NLP
Topic & Sentiment Analysis on the HK National Security Law

16 September 2021 | by Rand Sobczak Jr.

Table of contents

01

PROBLEM IDENTIFICATION

HISTORY

After the end of the First Opium War, **the Qing Dynasty ceded Hong Kong** (“HK”) **to the United Kingdom** (“UK”)

1841

Hybrid culture

HK became a global financial center & its population:

- Developed a hybrid culture
  - Maintaining their Chinese ethos
- Adopting British principles; notably Common Law

1841 - Present

Handing back

The UK & China signed the Sino-British Joint Declaration whereby **the UK agreed to cede HK back to China in 1997** as "**one country, two systems**" ("OcTs")

Under this agreement, **OcTs** would be **the structure between 1997 & 2047**

1984

Occupy Movement

In 2014, the Congress of China issued a decision regarding proposed reforms to the HK electoral system

This was widely seen to be highly restrictive, and tantamount to the Chinese Communist Party ("CCP")'s pre-screening of the candidates for the Chief Executive of HK

2014

New law

In 2020, the Congress of China unanimously passed the National Security Law ("NSL") which criminalizes

- Secession
- Subversion of state power
- Terrorism &
- Collusion with Foreign entities in HK

2020

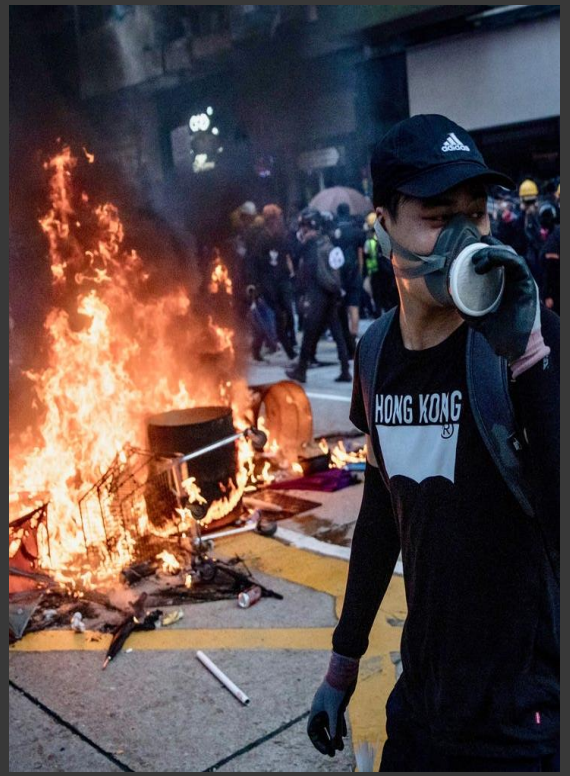
GOAL

A **dichotomy in perceived legal right** to enact such law **is where our story begins**

GOAL

A dichotomy in perceived legal right to enact such law is where our story begins

The result was protests ranging between 270k to 1M in size* ensued



** Depending on who's reporting*

Goal

A dichotomy in perceived legal right to enact such law is where our story begins

Protests ranging between 270k to 1M in size* ensued

The goal of this project is NOT to establish a position on who's right

Goal

A dichotomy in perceived legal right to enact such law is where our story begins

Protests ranging between 270k to 1M in size* ensued

The goal is NOT to establish a position on who's right.

The goal is to see where certain groups stand & on what footing

Goal

A dichotomy in perceived legal right to enact such law is where our story begins

Protests ranging between 270k to 1M in size* ensued

The goal is NOT to establish a position on who's right.

The goal is to see where certain groups stand & on what footing **via Topic & Sentiment Analysis using Natural Language Processing** on the NSL

02

Generated Deliverables

Powered by BeautifulSoup

NEWS (INT'L)

Fifteen (15) News Articles from International sources were scraped

	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

Powered by BeautifulSoup

News (Chinese)

Fifteen (15) **News Articles** from **Chinese sources** were also **scraped**

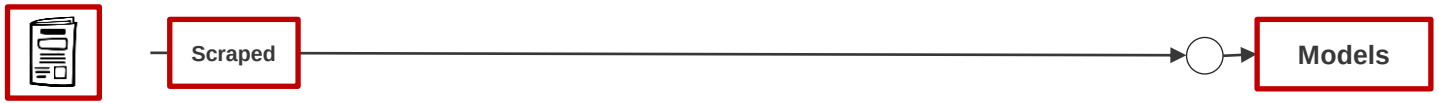
	file_name	date	source	country	local	title	article	word_count
15	peoples_daily_1	2020-07-03	People's Daily	China	Local	Newly passed national security law a seawall s...	The Law of the People's Republic of China on S...	3486
16	peoples_daily_2	2020-07-02	People's Daily	China	Local	Hong Kong national security 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\n\nCarrie Lam, chief exe...	806
26	xinhua_12	2020-07-01	Xinhua	China	Local	China adopts law on safeguarding national secu...	Video PlayerClose\n\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

News Cleaning & Initial Prep

- The **cleaning & initial preparation** for both the **Titles & Articles** (📰) themselves **is the same**. They were eventually combined

News Cleaning & Initial Prep

- The cleaning & initial preparation for both the Titles & Articles themselves is the same. They were eventually combined
- To begin, they were all scraped using beautifulsoup



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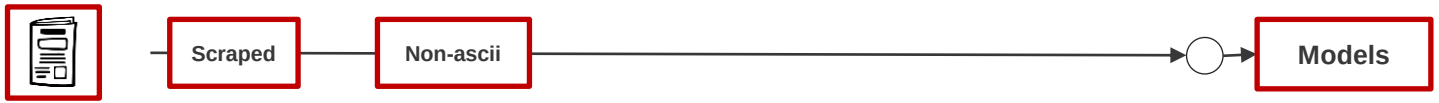
```
'State media says Hong Kong has a toxic ‘Apple’'
"State media says Hong Kong has a toxic 'Apple'"
```



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- To begin, they were all scraped using beautifulsoup
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- The **Sentiment Intensity Analyzer** ("SIA") was then **added to determine the Positive, Negative or Neutral position of the text**

	comp_article	neg_article	neu_article	pos_article
count	30.000000	30.000000	30.000000	30.000000
mean	0.338153	0.087933	0.795733	0.116567
std	0.897364	0.035946	0.034230	0.036774
min	-0.997900	0.013000	0.710000	0.064000
25%	-0.754575	0.068500	0.772500	0.089000
50%	0.979150	0.093500	0.785500	0.115500
75%	0.996675	0.110000	0.822750	0.132500
max	0.999600	0.145000	0.860000	0.207000

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- To begin, they were all scraped using beautifulsoup
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- The Sentiment Intensity Analyzer was then added to determine the Positive, Negative or Neutral position of the text
- Stop words are a **commonly used words** which **don't provide value to NLP**; examples are "a", "the", "is", "are", "and"; they were removed

```
# 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']
```

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- Lemmatization ("Lem") | **the process of grouping together the inflected forms of a word so they can be analyzed as a single item**, identified by the word's lemma, or dictionary form

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

```
Newly passed national
```

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

```
newly pass national
```

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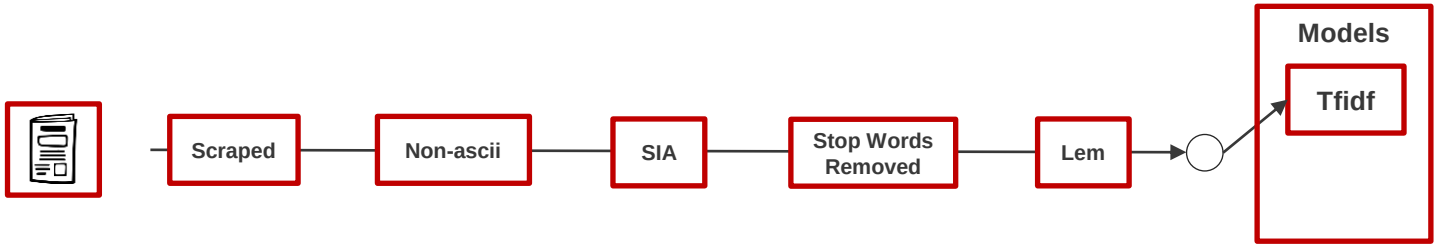
- Lemmatization ("Stem") | the process of grouping together the inflected forms of a word so they can be analyzed as a single item, identified by the word's lemma, or dictionary form
- **Tfidf** | Term Frequency Inverse Document Frequency; **an algorithm to transform text into a meaningful representation of numbers** which we can use to fit machine algorithms for prediction



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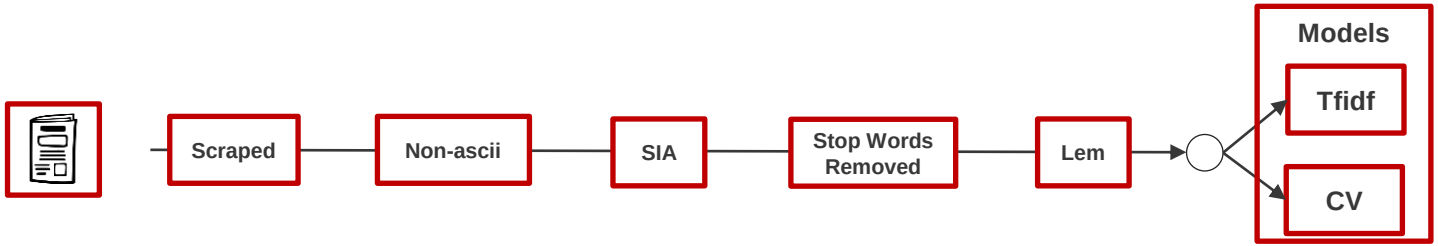
- CountVectorizer ("CV") | the **CountVectorizer is used to transform a given text into a vector on the basis of the frequency** (count) of each word that occurs in the entire text



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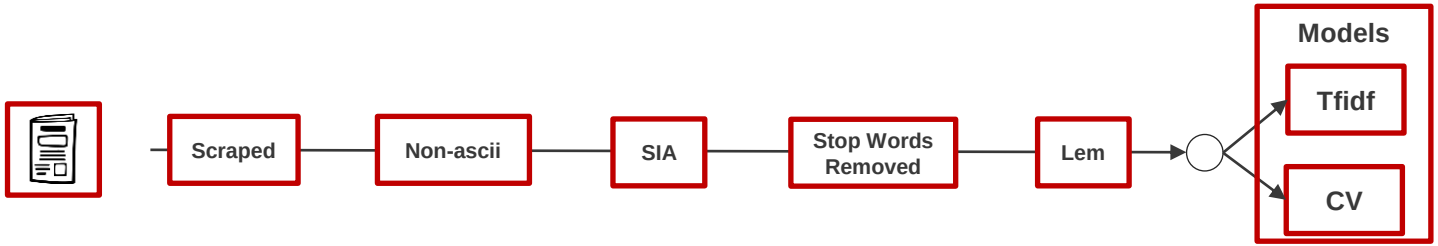
- These were the dataframe's sent to the next section



Powered by Twint

TWITTER

288k Tweets were scraped on twelve (12) **hashtags**; these are all anti-Law hashtags

PLEASE NOTE | these **exclusively arise from HK & Int'l Tweeters**; **Chinese social media's contribution is NOT present,** unfortunately

	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!!!!!!! 홍콩 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', 'questioneverything']
9307	#nochinaextradition	2020-05-31	techino_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	#hkpoliceterrorism	2020-06-08	leung18188868	@fxxkthepopoo @koshi2008 They are not police. ...	en	0	1	0	[{'screen_name': 'fxxkthepopoo', 'name': 'iamh...	['hkpolicebrutality', 'hkpoliceterrorism', 'hk...
284002	#HKpoliceterrorist	2020-07-25	bethenewyorkers	@PENamerica Journalists are always the target ...	en	0	2	2	[{'screen_name': 'PENamerica', 'name': 'PEN Am...	['hkpoliceterrorist', 'nationalsecuritylaw']

Twitter Cleaning & Initial Prep

- Twitter had the same process as the News but scraped with Twint (T) and had five (5) steps before

Twitter Cleaning & Initial Prep

288,416

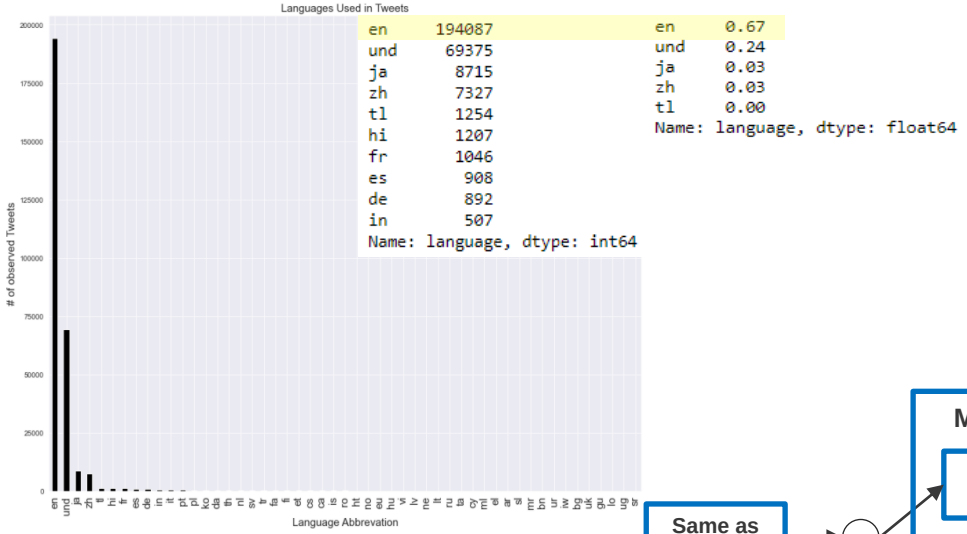
- Twitter had the same process as the News but scraped with Twint ( )
  and had five (5) steps before
  - This generated 288,416 Tweets for the DataFrame

Twitter Cleaning & Initial Prep

- Twitter had the same process as the News but scraped with Twint and had five (5) steps before
- Focused on English Tweets

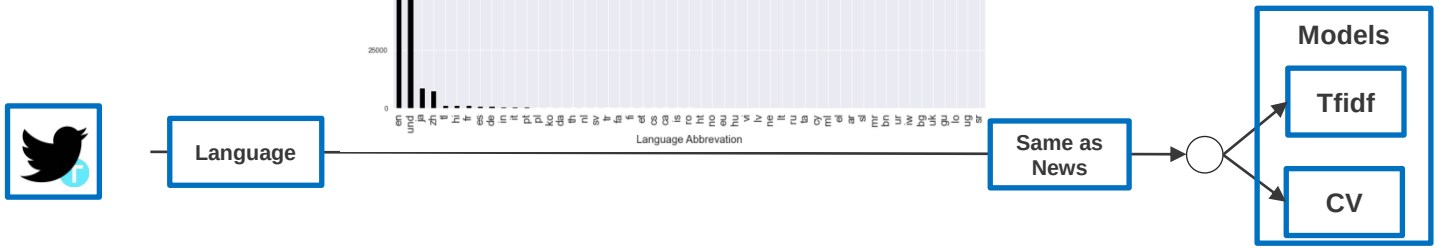
288,416

194,087




```
en     194087
und     69375
ja       8715
zh       7327
tl       1254
hi       1207
fr       1046
es        908
de        892
in        507
Name: language, dtype: int64
```

```
en     0.67
und    0.24
ja     0.03
zh     0.03
tl     0.00
Name: language, dtype: float64
```



Twitter Cleaning & Initial Prep

- Twitter had the same process as the News but scraped with Twint and had five (5) steps before
  Focused on English Tweets
- Removed Duplicates

288,416

194,087

163,699

Twitter Cleaning & Initial Prep

163,699

- Twitter had the same process as the News but scraped with Twint and had five (5) steps before
- Focused on English Tweets
- Removed Duplicates
- Mentions of other users & links were removed

```
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...

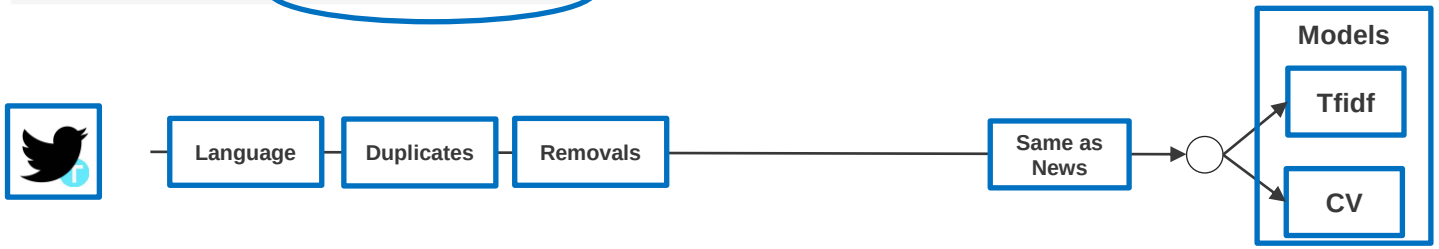
```
df['tweet'][9]
```

```
'Joshua Wong: ‘Forms of resistance need to be fluid and flexible’ #FightForHongKong #HongKongProtest https://t.co/COPpnczKp4'
```

```
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 '
```



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- Focused on English Tweets
- Removed Duplicates
- Mentions of other users & links were removed
- Emoji's were then converted to bigrams & trigrams & kept

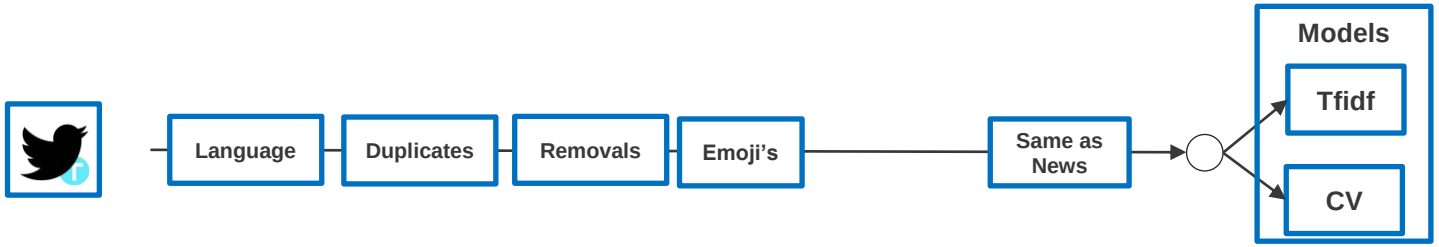
```
df.tweet[12]
```

