



# **Competing Narratives, Emotional Ripples: Mapping BRI Global Sentiment Diffusion on Twitter with Large Language Models**

吕蕙伊

外交学院人工智能社会科学研究系列讲座

2025年10月28日

## Self-Introduction

Research Interest:

- Substantive: **Information Politics**; Conflict Management; Southeast Asia
- Methodological: Text-as-data; Machine learning; LLMs; Spatial Analysis

BRI-related Research :

- *Competing Narratives, Emotional Ripples: Mapping BRI Global Sentiment Diffusion on Twitter with LLMs*
- How Border Anxiety in Official Discourse Impacts Public Sentiments? The Affective Geopolitics of BRI
- Provision of Infrastructure and Local Conflict: Project-Level Evidence from China's Belt and Road Initiative
- 流行性战略叙事缘何失效？基于大语言模型的“中国债务陷阱”叙事追踪

## Outline

- Research Motivation
- Literature Review
- Theoretical Framework
- Research Design
- Research Findings

# Research Motivation

Narrative competition as great power rivalry; IR's narrative turn



Achievement



Challenge

## Research Question

### The Belt and Road Initiative (BRI)

- grand strategy of China, from a Kazakh speech to a worldwide initiative, involving 153 countries as of 2023
- encompassing 50% of global GDP and 70% of the world's population as of 2020 (Garlick, 2020)
- Yet faces a stark 50-50 split in global public perception



### Belt and Road Initiative: Is China's trillion-dollar gamble worth it?

17 October 2023

Share ↗ Save ↘

Tessa Wong  
Asia Digital Reporter, BBC News

■ CT VIEWPOINTS

### Opinion: China's 'Belt and Road Initiative' is hurting us and other countries

## Literature Review

### Strategic Narrative Theory

- states compete through narratives about international order, identity, and policy (Miskimmon et al., 2013)
- discourse as the low-cost and soft balancing tool to constrain rising powers (Pape, 2005; Paul, 2018)
- social media platforms as primary battleground for narrative competition (Page, 2018)

### Two Competing BRI Narratives

- win-win opportunity, catalyst for cul&tech exchanges and modernization (Haggai, 2016; Shah, 2016)
- debt trap, strategic threat and economic colonization (Van Noort and Colley, 2021; Rajah, Dayant and Pryke, 2019)

### How Existing Research Explains BRI Perception

- governmental responses → rational calculations based on geopolitical considerations (alignment, regional competition), economic interests (trade, development), domestic politics (regime type, elite preferences)
- public opinion → interdependent reactions to reality

## Theoretical Framework

### Semtiment Contagion in Strategic Narrative Competition

The puzzle with structural explanations:

- Economic interests + Geopolitics + Domestic institutions → Perceptions

Cannot explain:

- Why do countries' BRI sentiments shift almost simultaneously?
- Why are many countries' attitudes toward the BRI seemingly irrational and contradictory?
- Our answer:
  - Sentiment contagion over structural calculation
  - Major powers initiate sentiment signals → Transnational diffusion → Shape global consensus or polarization

## Theoretical Framework

### Sentiment as Power:

- Traditional power: military, economic, institutional
- Sentiment power: Capacity to shape others' emotional responses
- Low cost, high efficiency, hard to counter (Crawford, 2000; Mercer, 2014)

### Sentiment Contagion Mechanism

- Influence ≠ Volume of messages
- Influence = Ability to make others “feel the same” and replicate emotions
- Social media amplifies contagion speed

### Asymmetry in Sentiment Contagion

- Not all actors have equal emotional influence
- Forms hierarchical “emotional leadership-followership” structure

## Research Design

### Option 1: Traditional Media

- Elite-focused, missing mass sentiment
- Slow publication cycles can't capture real-time contagion
- Limited cross-national comparison



The New York Times

### Option 2: Survey Data

- Prohibitively expensive for multi-country analysis, especially Global South
- Cannot trace moment-to-moment sentiment spread
- Response bias and potential manipulation



