped yet no have faced consequences that no thats todays
100588 judge i would like ask u seriously injured n medical report prove popo get hurt u treat turth _is_terrorists
102137 judge said cause testimonies polices found reliable inconsistent the judge sentenced yearold teacher assaulting police

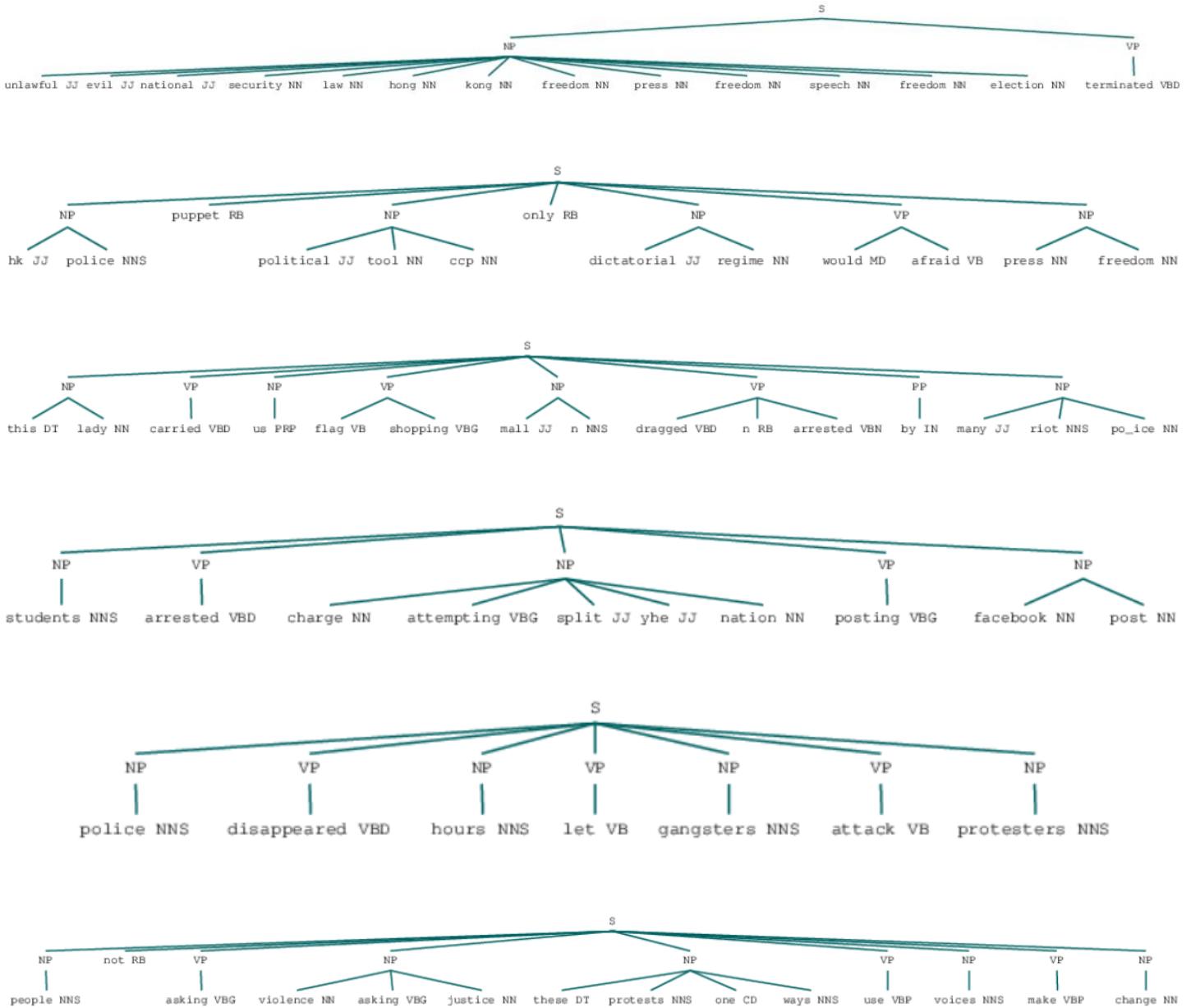
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[Selected Sentences, Twitter]



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