```
'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'
```



Twitter Cleaning & Initial Prep

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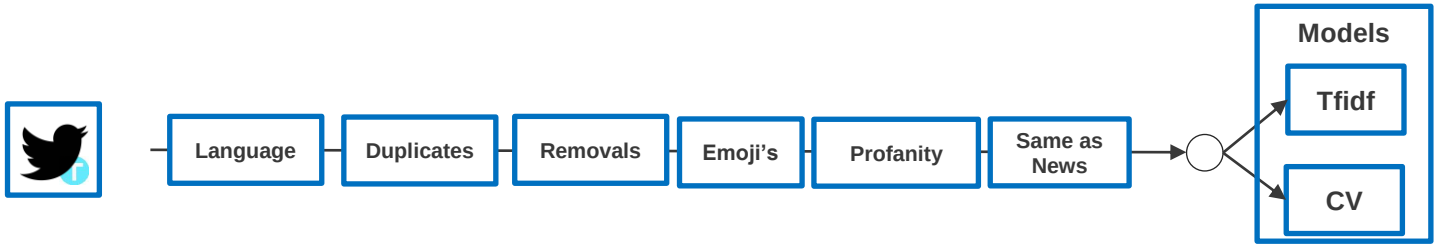
- Focused on English Tweets
- Removed Duplicates
- Mentions of other users & links were removed
- Emoji's were then converted to words & kept
- All profanity were then converted to the word "NEGATIVE"; this word was chosen to be well positioned in SIA



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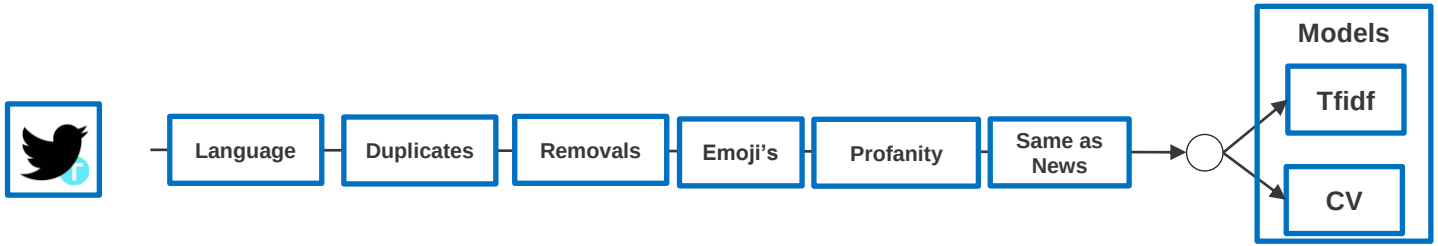
- Then sent to the next section as well



Generated Deliverables

Source Code

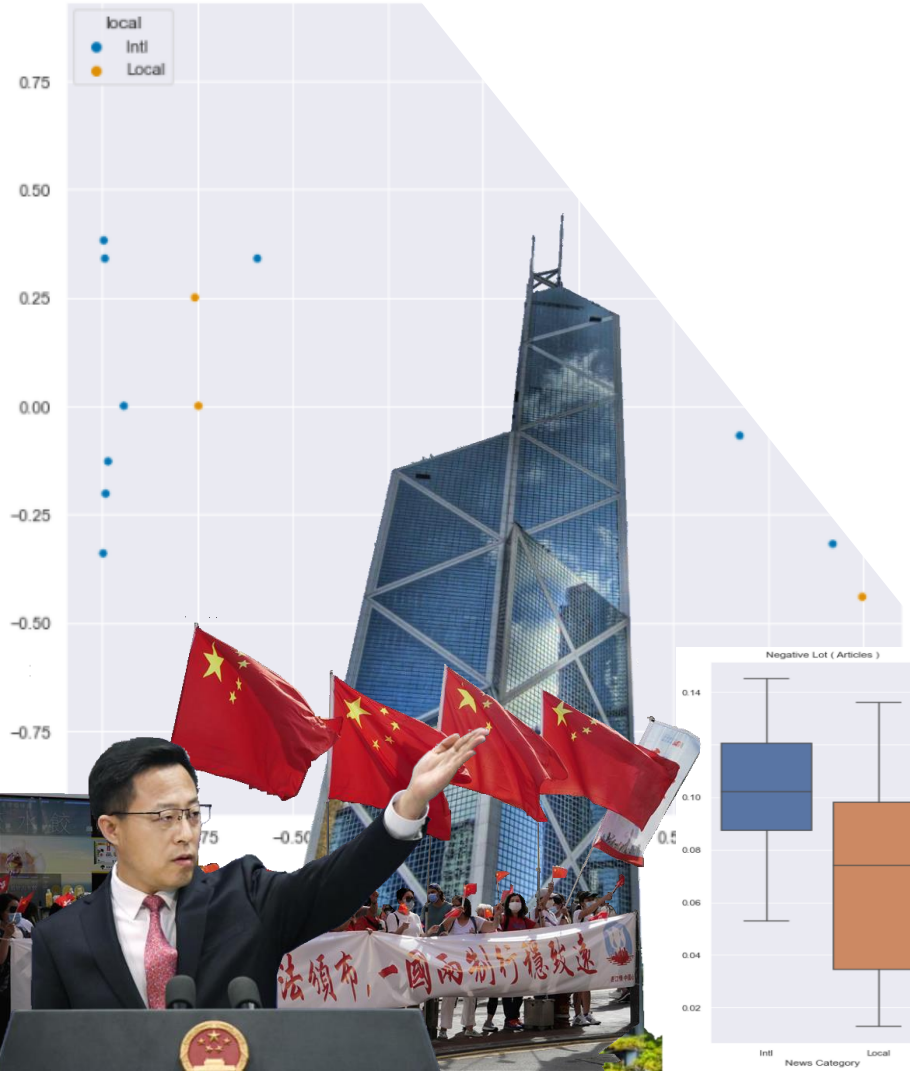
Each are found on my GitHub account referenced at the end

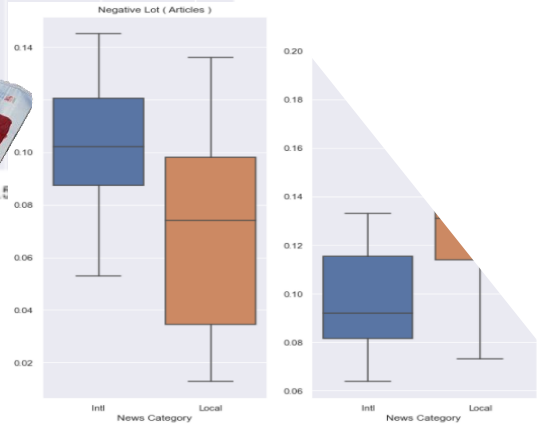
Research Report

Each are found on my GitHub account referenced at the end

Presentation Report

This one...





03

Exploratory Data Analysis

Exploratory Data Analysis

- The Exploratory data analysis ("EDA") was undertaken on both the News Articles & Tweets

Exploratory Data Analysis

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- The News & Tweets were done separately

Exploratory Data Analysis

- The Exploratory data analysis ("EDA") was undertaken on both the News Articles & Tweets
- They were done separately
- **The News will be reviewed first**, followed by the Tweets

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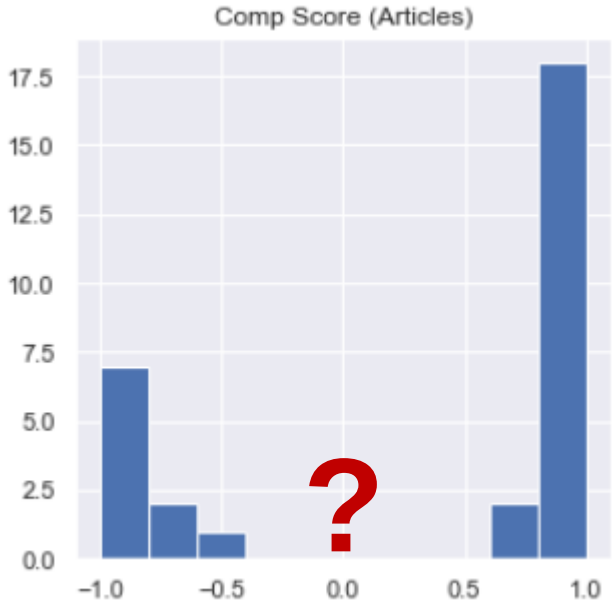
NEWS EDA

With the help of Sentiment Analysis using VADER, the **initial observation** of the News Articles was **the lack of a middle ground*** on the Articles Comp Score



** All the Sentiment Scores present Positivity as 1 & conversely Negativity as -1*

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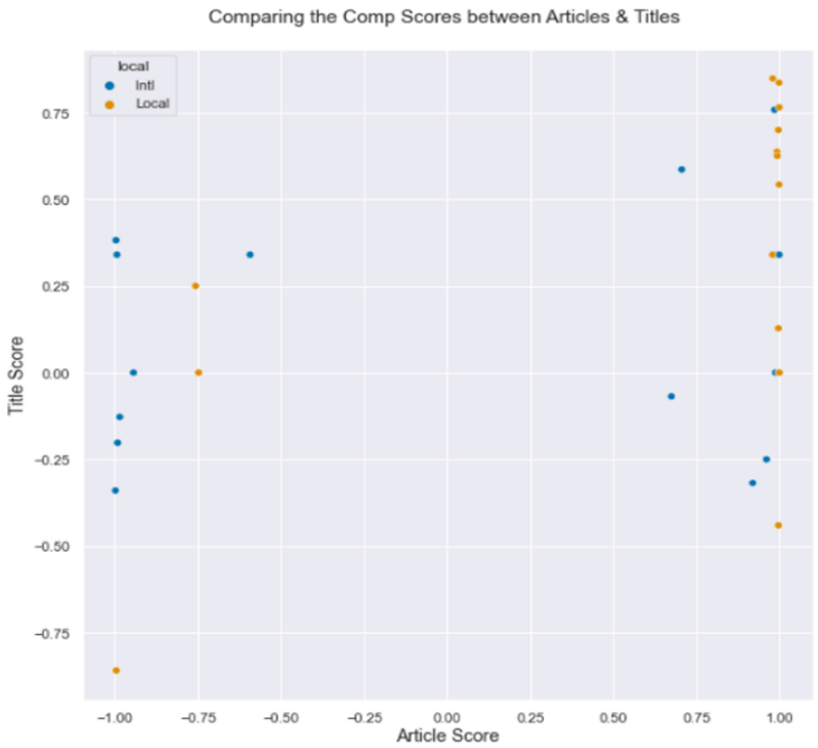
vaderSentiment

NEWS EDA

The initial observation was that the Sensitivity Scores for Titles don't "always" align with the Articles



** All the Sentiment Scores present Positivity as 1 & conversely Negativity as -1*

Powered by
vaderSentiment

NEWS EDA

Digging deeper |

20 Positive Articles


```
20 | Articles above 50%
```

** All the Sentiment Scores present Positivity as 1 & conversely Negativity as -1*

Powered by
vaderSentiment

NEWS EDA

Digging deeper |

20 Positive Articles | China controls this category but not domineering


```
20 | Articles above 50%
```

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

** All the Sentiment Scores present Positivity as 1 & conversely Negativity as -1*

Powered by
vaderSentiment

NEWS EDA

Digging deeper |

Conversely, **10 Negative Articles**


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

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

** All the Sentiment Scores present Positivity as 1 & conversely Negativity as -1*

Powered by
vaderSentiment

NEWS EDA

Digging deeper |

10 Negative Articles | International News controls this category but it's also not domineering

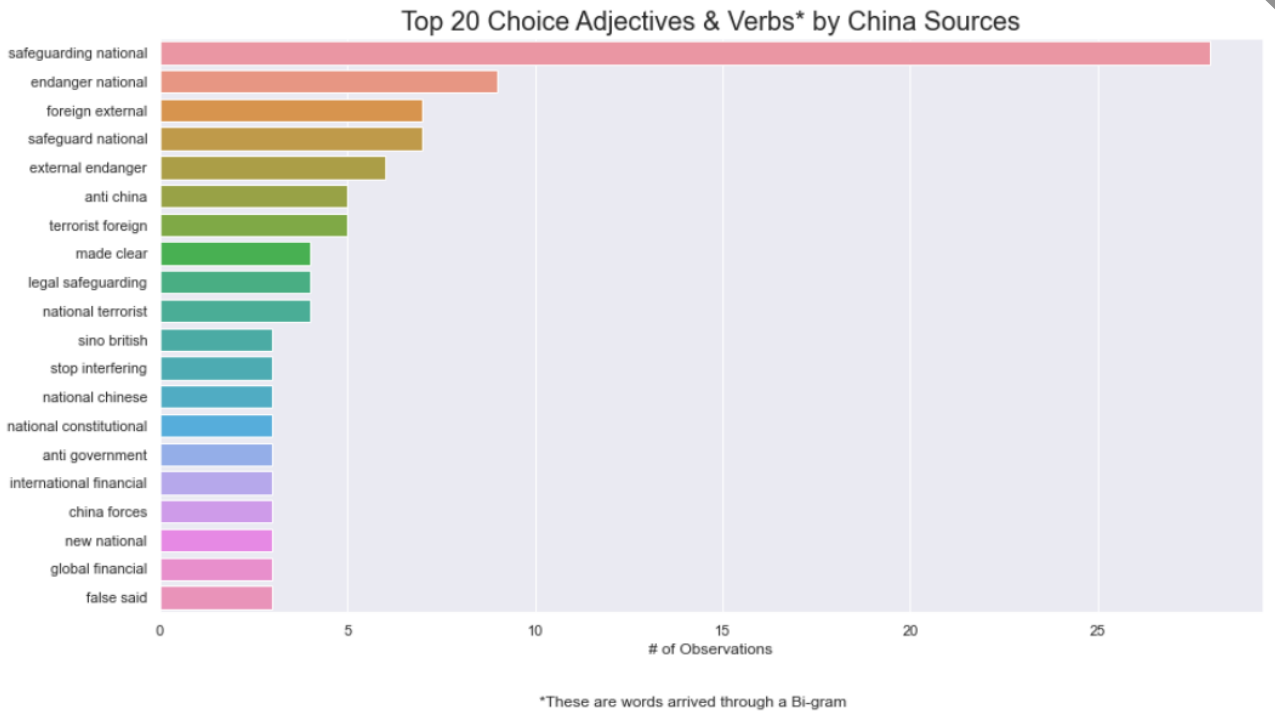