### Option 3: Social Media Data

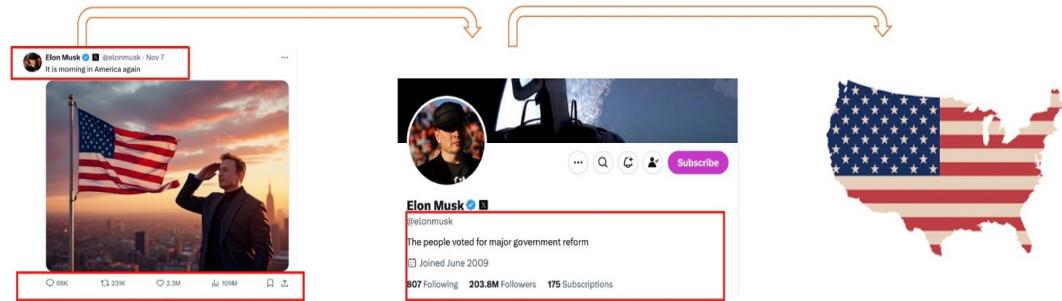
- Real-time spontaneous expression across borders
- Network structure makes contagion traceable
- Massive scale: millions of organic, unfiltered opinions



## Research Design

### Use Twitter as data source

- open access, low cost
- wide coverage, free report
- real-time capture, fine-grained measurement



### However

- acknowledge demographic skew (urban, educated)
- noise and manipulation (e.g., bots, trolls)
- representativeness: findings interpreted as Twitter users' views rather than entire societies

### Nested Data Structure (as shown in the picture)

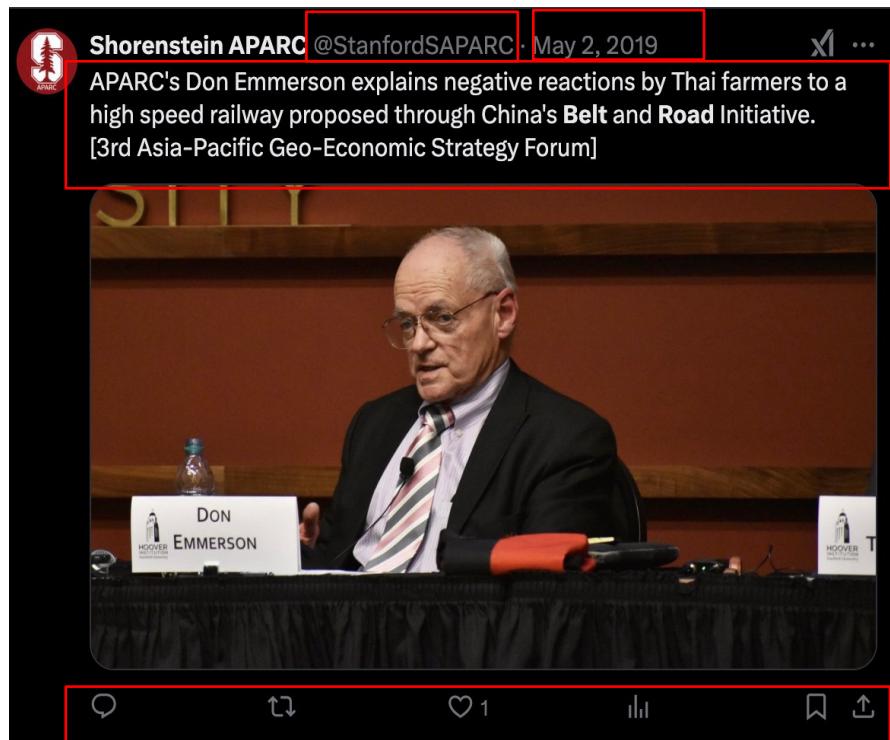
- analysis level: tweet; account; country

## Research Design

### Use Twitter API

- Search keywords: “the Belt and Road” “One Belt One Road” and “the New Silk Road” as well as common hashtags - #beltandroad, #obor, #bri, and #beltandroadinitiative
- Timeframe: 2013-2023
- Original English tweets (exclude retweets and replies)
- Final dataset: 251179 tweets from 63986 accounts
- Metadata: Timestamp; Username; User profile; Full text; Quantitative metrics (like, reply, retweet)
- Inferred Data:
  - Tweet Sentiment: Positive, Neutral; Negative
  - Tweet Topic: Politics, Economics, Culture&Tech, Social, Ecology, COVID-19, Comprehensive (multiple topics)
  - User Account Type: Official, Business, Media, Academic, Social organizations and social elites, Regular users
  - Geolocation at Country Level: 153 countries