```
20 | Articles above 50%
10 | Articles below -50%

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
```

** All the Sentiment Scores present Positivity as 1 & conversely Negativity as -1*

Powered by learn

News EDA

A deeper look with Scikit-learn's CountVectorizer conveys that notable mentions of **safeguarding** & **externalities** show up **in Chinese News**



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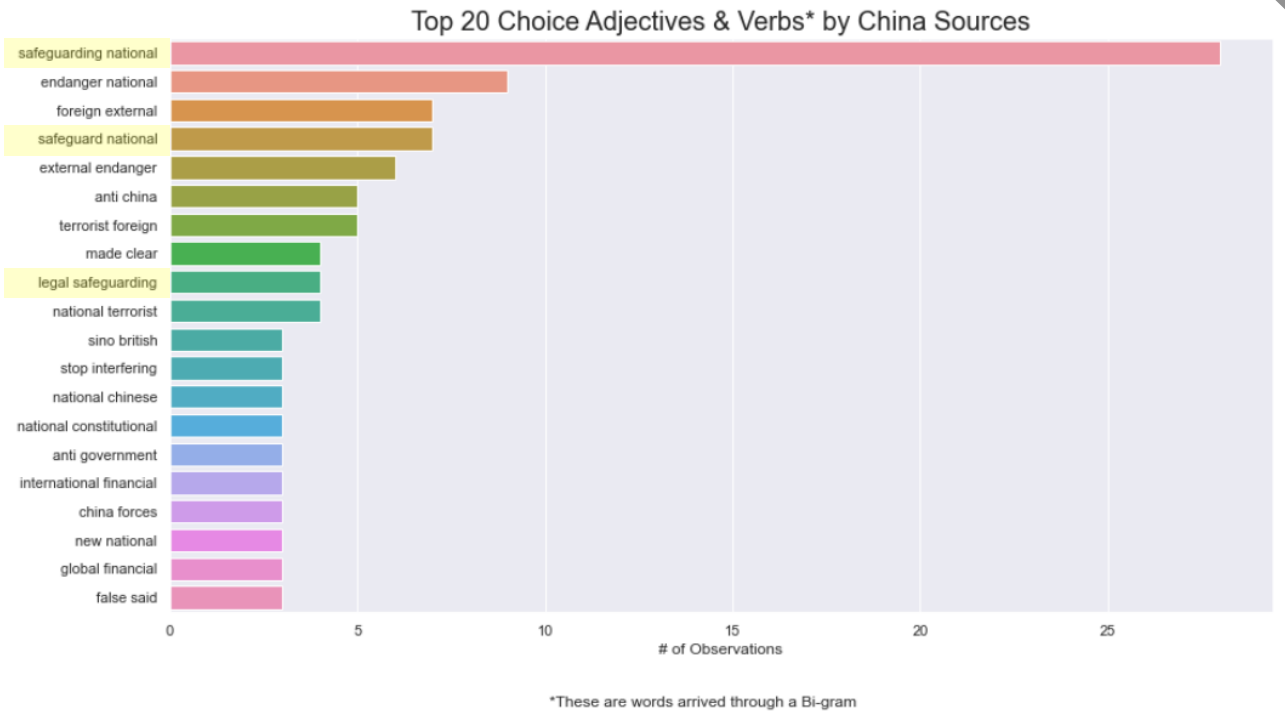

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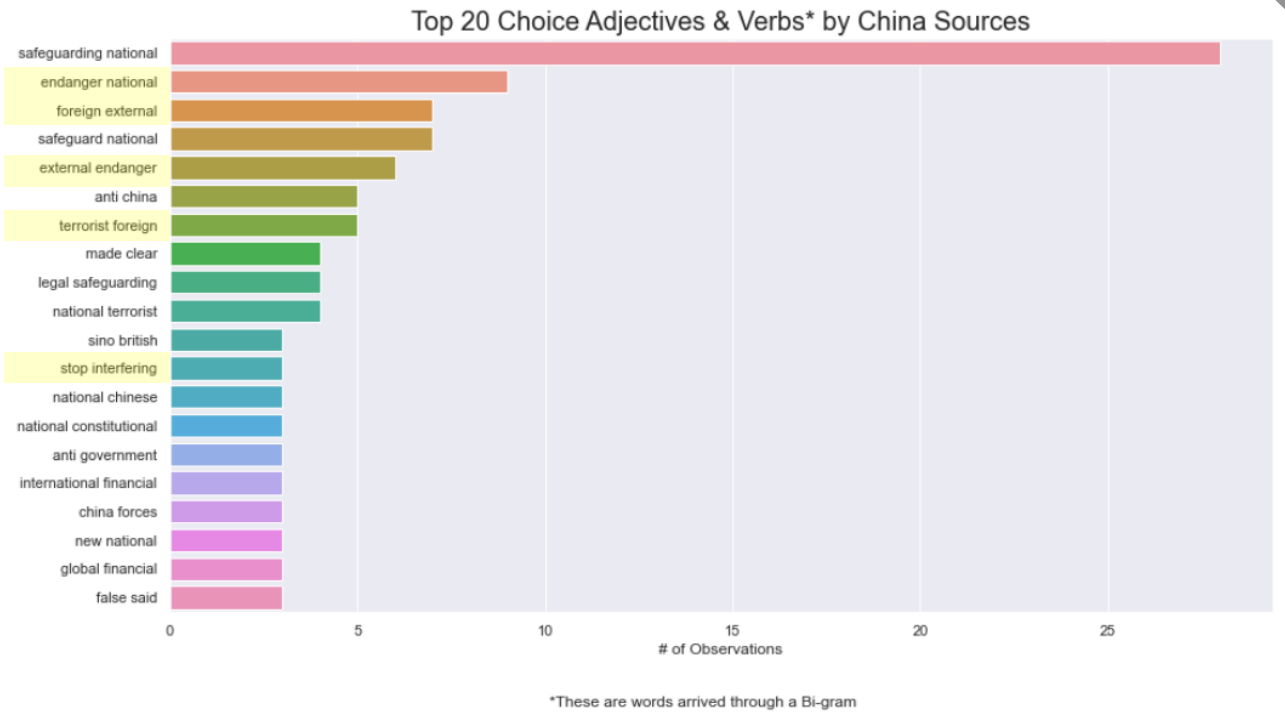
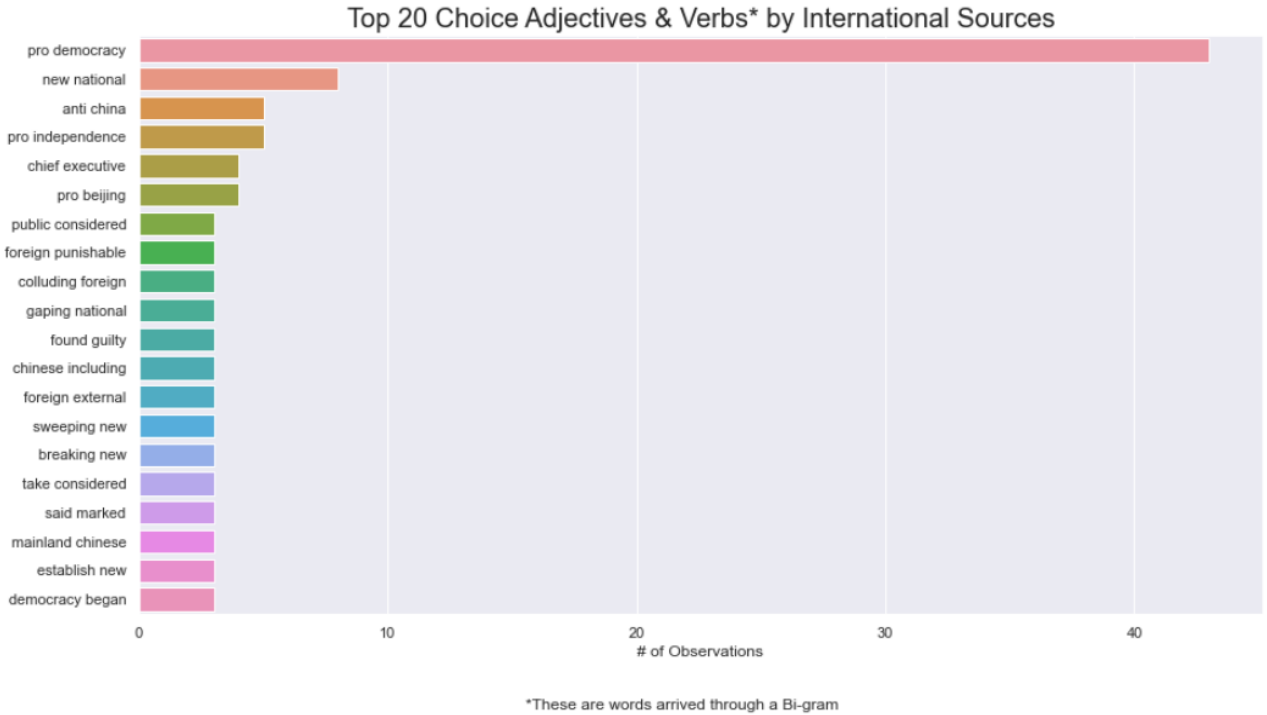


Powered by

News EDA

Pro democracy commands a notable majority in International News



Powered by learn

News EDA

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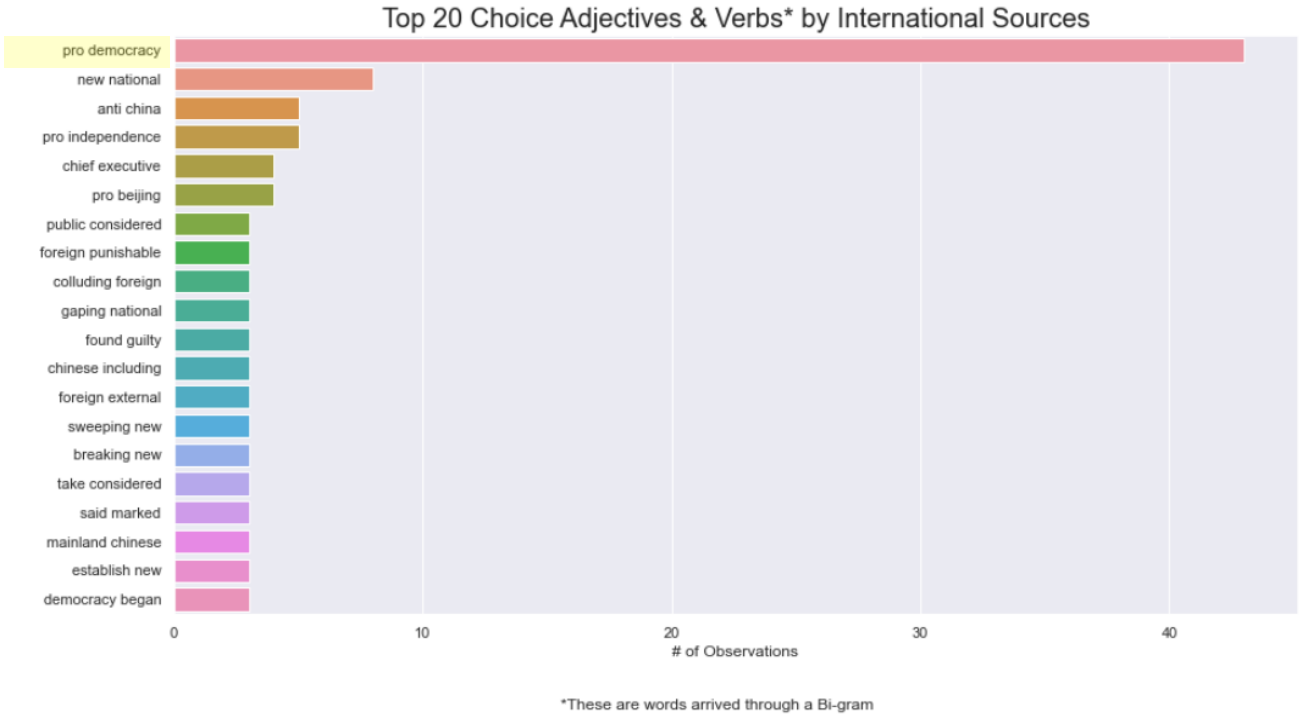

News EDA Take-Aways

China | Positive

China & the Law's intent is to protect & support the freedom & prosperity of HK as a unified motherland

Int'l | Positive

No clear indication for a positive position; to be confirmed in later stages

China | Negative

The West may be misinformed or not see the longer term as well as endangering HK by interfering

Int'l | Negative

Concern over the freedom of the HK people, particularly the protestors

** Int'l is short for International*

Exploratory Data Analysis

- The Exploratory data analysis ("EDA") was undertaken on both the News Articles & Tweets
- They were done separately
- The News will be reviewed first, followed by the Tweets
- Moving over to the Tweets
  - To reiterate, the Tweets are expected to be unanimously against the Law

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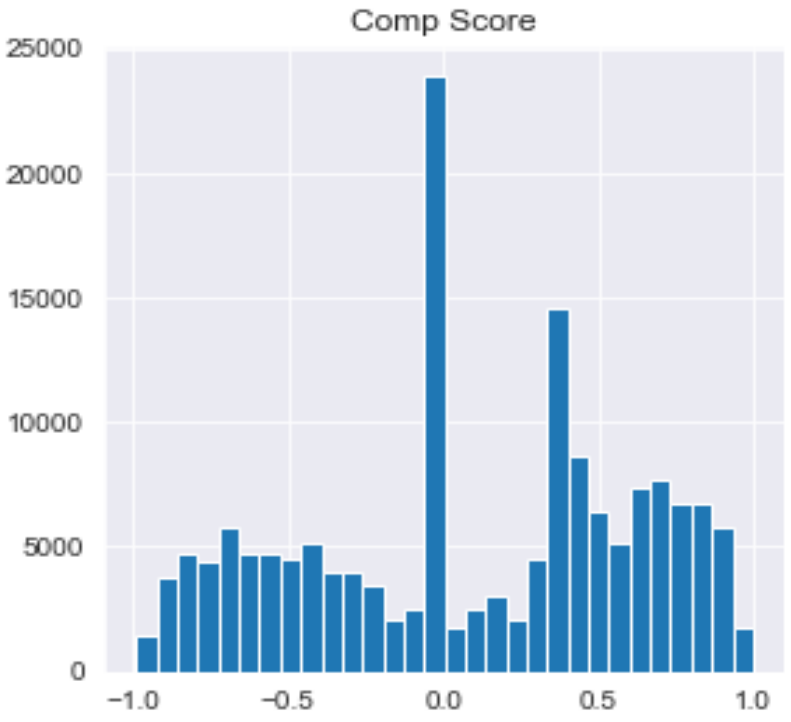
TWITTER EDA

Twitter **Tweets** present a **bimodal nature** on the Comp Score



** All the Sentiment Scores present Positivity as 1 & conversely Negativity as -1*

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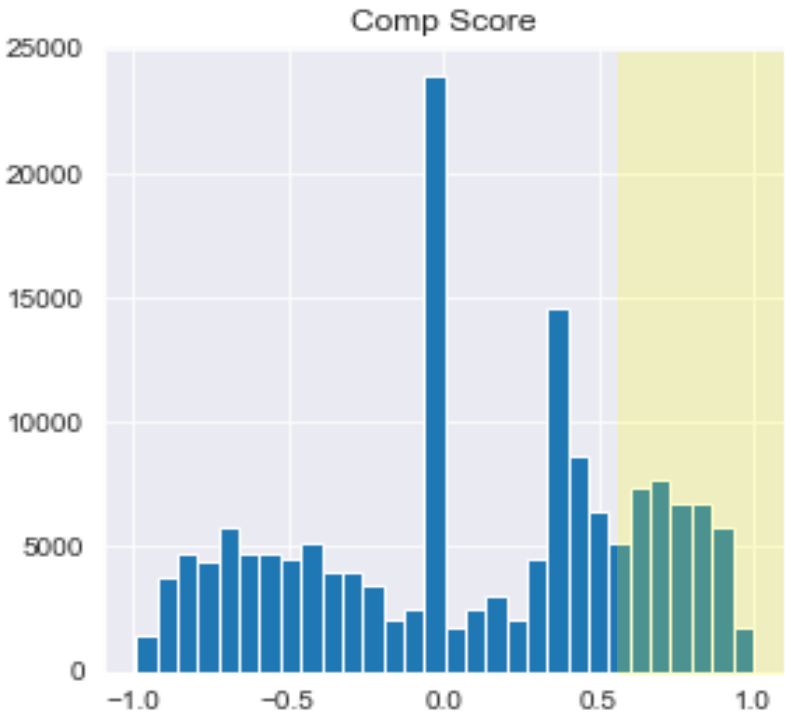
vaderSentiment

Twitter Prep

Using Descriptive Statistics, we determined that **Tweets with a Comp Score at or above 0.539 to be Positive**



count	163699.000000
mean	0.095108
std	0.534434
min	-0.990100
25%	-0.361200
50%	0.077200
75%	0.539900
max	0.998900

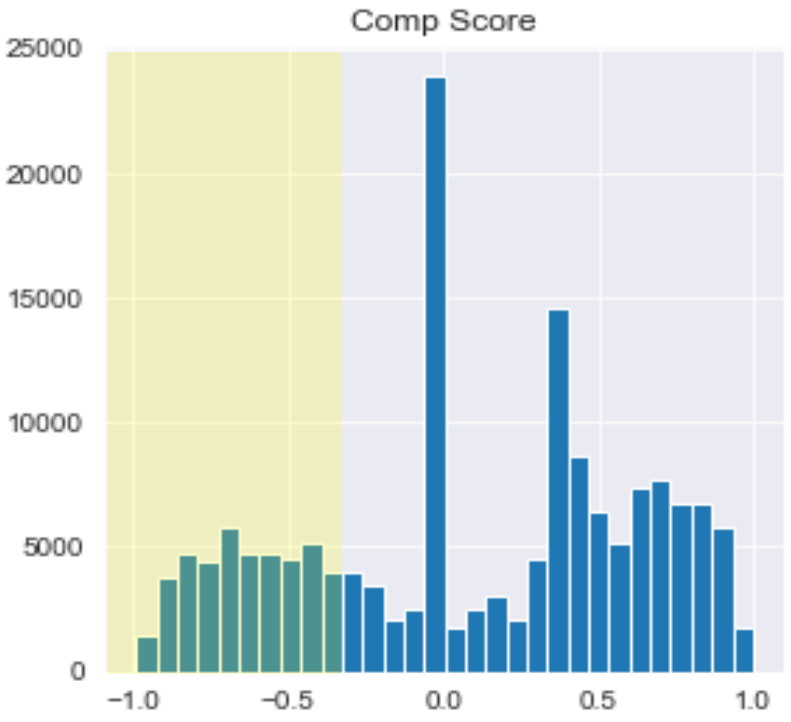
Name: comp, dtype: float64

** All the Sentiment Scores present Positivity as 1 & conversely Negativity as -1*

Powered by vaderSentiment

TWITTER EDA

Using Descriptive Statistics, we determined that Tweets with a Comp Score at or above 0.539 to be Positive & Tweets **at or below -0.361 to be Negative**




```
count    163699.000000
mean          0.095108
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min          -0.990100
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max           0.998900
Name: comp, dtype: float64
```

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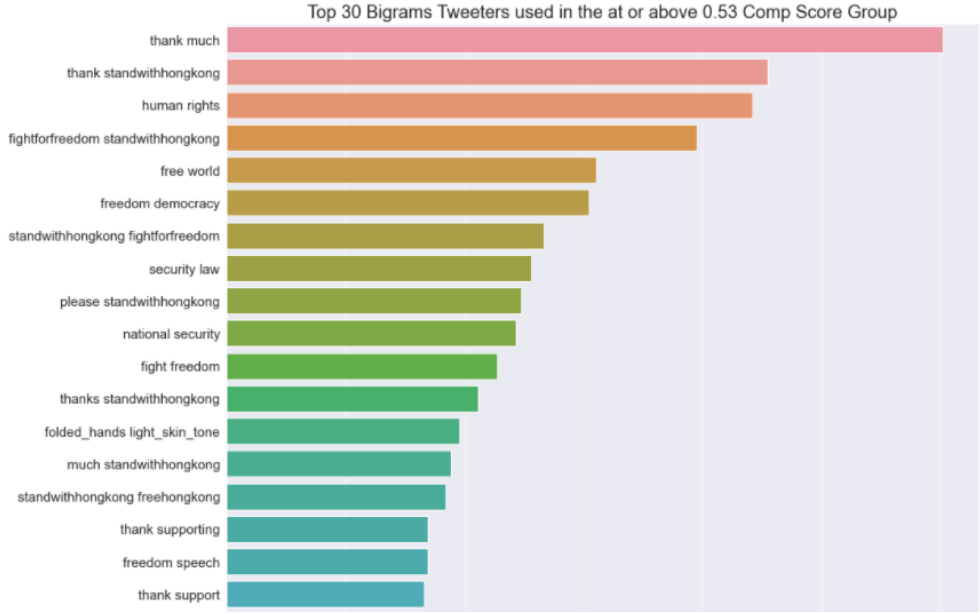
Powered by learn

TWITTER EDA

This is also seen in the top bigrams therein with thanks



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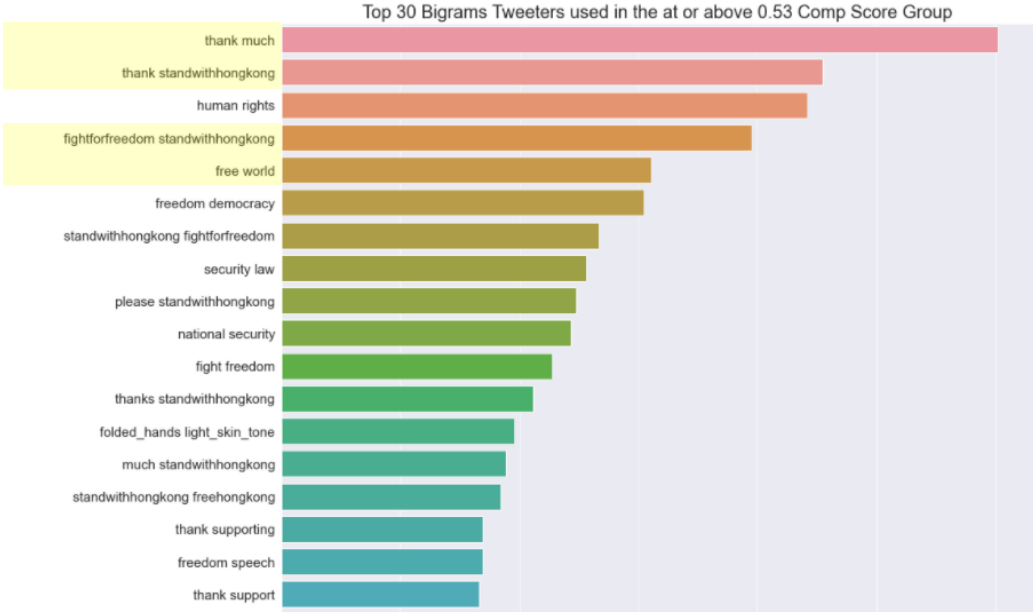
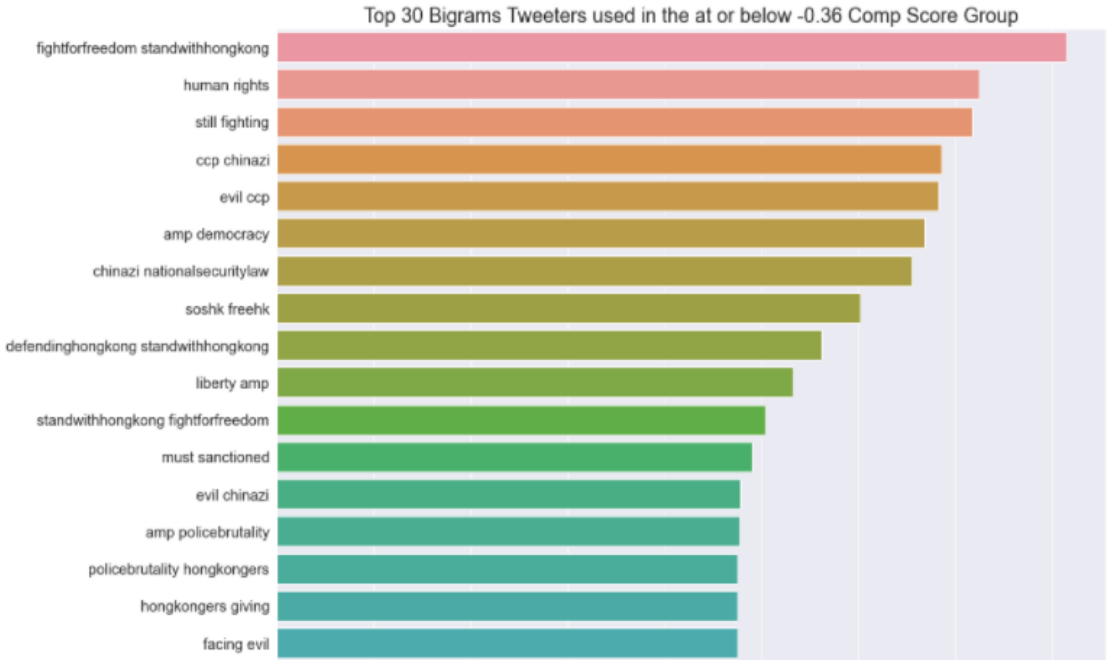


Powered by

TWITTER EDA

This may suggest that the optimism is low towards these positive topics

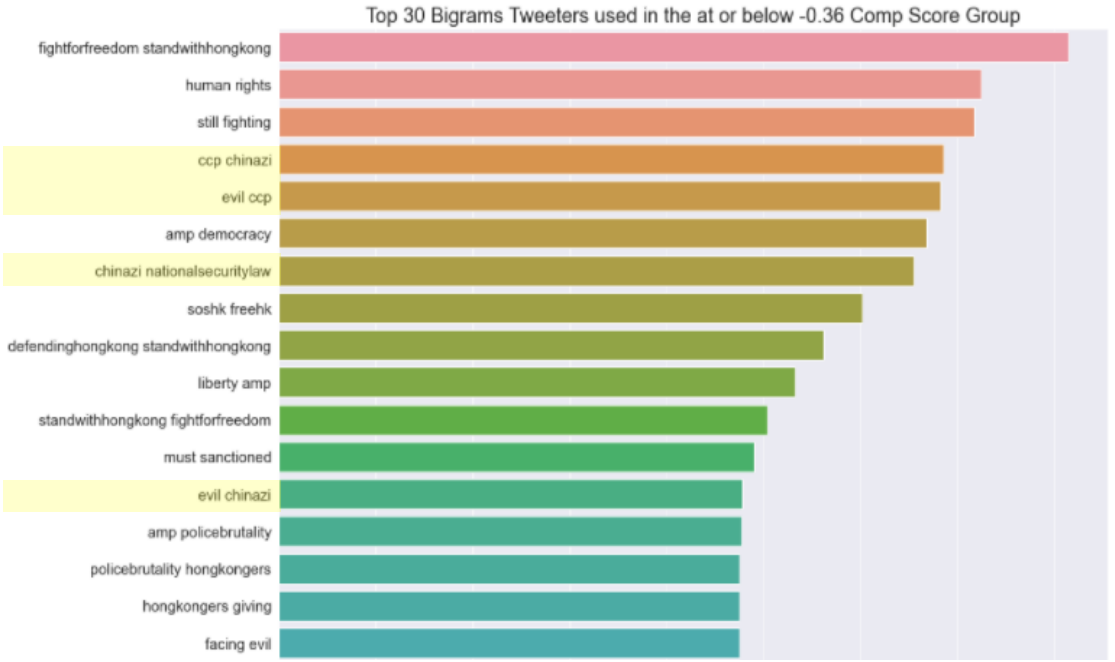


Powered by learn

TWITTER EDA

This may suggest that the optimism is low towards these positive topics

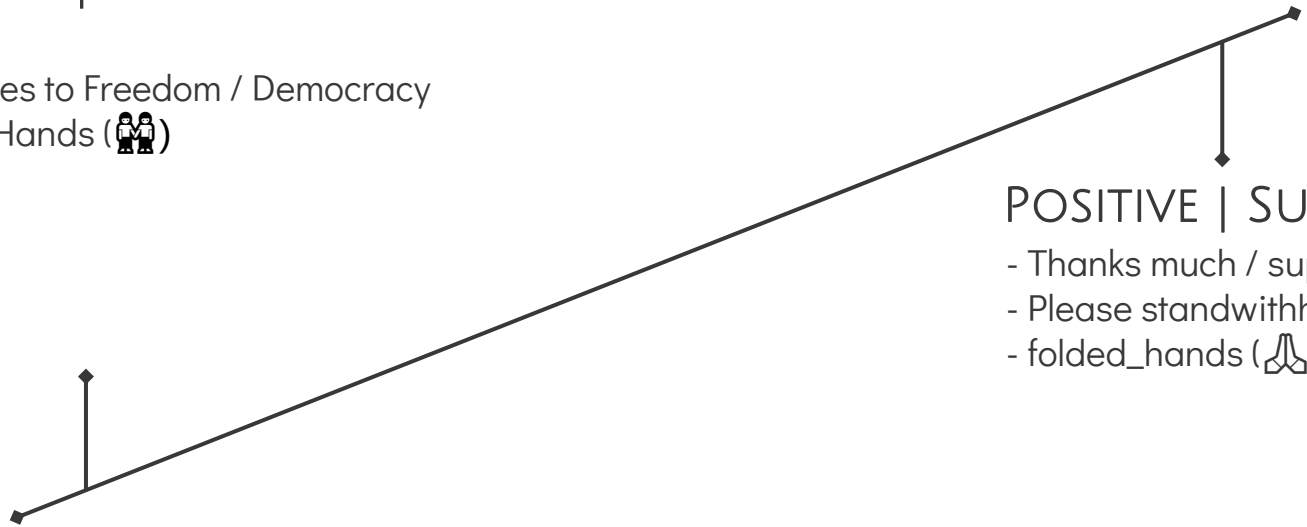
Especially given **negativity towards China**



Twitter EDA Take-Aways

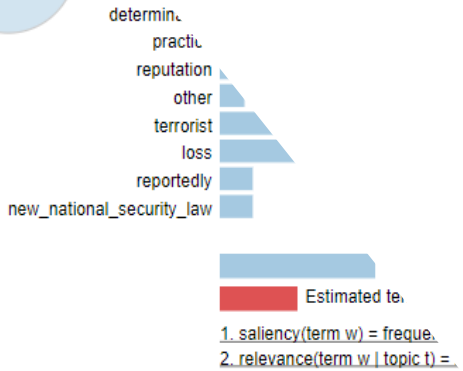
Negative | Summary

- Evil CCP
- References to Freedom / Democracy
- Holding Hands (👬)



Positive | Summary

- Thanks much / support / free world
- Please standwithhongkong / support
- folded_hands (🙏)



04

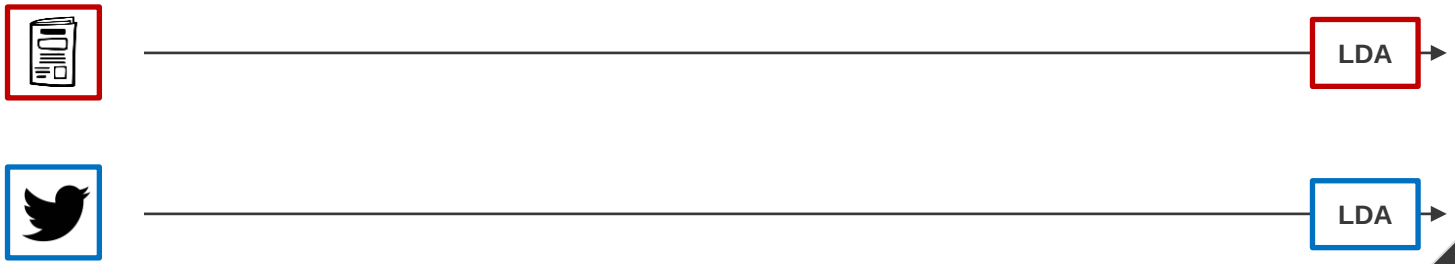
Model Description

Model Approach

- The modelling approach for the News (📰) & Twitter (🐦) is identical

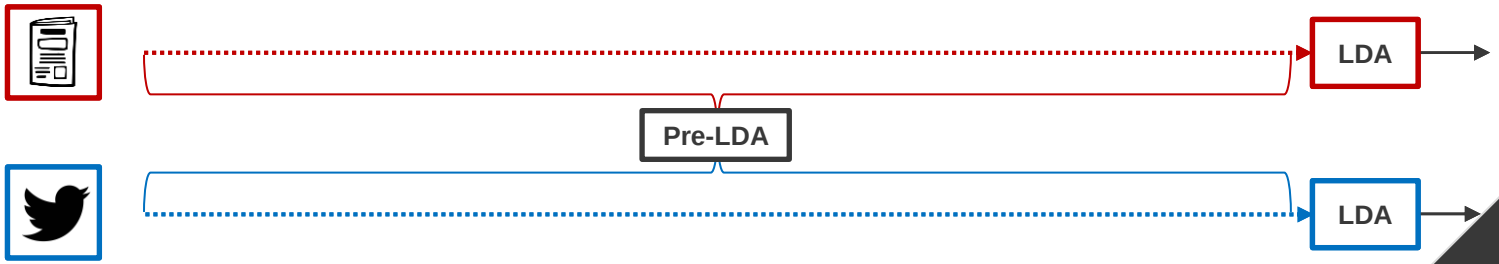
Model Approach

- The modelling approach for Twitter & News is identical
  - both use **Latent Dirichlet Allocation** ("**LDA**") to classify text



Model Approach

- The modelling approach for Twitter & News is identical
- Before they get to LDA, they do another "cleaning" process which we call Pre-LDA



Model Approach

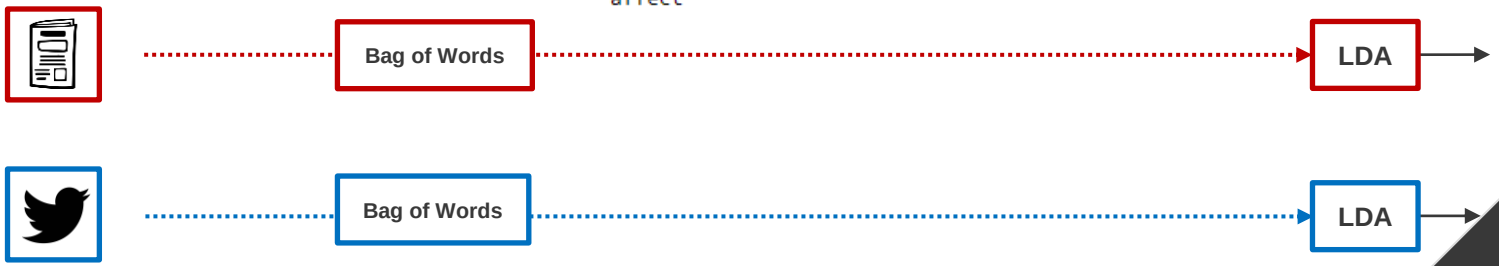
- The modelling approach for Twitter & News is identical
- Before they get to LDA, they do another "cleaning" process which we call Pre-LDA
  - **Bag of Words** | A **representation of text** that **describes the occurrence of words**; it disregards the order or structure, the occurrence is what matters

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

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

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

```
affect
```



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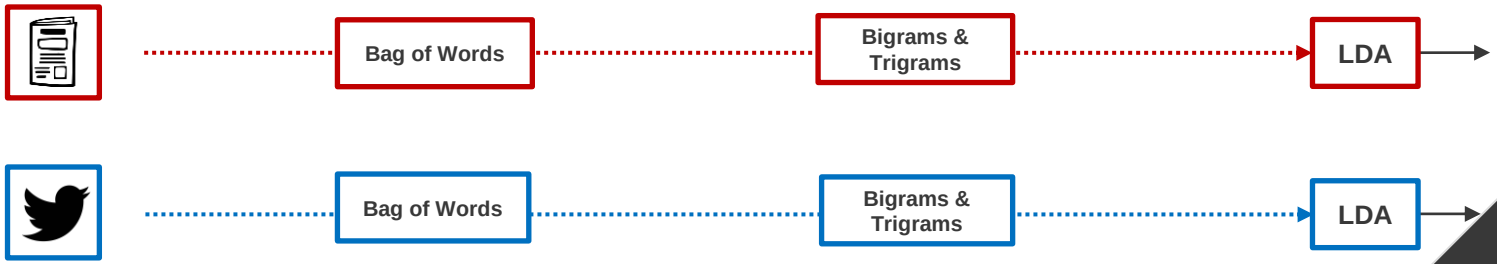
  - Bag of Words | A representation of text that describes the occurrence of words; it disregards the order or structure, the occurrence is what matters
  - **Bigrams & Trigrams** | **sequences of two (2) or three (3) words respectively**; it's efficient to identify occurrences of groups of **words appearing together**

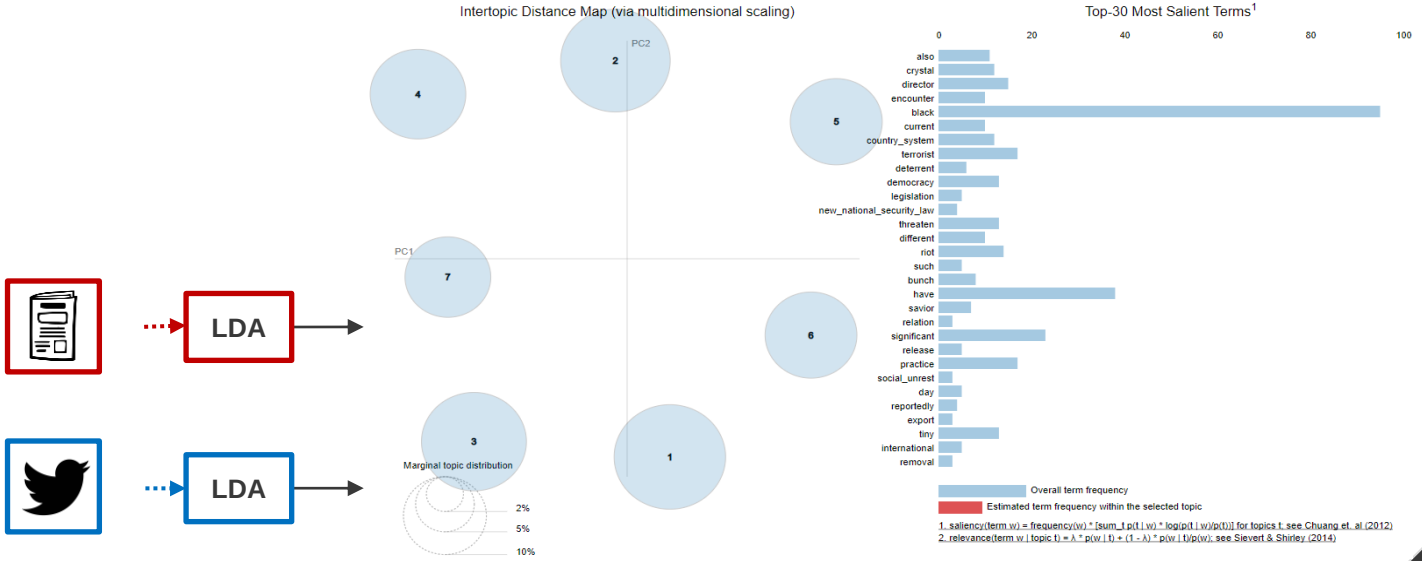
```
# below is a bigram & trigram
print(data_bigrams_trigrams[16][0:2])
```