# Research Design



## Metadata:

- Timestamp
- Username
- Full text;
- Quantitative metrics (like, reply, retweet)

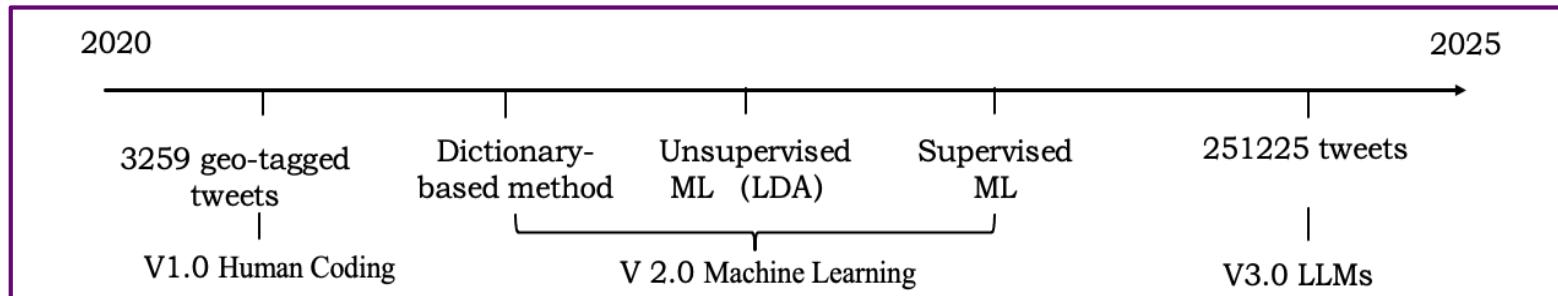
## Inferred Data (using GPT-4o)

- Tweet Sentiment: Negative
- Tweet Topic: Economics
- User Account Type: Academic
- Account Country of Origin: USA
- BRI membership: No