```
['hong_kong', 'national_security_law']
```



Model Approach

- The modelling approach for Twitter & News is identical
- Before they get to LDA, they do another "cleaning" process which we call Pre-LDA
- **Then sent to LDA &** subsequently **the pyLDAvis** which is a topic model visualization tool. An initial glimpse of how many topics there are & which words are assigned to them is achieved here



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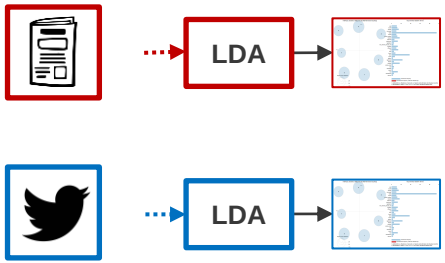
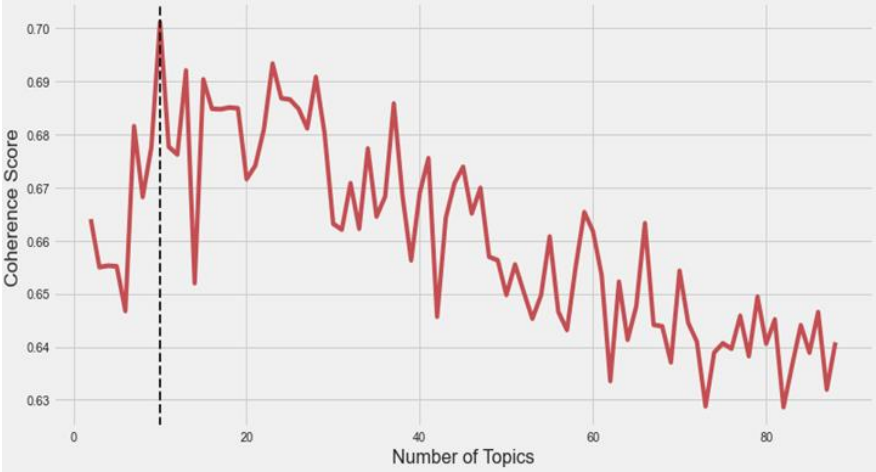
- **Determining the optimal number of topics, a Coherence Score is calculated** measuring the degree of semantic similarity; In other words, **a set of statements or facts that support each other are said to be coherent**





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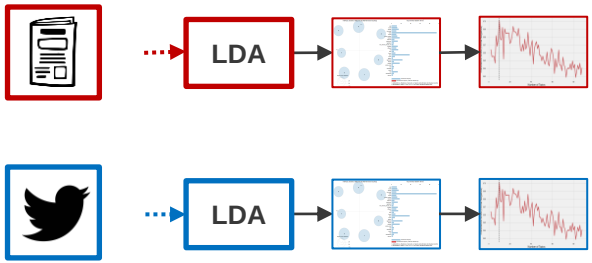
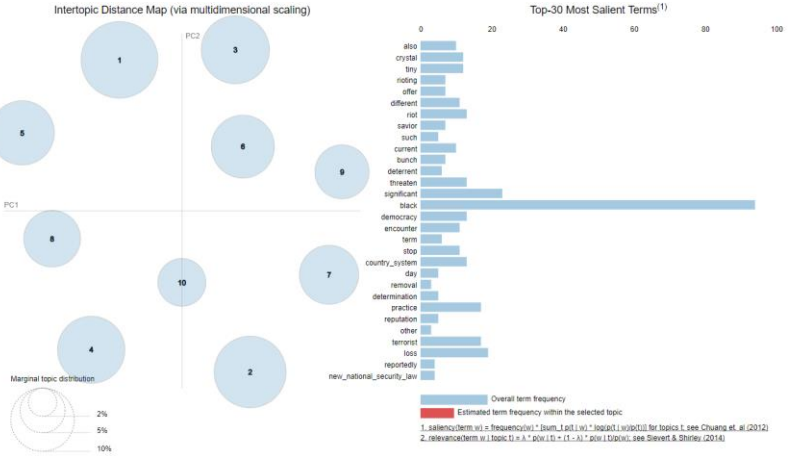
- Determining the optimal number of topics, a Coherence Score is calculated measuring the degree of semantic similarity; In other words, a set of statements or facts that support each other are said to be coherent.
- **With the Coherence Score, the LDA & pyLDAvis process is done again** with the optimal number **& an investigation of each those topics is reviewed**



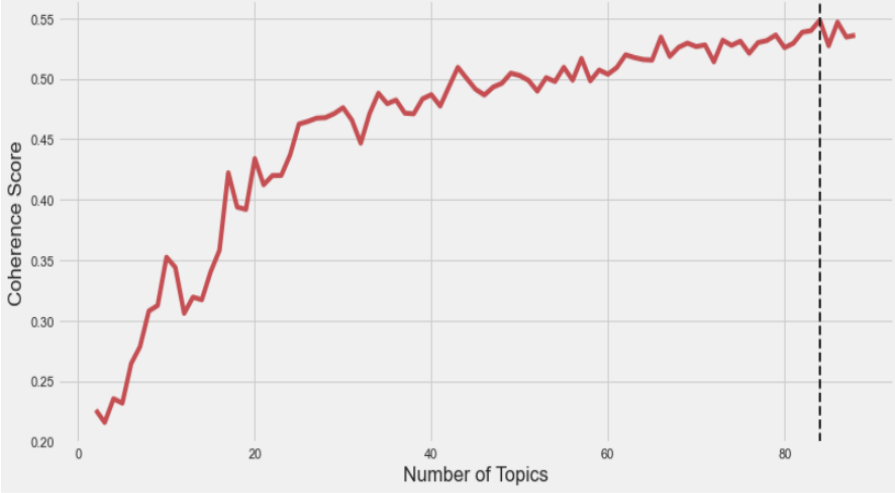


05

MODEL FINDINGS

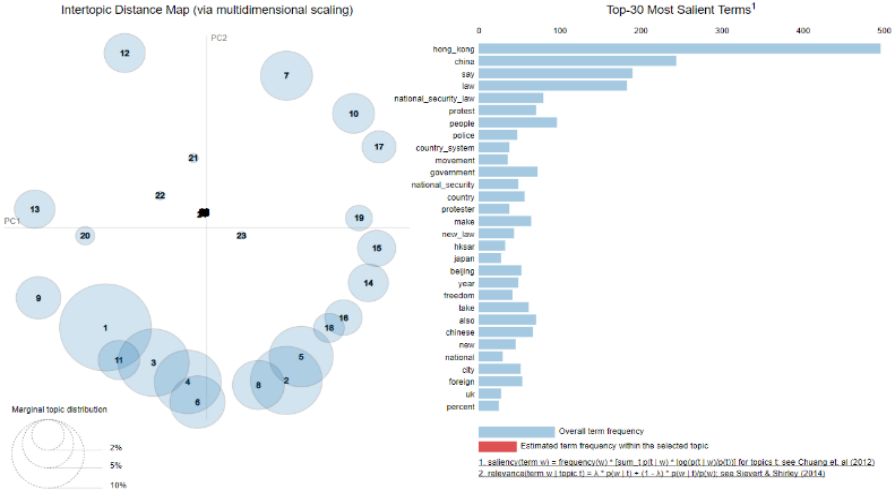
News | Initial Findings

- The 30 News Articles presented 84 Topics as the ideal breakdown



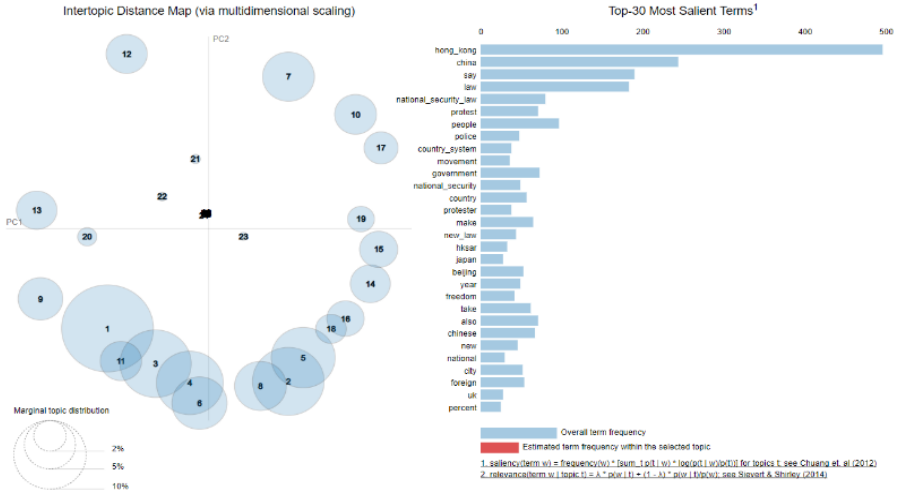
News | Initial Findings

- The 30 News Articles presented 84 Topics as the ideal breakdown
  - The **sizes vary** in size
  - **Distance between the center** for many indicates some are distinct while **21+ hover in the center**
  - A **notable amount of overlap** is presented



News | Initial Findings

- The 30 News Articles presented 84 Topics as the ideal breakdown
- Removing the 21 topics given their proximity to the center & size is an option, **another option was decided to better handle the LDA Modeling process** on the News Articles



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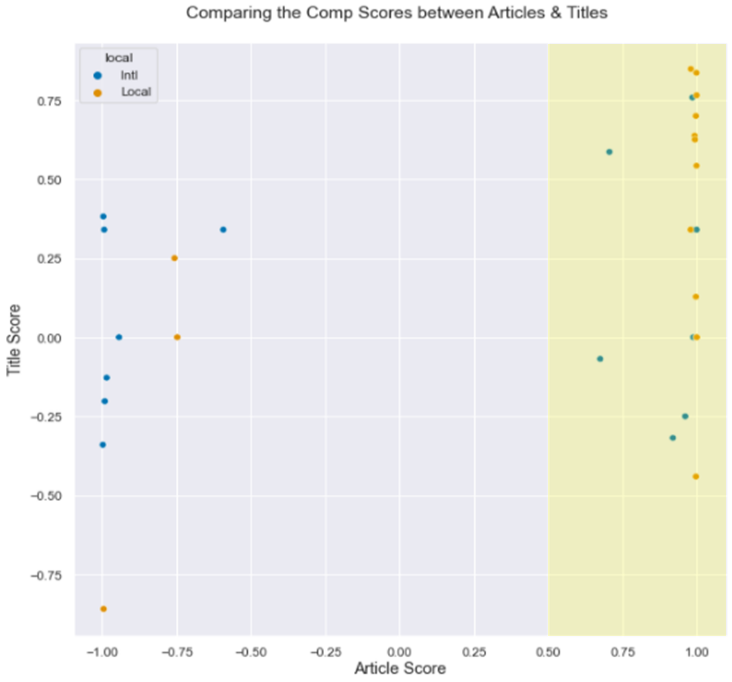
- Heading back to EDA, we have **four** (4) **categories**:
  - China & International **Positive** x2



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  - China & International Positive x2
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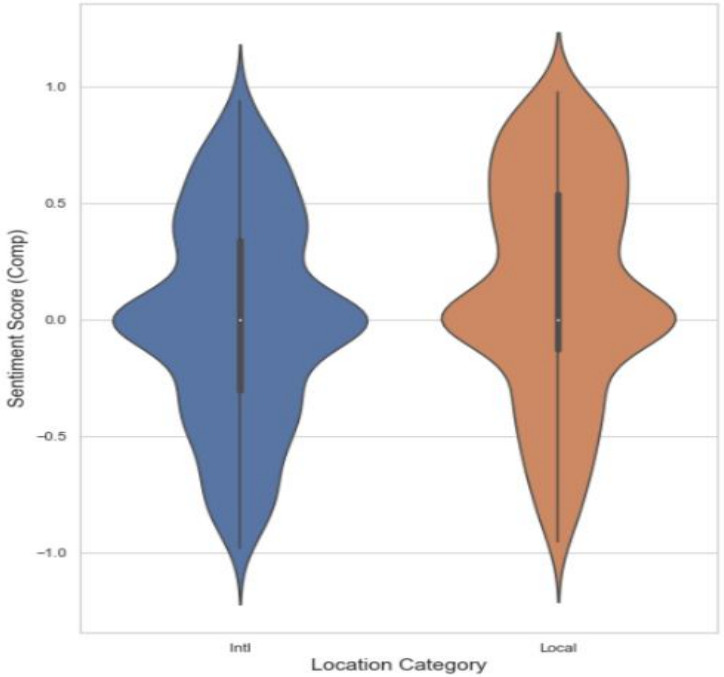

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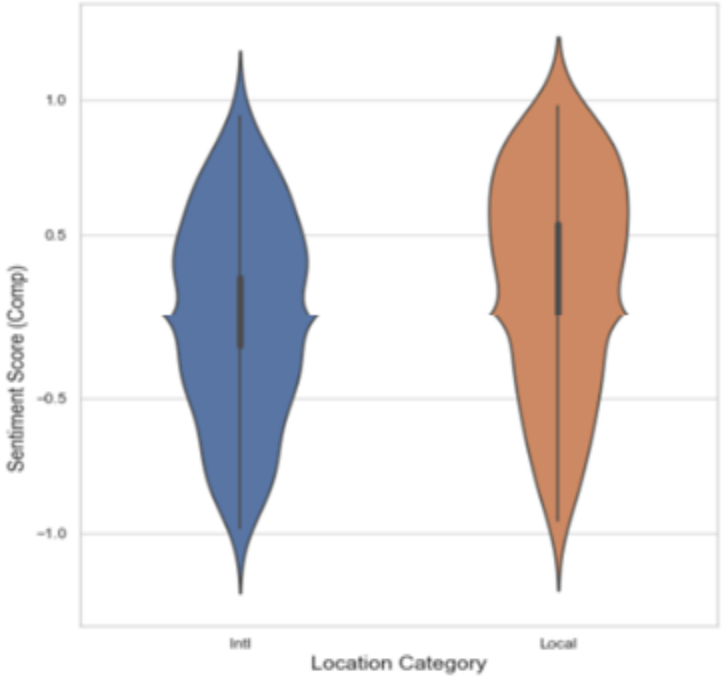
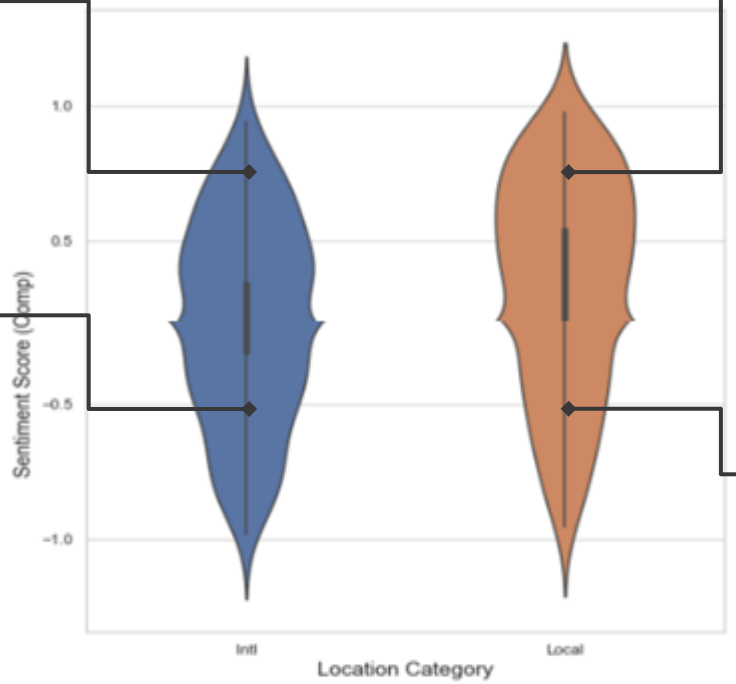
  - Neutrals were removed



News | Initial Findings

Int'l Positive

Int'l Negative

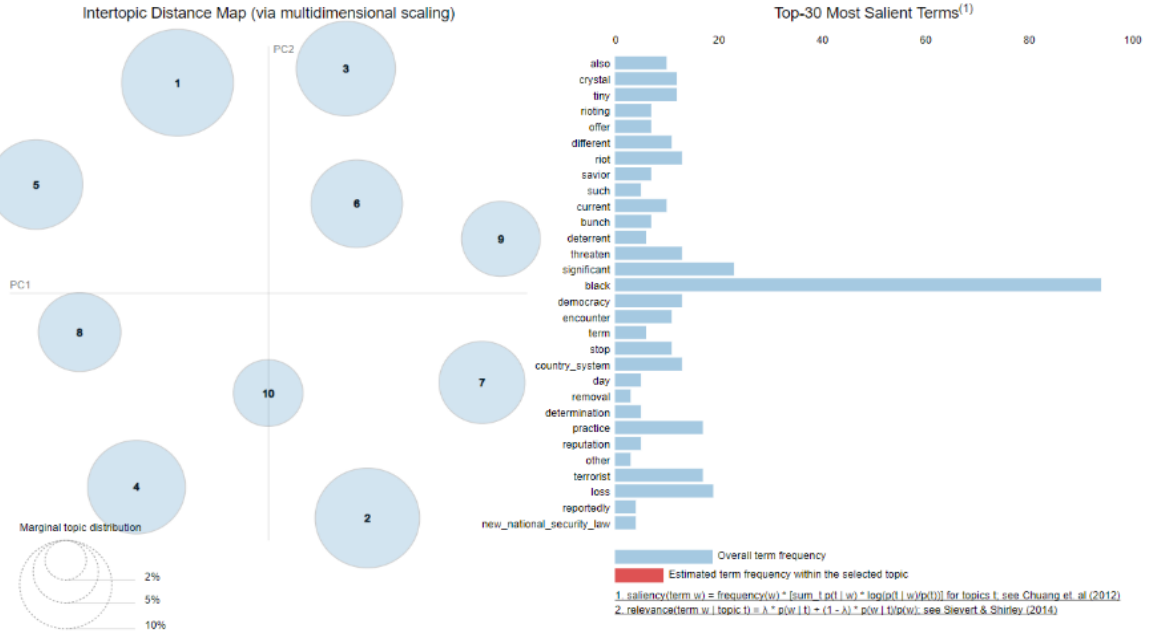


China Positive

China Negative

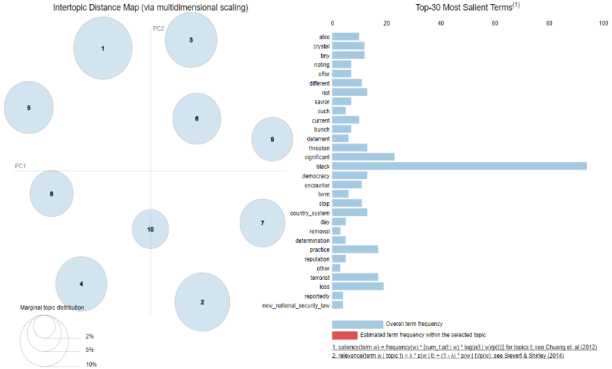
News | China Negative

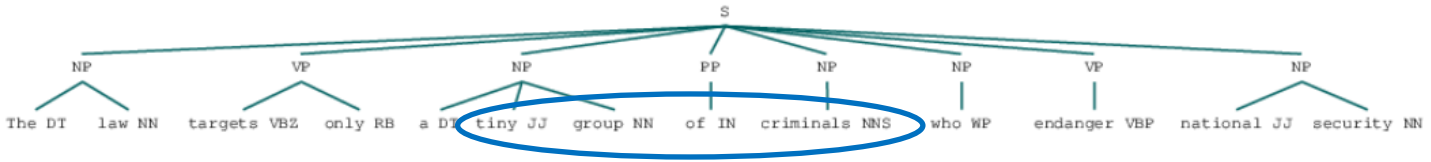
- The Coherence Score had **10 Topics**



News | China Negative

- The Coherence Score had 10 Topics
- A summary* is highlighted below:
  - The NSL intents is to target a **small group** of criminals





** A larger subset of examples in both the Report & Source Code*

News | China Negative

- The Coherence Score had 10 Topics
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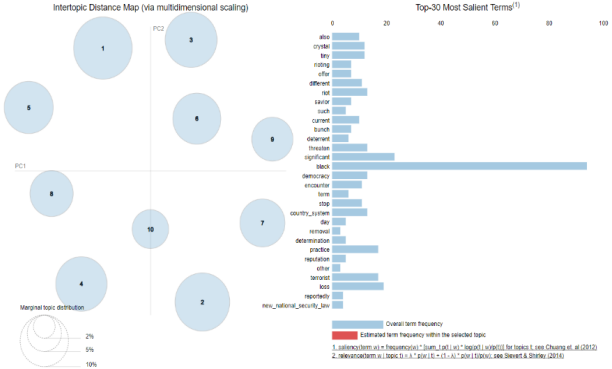
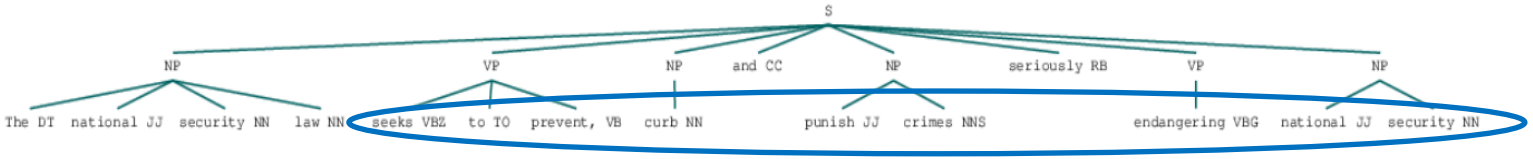
  - The NSL intents is to target a small group of criminals
  - NSL's intent is to heal HK from previous violence





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News | China Negative

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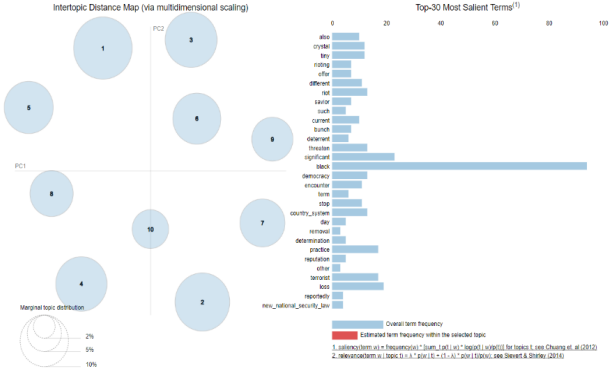
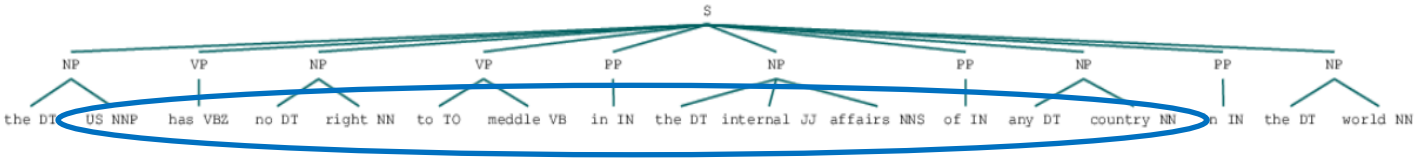
  - Discontent of the US for meddling in their affairs





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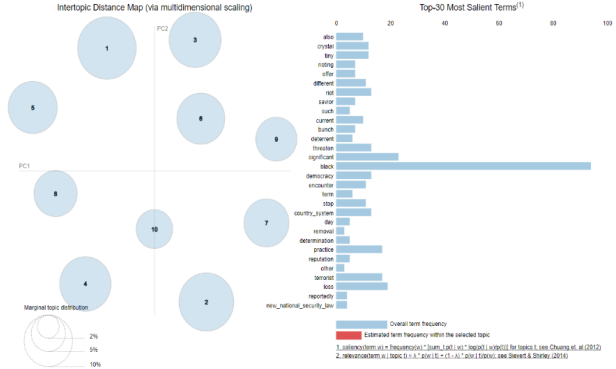
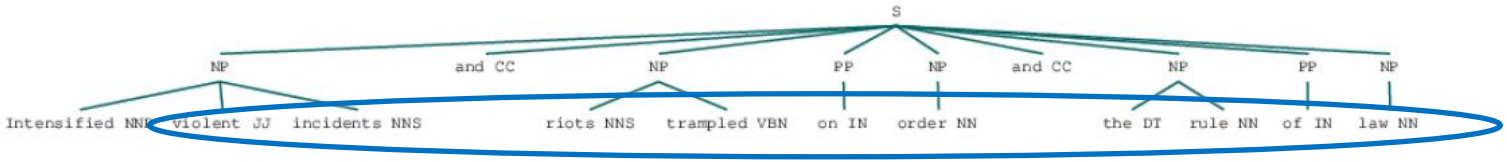
  - Protestors **criminal activity**

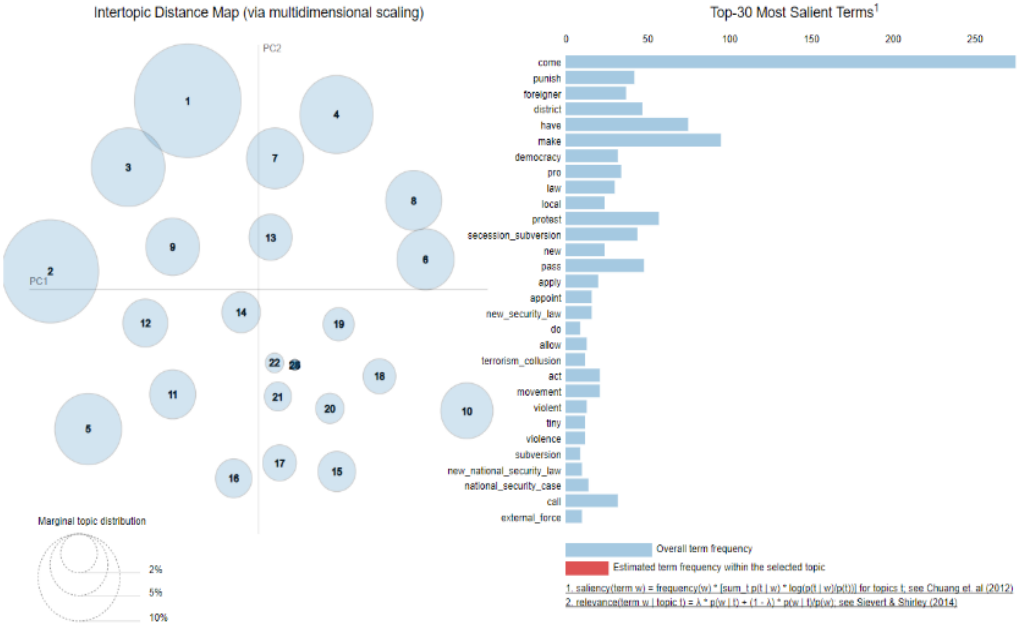




** A larger subset of examples in both the Report & Source Code*

News | Int'l Negative

- The Coherence Score had 47 Topics
  - 10 that had 7+ observations shortlisted



News | Int'l Negative

- The Coherence Score had 47 Topics
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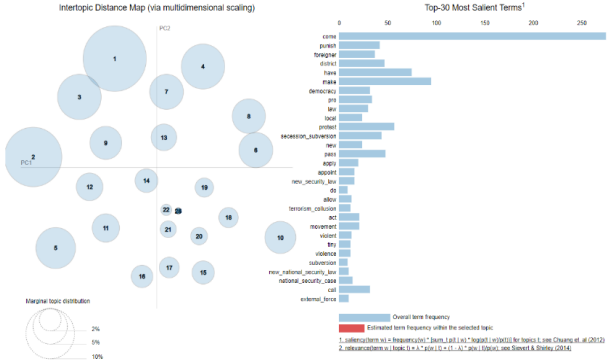
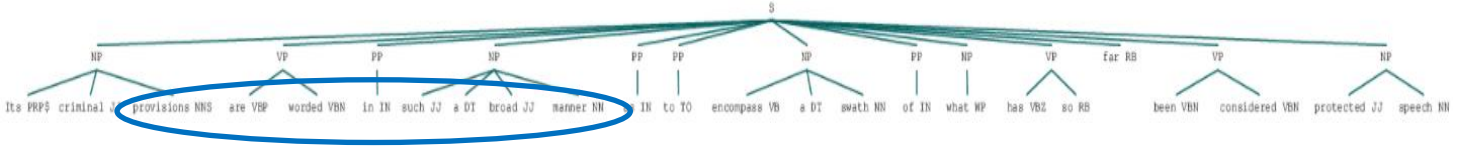
- The summary is highlighted below:
  - The NSL is vaguely worded





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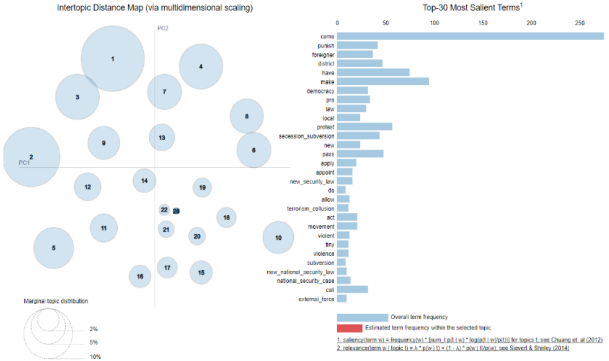

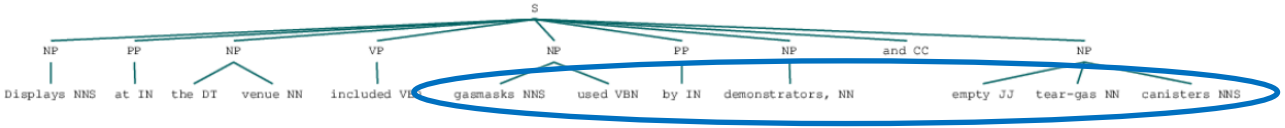

** A larger subset of examples in both the Report & Source Code*

News | Int'l Negative

- The Coherence Score had 47 Topics
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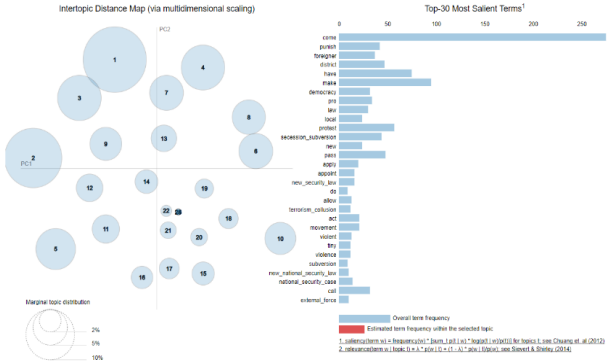
- The summary is highlighted below:
  - The NSL is vaguely worded
  - Tactics of the protestors
  - The **NSL undermines the OcTs system**



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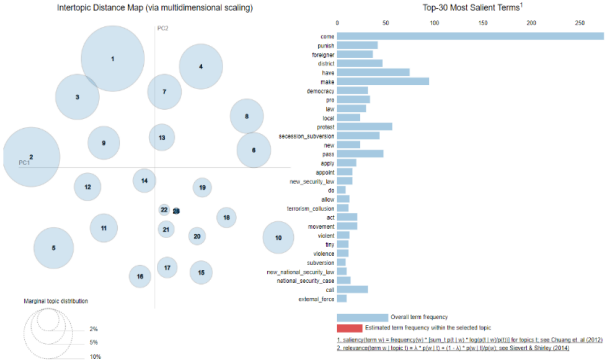
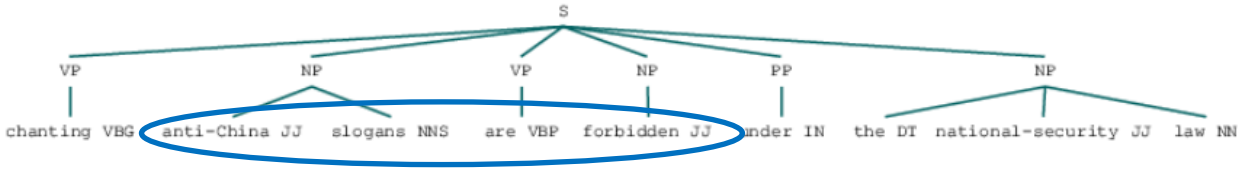
- The summary is highlighted below:
  - The NSL is vaguely worded
  - Tactics of the protestors
  - The NSL undermines the OcTs system
  - Possible **suppression of free speech**

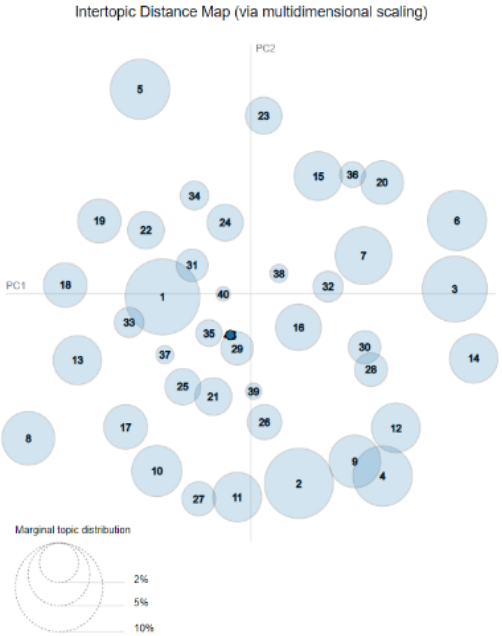


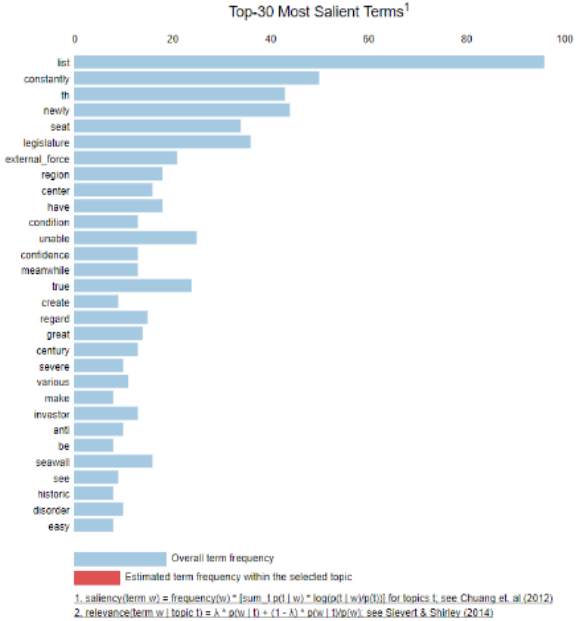


** A larger subset of examples in both the Report & Source Code*

News | China Positive

- The Coherence Score had **48 Topics**
  - **Top 25%** contributors were **shortlisted: 12**





News | China Positive

- The Coherence Score had 48 Topics
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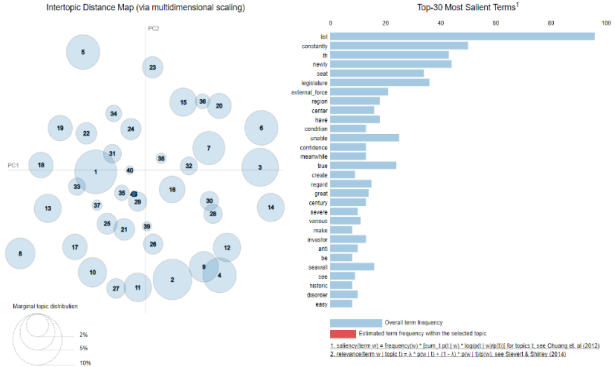
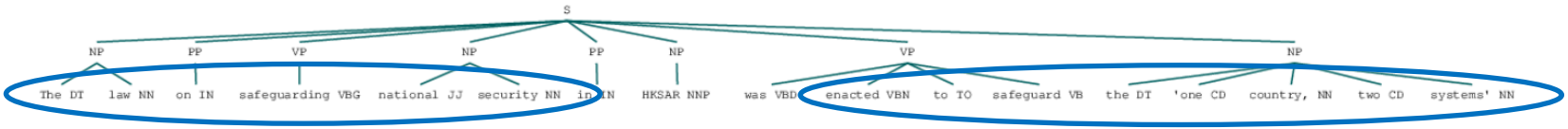
- The summary is highlighted below:
  - The NSL is about **safeguarding national security**





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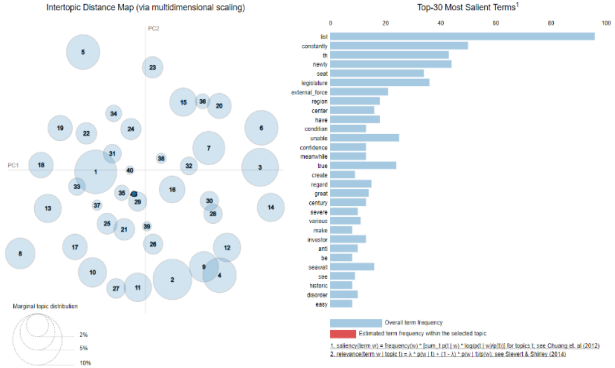

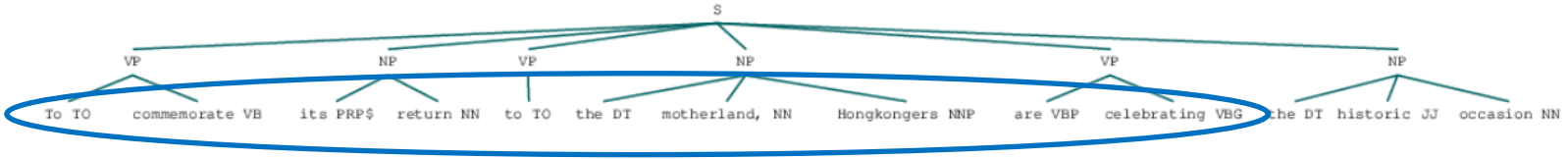

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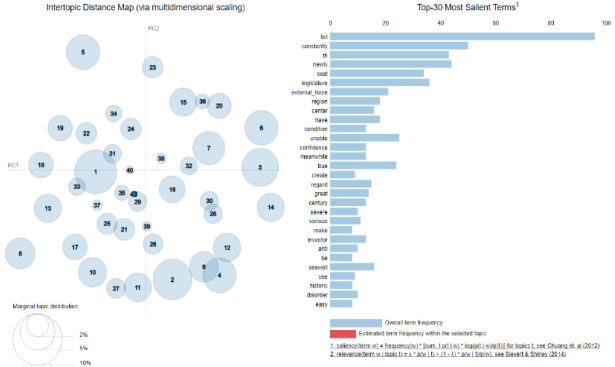

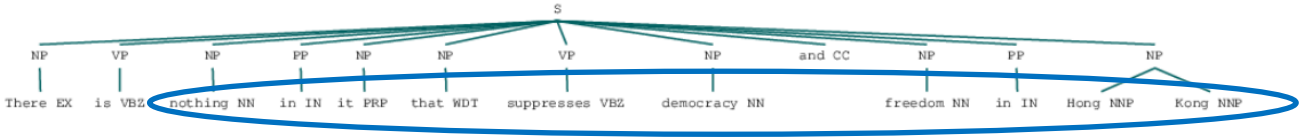

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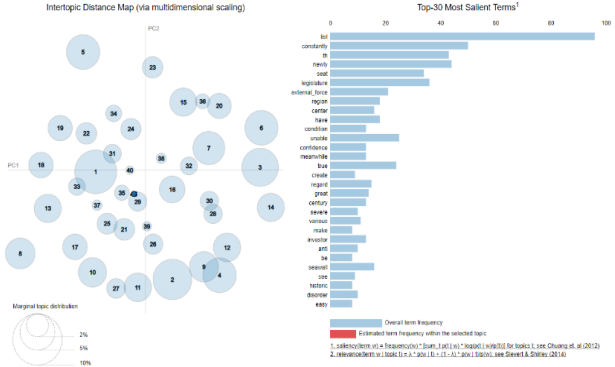

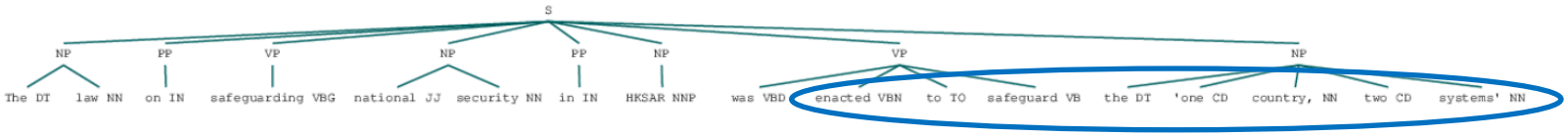

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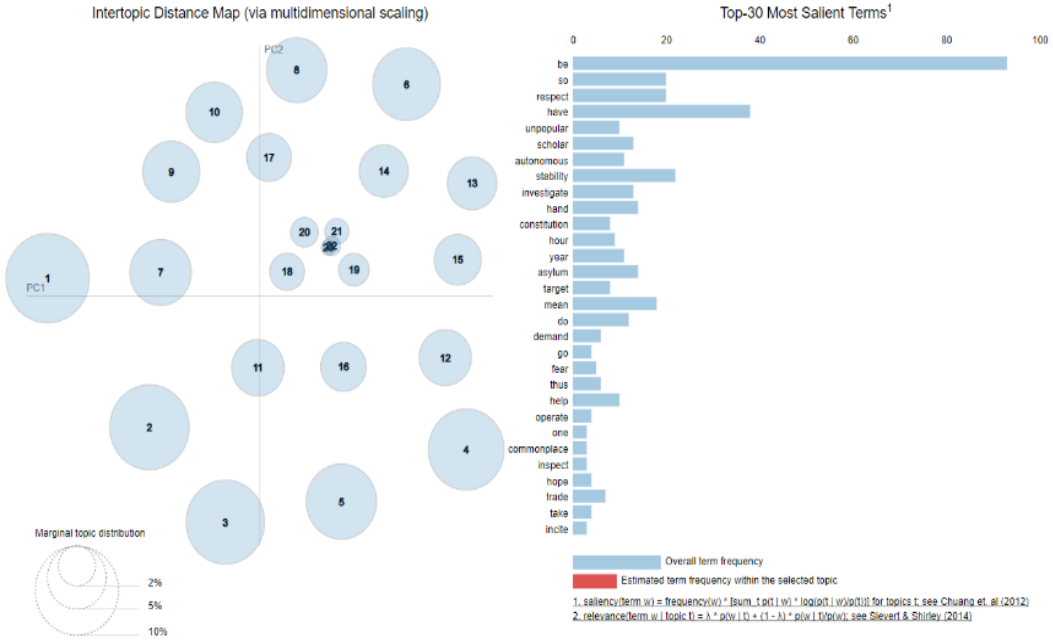
News | Int'l Positive

- The Coherence Score had **23 Topics**
  - **17 that had 10+ observations shortlisted**



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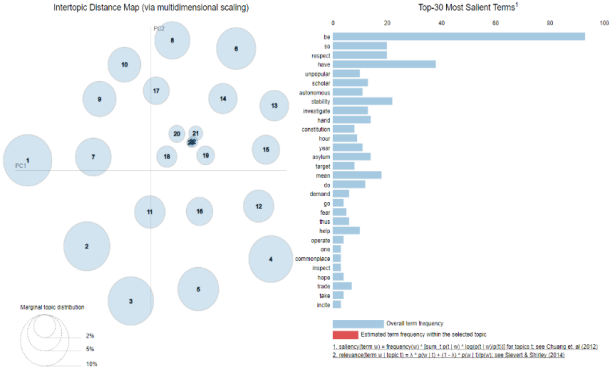

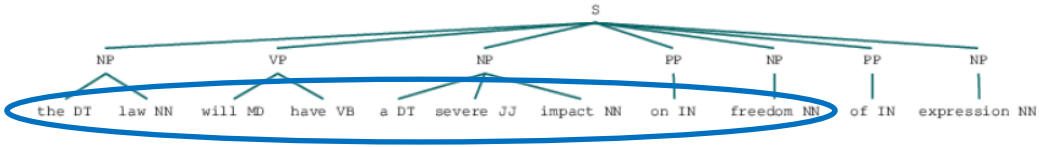

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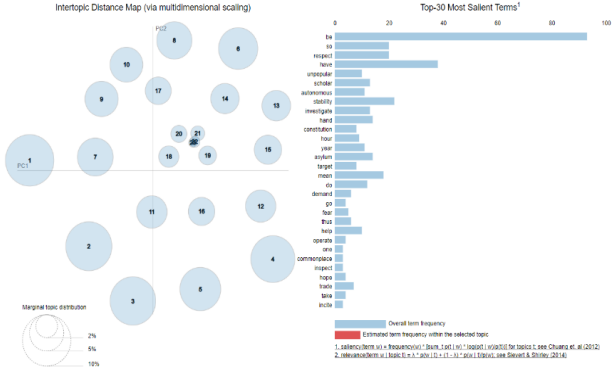

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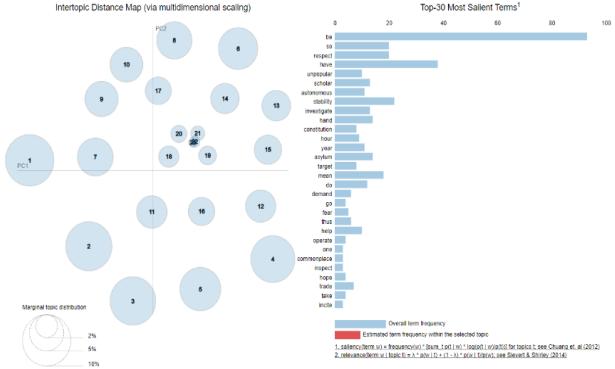

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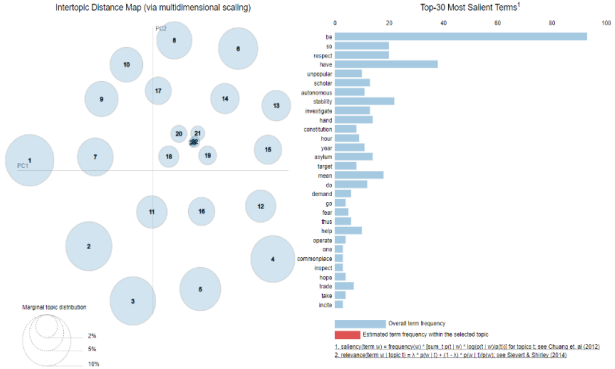
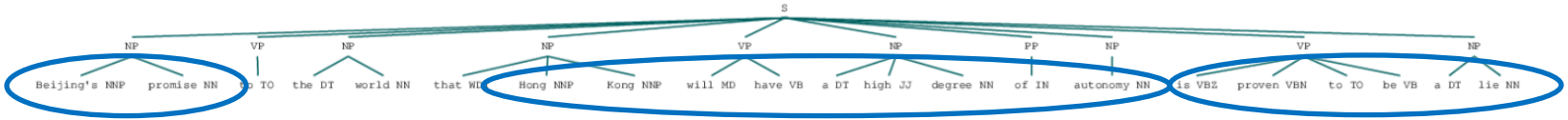
  - **Mentions of Beijing's position** of safeguarding security





** A larger subset of examples in both the Report & Source Code*

News Modeling Take-Aways

China | Positive

- The NSL is to **safeguard** the majority of HK
- **HK people celebrate** the return to China
- The NSL will **not infringe on OcTs**

Int'l | Positive

- **Great deal of positive words** without a possible positive intent
- Mentions of **NSL supporters in HK**
- Mentions of **Beijing's position**

China | Negative

- The **violence of protestors**
- **Interference in China** & HK's internal **affairs**
- China's belief that the **NSL will lead to long term stability & prosperity in HK**

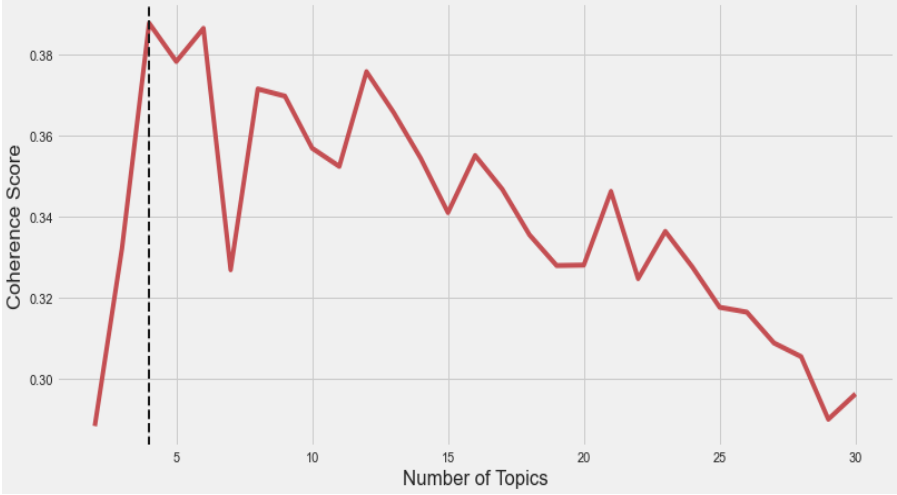
Int'l | Negative

- NSL's **infringement on Common Law**
- Credence towards the **vagueness of the language** used in the NSL
- **Actions & tactics of protestors**

** Int'l is short for International*

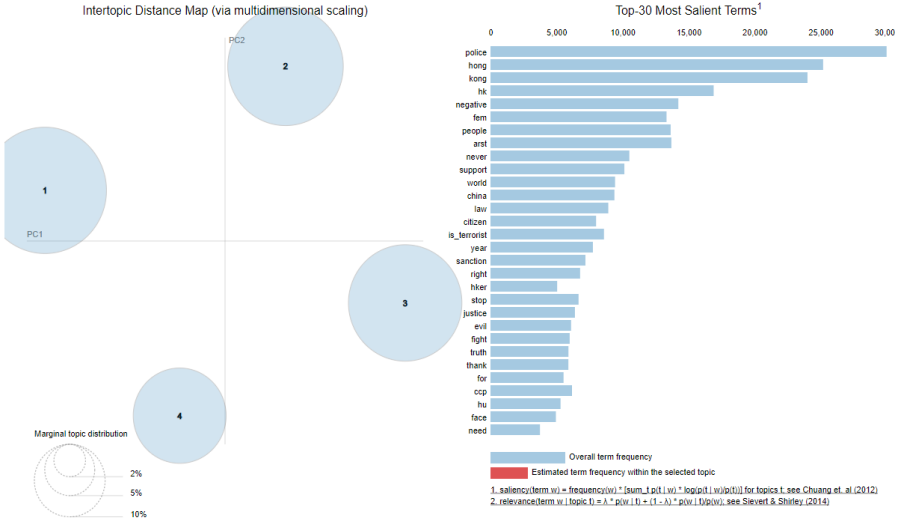
Twitter | Initial Findings

- The 163,699 Tweets presented 4 Topics as the ideal breakdown



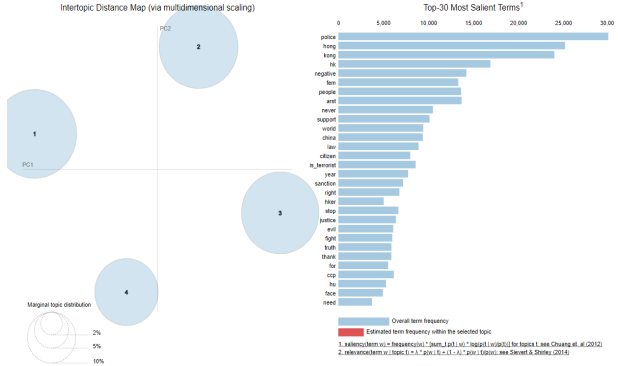
TWITTER | INITIAL FINDINGS

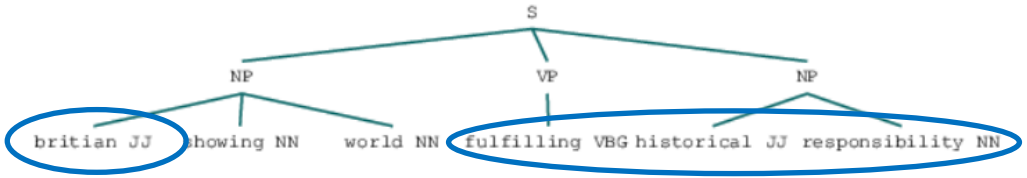
- The 163,699 Tweets presented 4 Topics as the ideal breakdown
  - The sizes **appear similar in size**
  - **Distance to the center suggest unique**
  - **No overlap** observed



TWITTER | TOPIC ONE

- The summary* is highlighted below:
  - Appreciation for support from the world

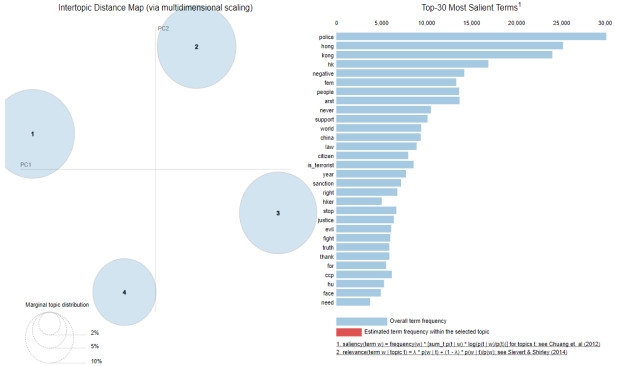


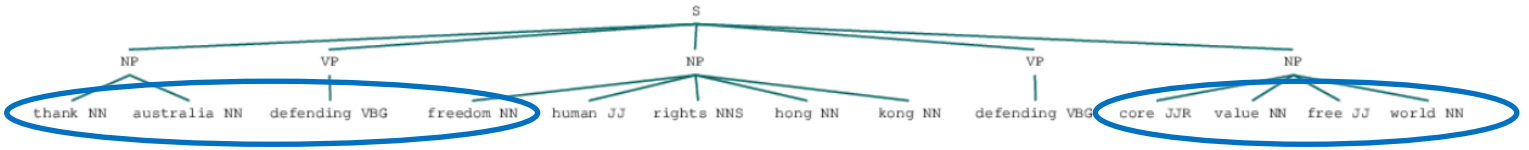


** A larger subset of examples in both the Report & Source Code*

TWITTER | TOPIC ONE

- The summary* is highlighted below:
  - Appreciation for support from the world
  - Mentions of **support from the free world**

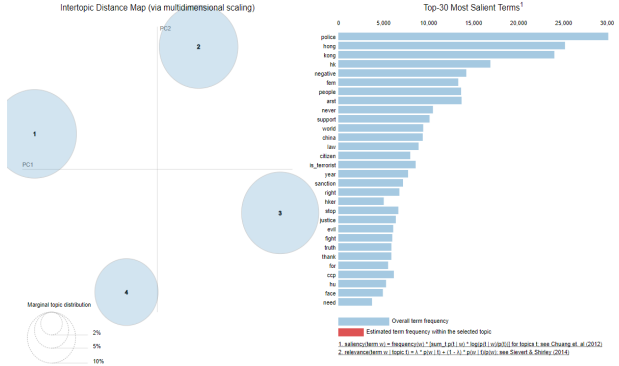


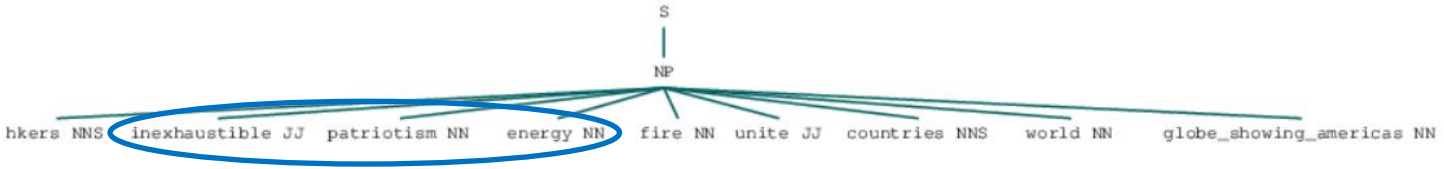


** A larger subset of examples in both the Report & Source Code*

TWITTER | TOPIC TWO

- The summary* is highlighted below:
  - Protestors **sense of comradery**

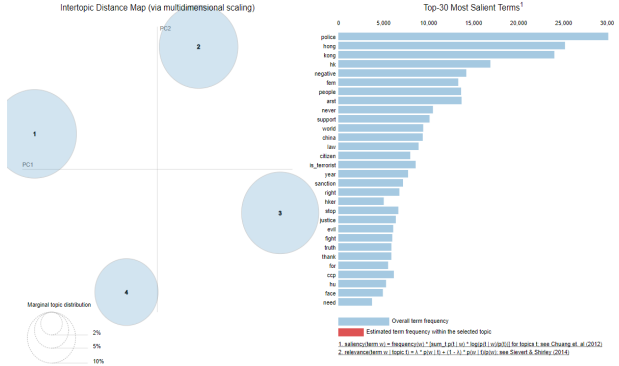


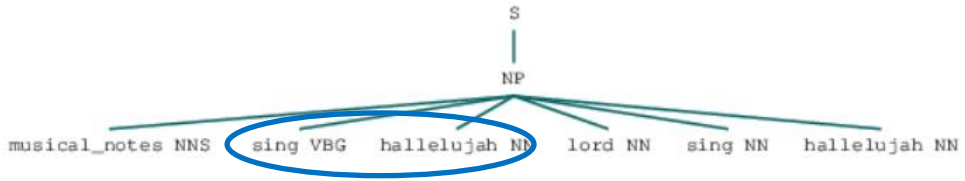


** A larger subset of examples in both the Report & Source Code*

TWITTER | TOPIC TWO

- The summary* is highlighted below:
  - Protestors sense of comradery
  - **Usage of positivity** to achieve their goals





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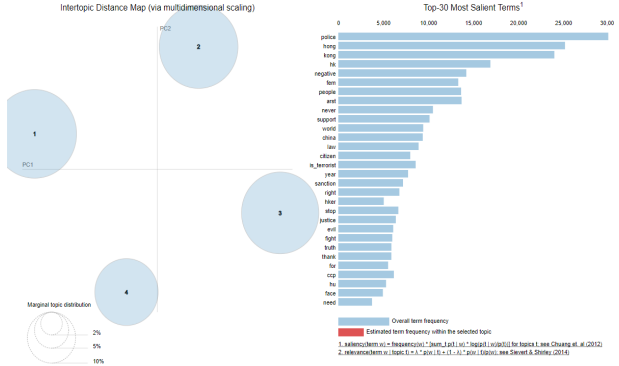
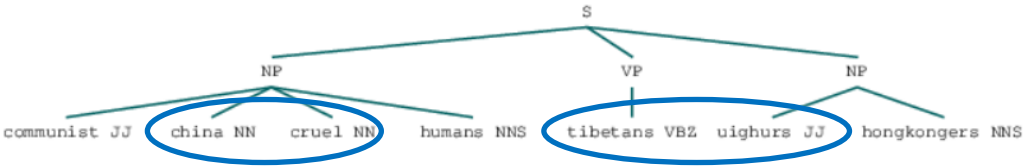
TWITTER | TOPIC THREE

- The summary* is highlighted below:
  - Vocalize **their opinion** towards what they **believe China's goal is**

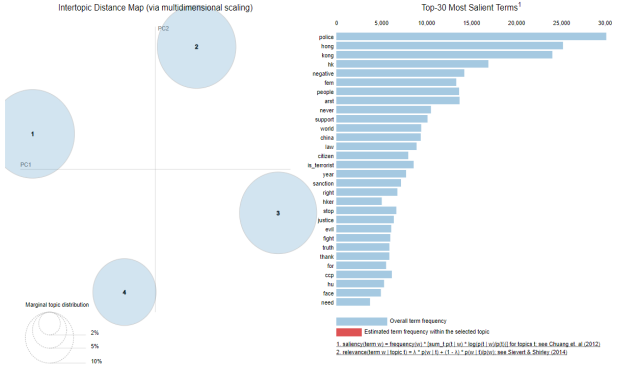


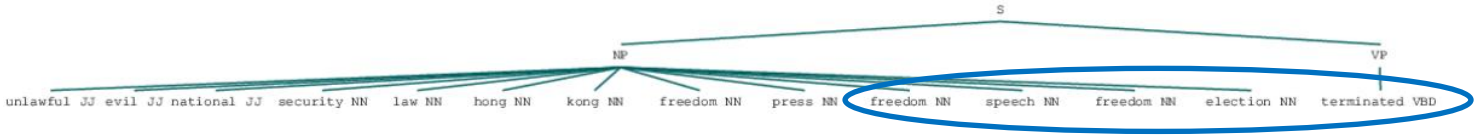


** A larger subset of examples in both the Report & Source Code*

TWITTER | TOPIC THREE

- The summary* is highlighted below:
  - Vocalize their opinion towards what they believe China's goal is
  - **Belief that the NSL** will set **limitations on** their **freedom**





** A larger subset of examples in both the Report & Source Code*

TWITTER | TOPIC THREE

- The summary* is highlighted below:
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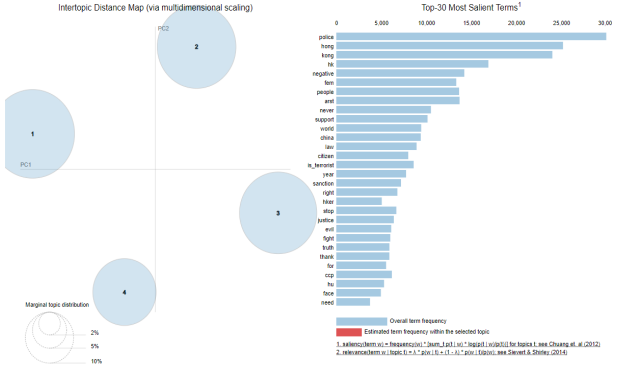
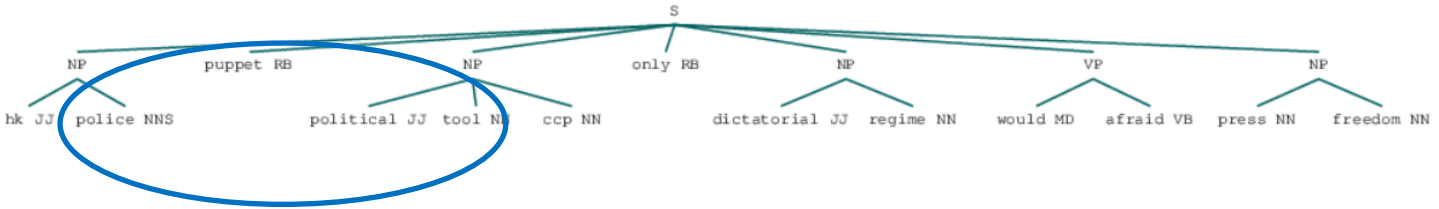
  - Belief that the NSL will set limitations on their freedom
  - **Belief that the HK police are puppets**

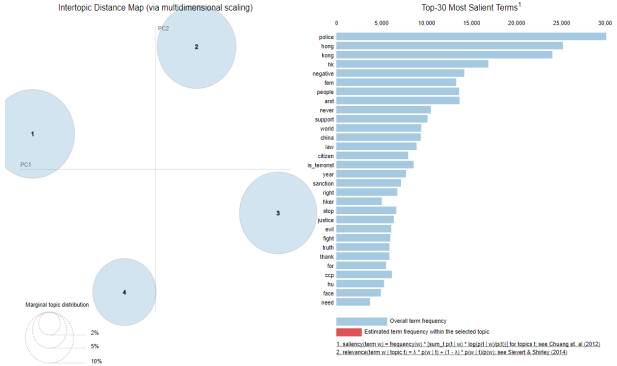


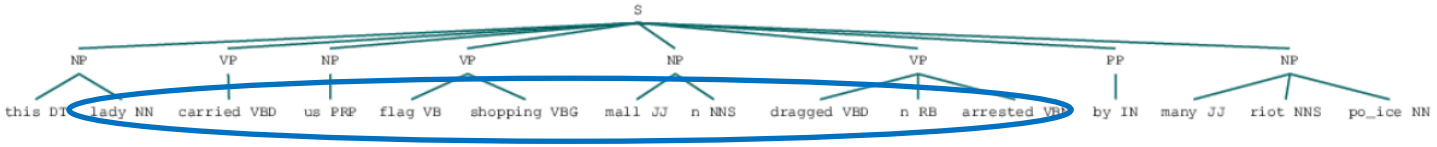


** A larger subset of examples in both the Report & Source Code*

Twitter | Topic Four

- The summary* is highlighted below:
  - Arrests

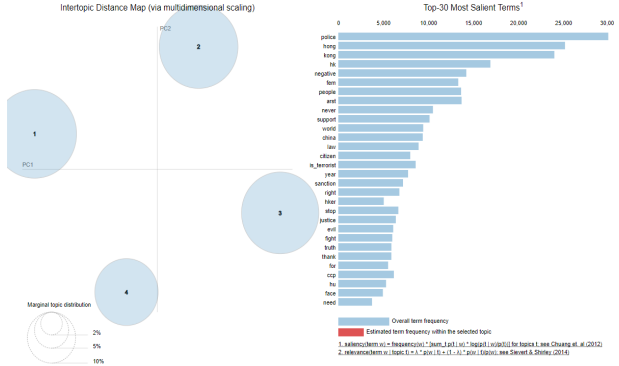


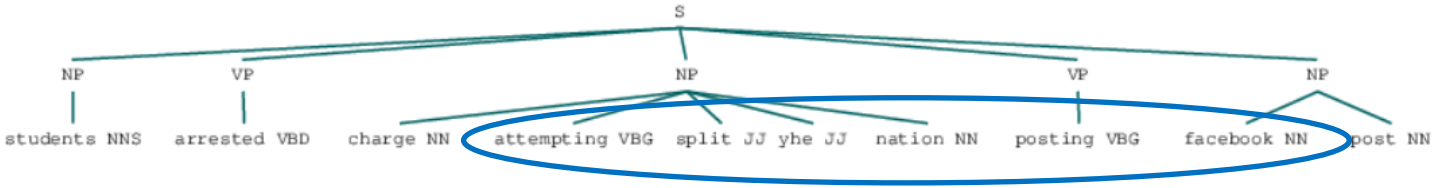


** A larger subset of examples in both the Report & Source Code*

Twitter | Topic Four

- The summary* is highlighted below:
  - Arrests
  - **Confrontations with legal authorities** with charges





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Twitter | Topic Four

- The summary* is highlighted below:
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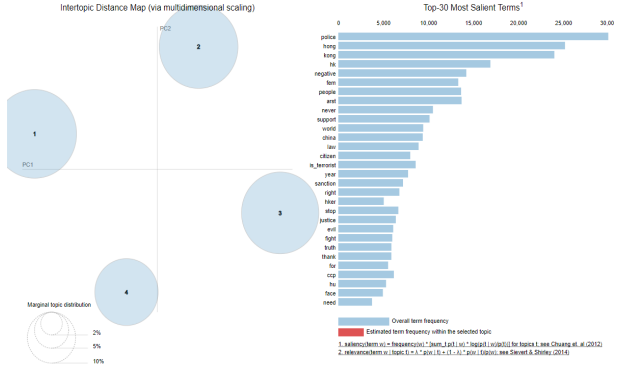
  - Confrontations with legal authorities with charges
  - Police left while **gangsters came in**



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Twitter | Topic Four

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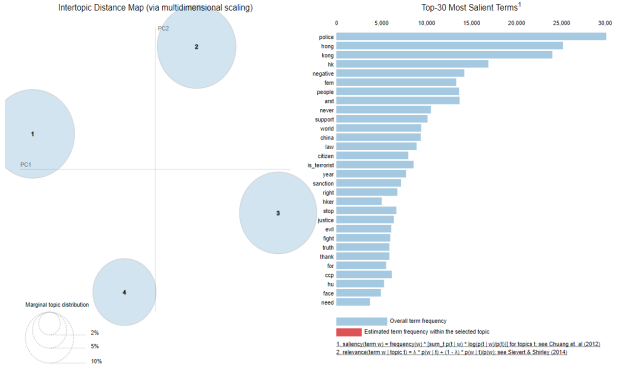
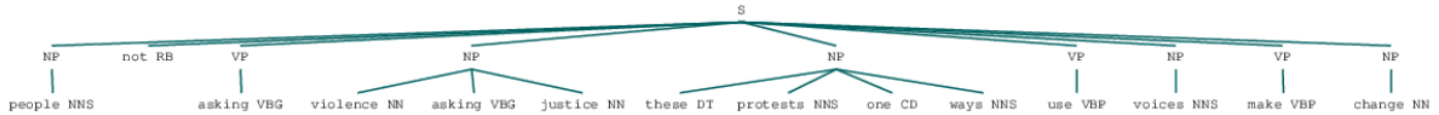
  - Confrontations with legal authorities with charges
  - Police left while gangsters came in
  - Protestors belief that **the media confuses their intentions**





** A larger subset of examples in both the Report & Source Code*

Twitter Modeling Take-Aways

Topic 1

- Appreciation for support from abroad
- Helping their perceived fight for freedom

Topic 2

- Comradery towards their fight
- Usage of positive Emoji's

Topic 3

- Their negative opinion towards what they believe China's goal with the NSL is
- Belief that the HK police are puppets

Topic 4

- Police & legal authorities confrontations
- The protestors belief that the media confuses their intentions

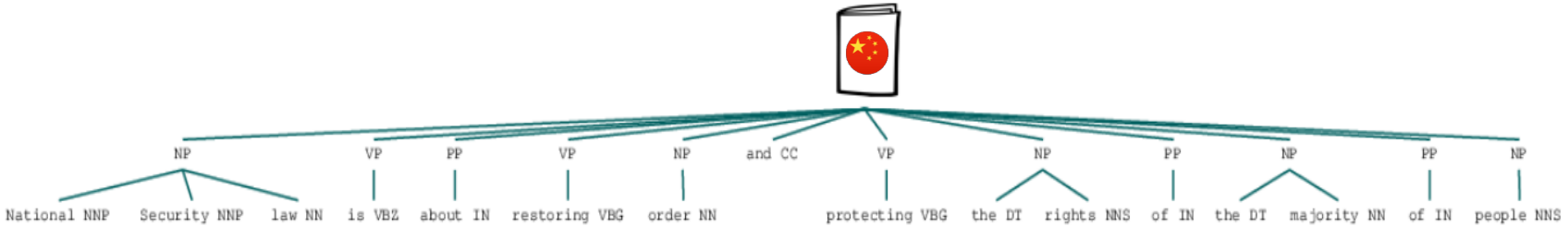
** Int'l is short for International*

06

READ BETWEEN THE LINES ("RBL")

RBL | Bringing Them All Together

- 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



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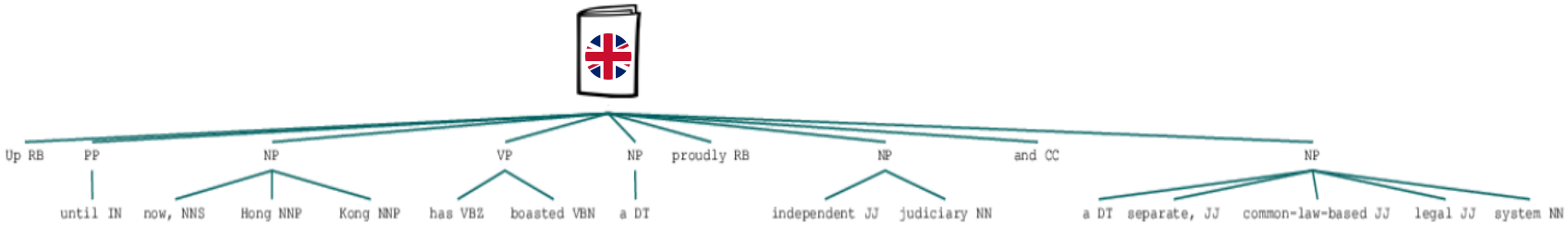
RBL | Bringing Them All Together

- 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 while conversely the **Int'l community believe the NSL infringes on Common Law & will infringe on HK's freedom**



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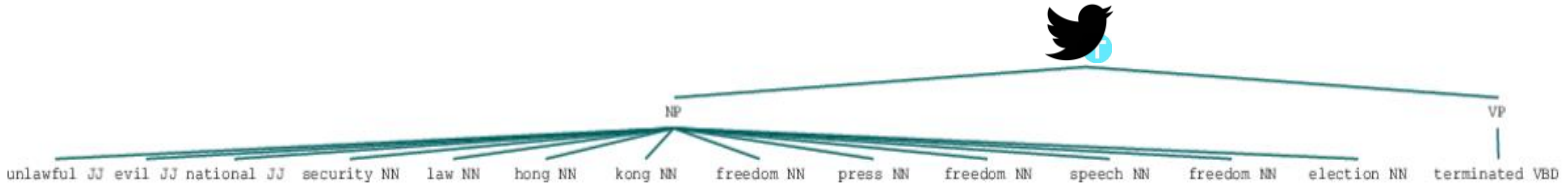
RBL | Bringing Them All Together

- 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 while conversely the Int'l community believe the NSL infringes on Common Law & will infringe on HK's freedom; including the Tweeters



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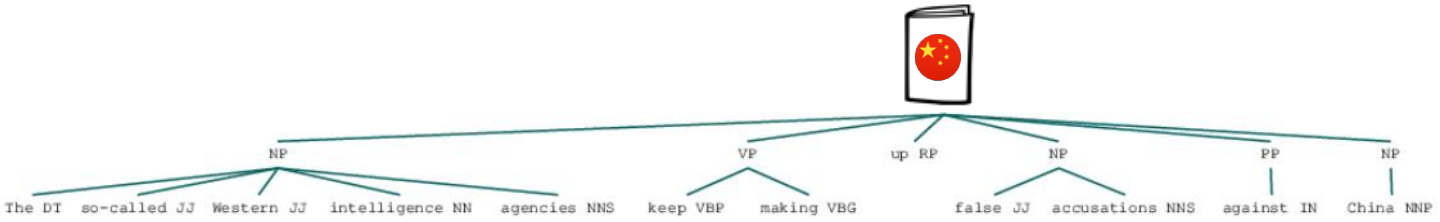
  - China believes the Int'l community have a misunderstanding of the pure intent of the NSL.



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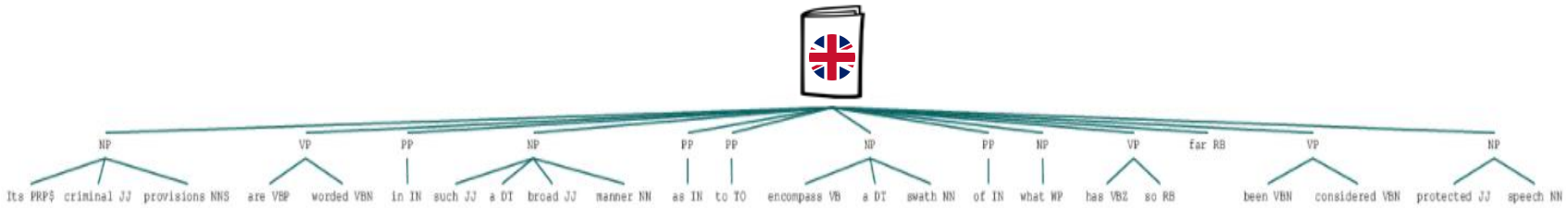
  - China believes the Int'l community have a misunderstanding of the pure intent of the NSL. **Int'l News believes the NSL has vague wordage to possibly serve other intentions**.



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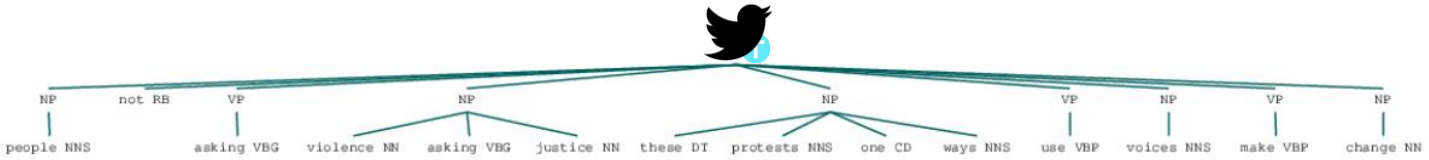

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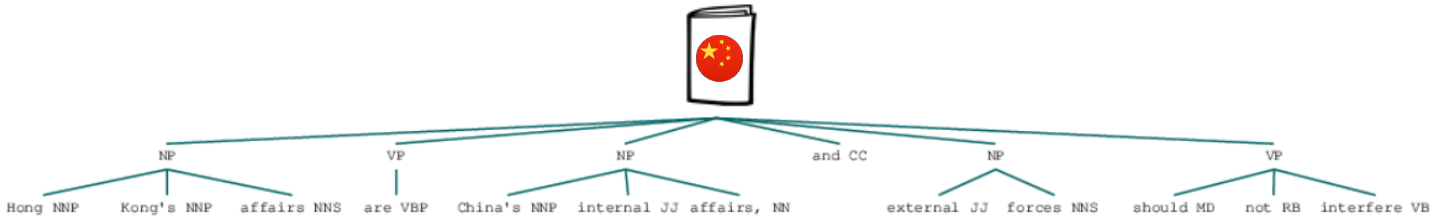
  - China believes that the Int'l community should stay out of Chinese affairs



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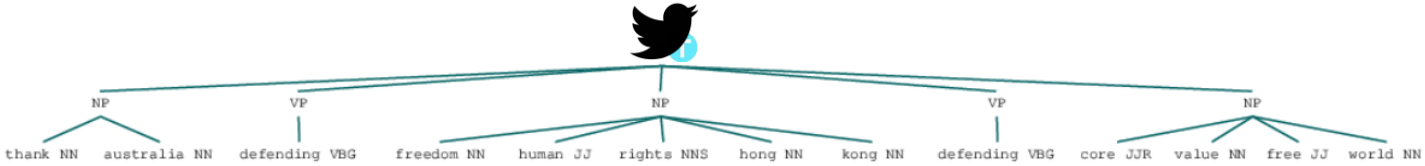
  - China believes that the Int'l community should stay out of Chinese affairs & **the Tweeters are thankful for the support from the Int'l community**



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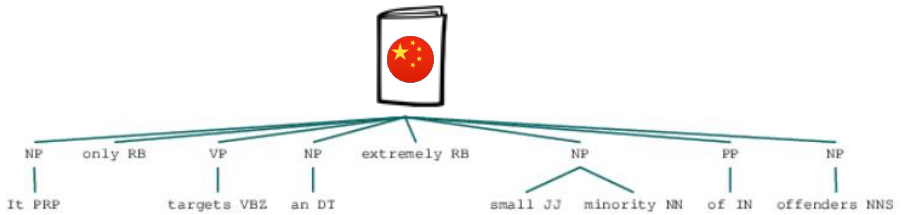
  - China believes that the Int'l community should stay out of Chinese affairs & the Tweeters are thankful for the support from the Int'l community
  - China's position on police engagement is justified & only targets a minority of criminals.



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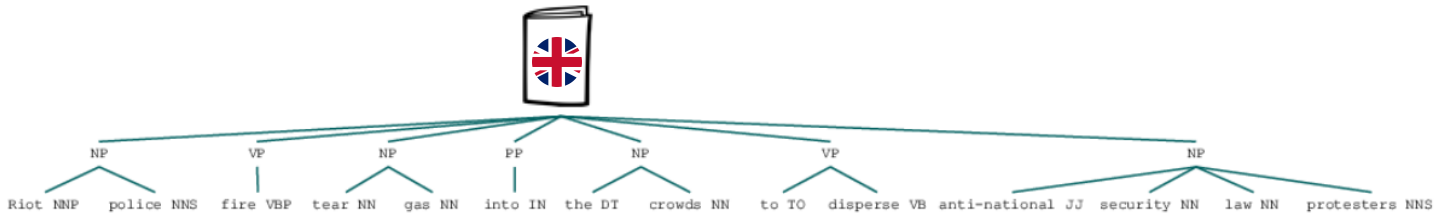
  - China believes that the Int'l community should stay out of Chinese affairs & the Tweeters are thankful for the support from the Int'l community
  - China's position on police engagement is justified & only targets a minority of criminals. **Int'l News highlights the engagements**



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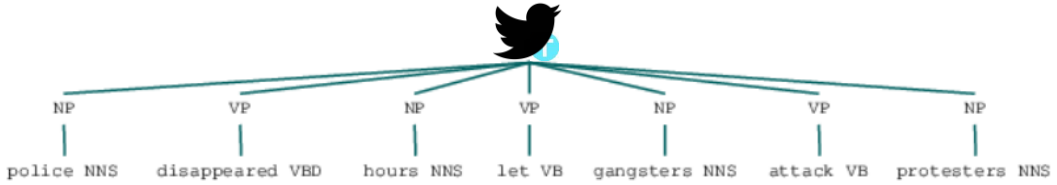
  - China believes that the Int'l community should stay out of Chinese affairs & the Tweeters are thankful for the support from the Int'l community
  - China's position on police engagement is justified & only targets a minority of criminals. Int'l News highlights the engagements while **Tweeters convey a belief that the police are going above their call of duty or not on duty**



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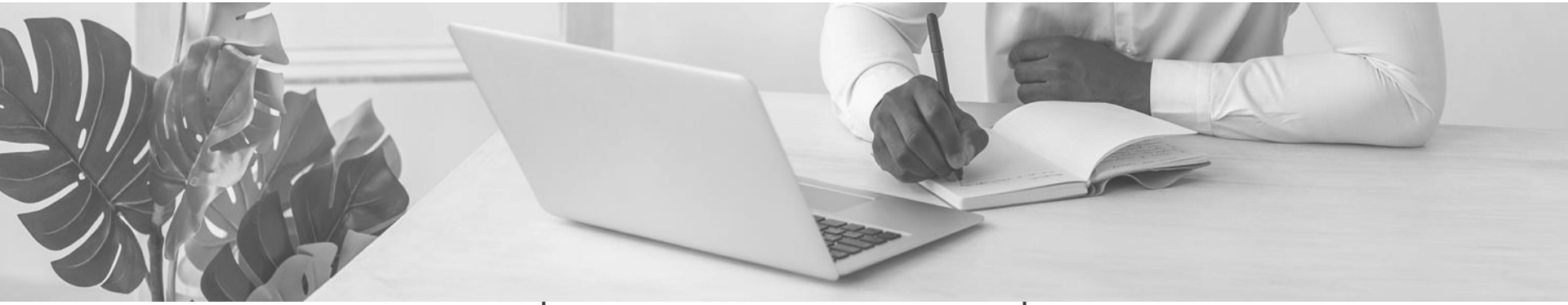
07

NEXT STEPS

Next Steps



Translation

Google Translate sent many errors for Twitter, we had to limit our data to English

Formatting

Minor formatting issues that didn't present issues for Sentiment Scores but should be addressed

Count Vectorizer

Re-examining the data frames with attention to Count Vectorizer may help

THANK YOU
谢谢 | 多谢

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+1 313 443 8634