# Research Design

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	created_at_tweet	description	favourites_count	followers_count	friends_count	media_count	username	verified	favorite_count	full_text	quote_count	reply_count	retweet_count
2	Thu Aug 05 04:21:16 +0000 2018	Product Manager at @Bforeai_	15494	7774	6553	13316		FALSE	0	The New Silk Road: R&D Networks, Knowledge	0	0	0
3	Sat Jul 13 15:49:10 +0000 2018	Kinda good to go (sorta).	77067	3626	4992	15433		FALSE	0	Angelo Giuliano (@Angelo4justice3)	0	0	0
4	Tue May 21 16:33:14 +0000 2018	Possunt quia posse videntur.	5071	77	1853	310		FALSE	0	Western #Balkans have become an increasingly important	0	0	0
5	Fri May 20 17:54:18 +0000 2018	China content of The Epoch Times.	3059	63832	100	1559		FALSE	20	News Analysis _ Western nations are increasing global	2	1	11
6	Mon Sep 05 22:30:34 +0000 2018	Data Scientist   Passionate about m	106108	3380	4928	7412		FALSE	1	Despite all the attacks & rantings against China & its	0	0	0
7	Thu Jul 12 16:17:43 +0000 2018	Sign the petition demanding clemency	32068	3751	953	358		FALSE	11	One thing has become patently obvious to me, the federal gov	1	1	4
8	Sun Jan 17 17:38:06 +0000 2018	Hermetic Bataillean Maoism / On a Qt	149816	5887	485	2339		FALSE	7	@WoodlouseM - LaRouchite American Belt and Road	0	0	0
9	Sat Mar 08 01:48:18 +0000 2018	cis man. engineer? relocating to https:/	136195	474	448	280		FALSE	1	@jf2by4 @eminently_me5 @mlhershb When PRC rolled int	0	1	0
10	Tue Aug 28 19:39:45 +0000 2018	wearing the guise of a fakeer,	23575	47	155	3		FALSE	0	It's called the Belt and Road Initiative.	0	0	0
11	Fri Jun 29 19:07:39 +0000 2018		911	28	57	48		FALSE	0	@WineJerk @musdurken @ryancooper Earlier this year, Fr	0	0	0
12	Fri Apr 23 10:29:53 +0000 2018	Militant Atheist_	3803	410	4954	1201		FALSE	0	@TheEconomist Much like the #BeltandRoadinitiative	0	0	0
13	Sat May 31 03:35:24 +0000 2018	Vice President @CarnegieEndow; twi	26574	34326	7959	2437		FALSE	1	@DrIanHall Catchier than the Belt and Road rap, though ...	0	1	0
14	Mon Jun 03 22:15:10 +0000 2018	Author _ own of Eurasia, _ elt and ]	9309	118805	1752	6967		FALSE	11	Listen to "Belt and Road Meets the Pandemic" by Foreign Po	0	0	0
15	Wed Mar 24 01:26:11 +0000 2018	ML MZT Dengist Stalinist Jucheis	10395	857	1750	420		FALSE	3	The One Belt One Road Initiative will help small countries de	0	0	0
16	Wed Mar 24 01:26:11 +0000 2018	ML MZT Dengist Stalinist Jucheis	10395	857	1750	420		FALSE	3	@LVKVD @based_eva China achieved 0% poverty in 2020	0	0	0
17	Mon Dec 07 16:52:09 +0000 2018	Just some angry dude. (static) Clingy.	834	30	182	199		FALSE	2	@gematriac59 @jeffery_hails @yao_zilong @fishhead436 @	0	3	0
18	Sat Oct 17 00:25:03 +0000 2018	National Taiwan University BA; Univ	2	6	4	0		FALSE	0	Answer to What is the main difference between the Belt and I	0	0	0
19	Sat Sep 05 22:33:47 +0000 2018	You do not want to follow me. I AM	14615	2304	105	5158		FALSE	0	@scotthill222 Yes. Quality growth, canceling infrastructure,	0	1	0
20	Fri Feb 27 08:28:14 +0000 2019	The Hong Kong Trade Development C	217	2131	1846	1850		FALSE	0	Excellent networking opportunity at the pre-mission zoom ga	0	0	0

## Research Design



### Option 1: Human Coding

- Gold standard for nuanced political sentiment
- Impossible scale; Consistency issues; Cultural bias

### Option 2: Machine Learning

- Handles volume: Scalable for large datasets
- Context-blind (miss irony, cultural expressions); Training limitations

### Option 3: Large Language Models (LLMs)

- Speed + Scale; Contextual understanding; Adaptive flexibility

# Research Design

# [to infer sentiment]

Below is a list of Twitter text details, each row containing row ID, user's country, username, and the full text. Each entry ends with '\_END\_'. Your task is to label the tweets in the dataset with sentiment scores. Connect all dots. Output "1", "0", or "-1" to each tweet as per the guidelines.

Response must follow this:

[row ID] Sentiment Score; Reason  
[row ID] Sentiment Score; Reason

Zero-shot

Sentiment Labelling Guidelines:

General guidelines:

- The sentiment label should reflect the stance/sentiment of the author rather than face value.
- Keywords can sometimes be misleading as the author of a tweet may quote someone they disagree with, or use rhetorical devices such as sarcasm to convey their stance and message to their audience.

1. Label "1" for Positive Tweets:

- Tweets that express appreciation, praise, or support for the Belt and Road Initiative (BRI)

2. Label "0" for Neutral Tweets:

- Tweets that present a balanced view, factual information, or are unrelated to BRI

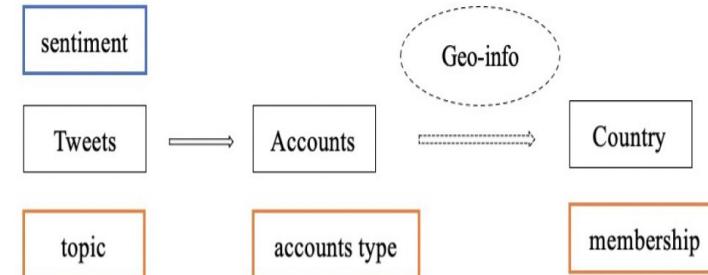
3. Label "-1" for Negative Tweets:

- Tweets that show criticism, concern, fear, etc. about BRI

Twitter text details:

Xxx

Xxx



D	E
sentiment	sentiment_reason
0	The tweet discusses the potential impact of the BRI on regional stability.
0	The tweet reports on China's new Silk Road Economic Belt and its global reach.
0	The tweet is neutral, discussing the consequences of the BRI without a clear stance.
1	The tweet shows positivity about China investing in infrastructure projects along the BRI route.
-1	The tweet suggests that Russia is in danger due to the BRI's impact on its economy.
1	The tweet reports on China's new Silk Road Economic Belt and its global reach.
0	The tweet mentions Japan's balancing act in the Asia-Pacific region regarding the BRI.
0	The tweet mentions Georgia and Azerbaijan's role in the BRI.
0	The tweet provides information about the BRI's environmental impact.
1	The tweet mentions China's One Belt One Road Initiative (OBOR) and its global reach.
1	The tweet suggests that China and Russia are competing for influence in Central Asia via the BRI.
1	The tweet mentions the opening of a hotel along the BRI route.
0	Inviting to join an event related to the Belt and Road Initiative.
1	The tweet is mentioning Singapore's United Nations' role in the BRI.
1	The tweet expresses positivity by mentioning the BRI's potential to bring prosperity.
-1	The tweet reports on the US stepping up its trade policies against China over the BRI.
0	The tweet mentions an article on the Belt and Road Initiative's impact on local communities.

## Research Design

### Core LLM Limitations

- Hallucination Risk: May invent sentiments or misread neutral text as emotional
- Black Box Nature: Opaque reasoning makes errors hard to detect
- Output Instability: Same tweet may receive different labels across runs

### What we did:

- Prompt Engineering: 100+ test iterations to optimize instruction clarity
- Human Validation
  - 1% sample (3259) for human coding, 90%+ accuracy achieved against human coding
  - Error repository built for systematic improvement
- Technical Optimization
  - Temperature = 0 for deterministic, replicable results; Zero-shot approach to avoid few-shot bias
  - Multiple runs with consistency checks

# Prompt Design

## V1: Basic

Please read each English tweet and determine whether its attitude toward the Belt and Road Initiative is positive, neutral, or negative.

## V2: Detailed

Please carefully read the following English tweet and determine whether its attitude toward the Belt and Road Initiative (BRI) is **positive, neutral, or negative**. Then briefly explain the reasoning behind your judgment.

### Definitions:

**Positive:** Expresses support, praise, anticipation, or views BRI as beneficial

**Neutral:** Remains objective or balanced, or simply states facts without a stance

**Negative:** Expresses criticism, concern, opposition, or views BRI as harmful

### Please answer in the following format:

Attitude: [Positive / Neutral / Negative]

### Final:

**Role:** You are a political science researcher specializing in IR.

**Task:** Your task is to assign a sentiment label to each tweet and briefly explain the rationale behind your labeling.

### Sentiment Labeling Guidelines:

Focus on the author's stance, not the literal content or quoted text.

Be cautious of sarcasm, quotes, or indirect expressions that may convey opinions implicitly.

### Instructions:

1. Label "1" for Positive Tweets: Tweets that express appreciation, praise, or support for the Belt and Road Initiative (BRI)
2. Label "0" for Neutral Tweets: Tweets that present a balanced view, factual information, or are unrelated to BRI
3. Label "-1" for Negative Tweets: Tweets that show criticism, concern, fear, etc. about BRI

For each tweet\_id in INPUT, answer ALL TWO questions below:

Q1: Sentiment score (choose from: 1, 0, -1)

Q2: A one-sentence justification explaining the sentiment score, based on the author's stance.

### Return format:

Return exactly {number\_of\_line} lines. NO MORE NO LESS.

For each tweet\_id, return one VALID jsonline!

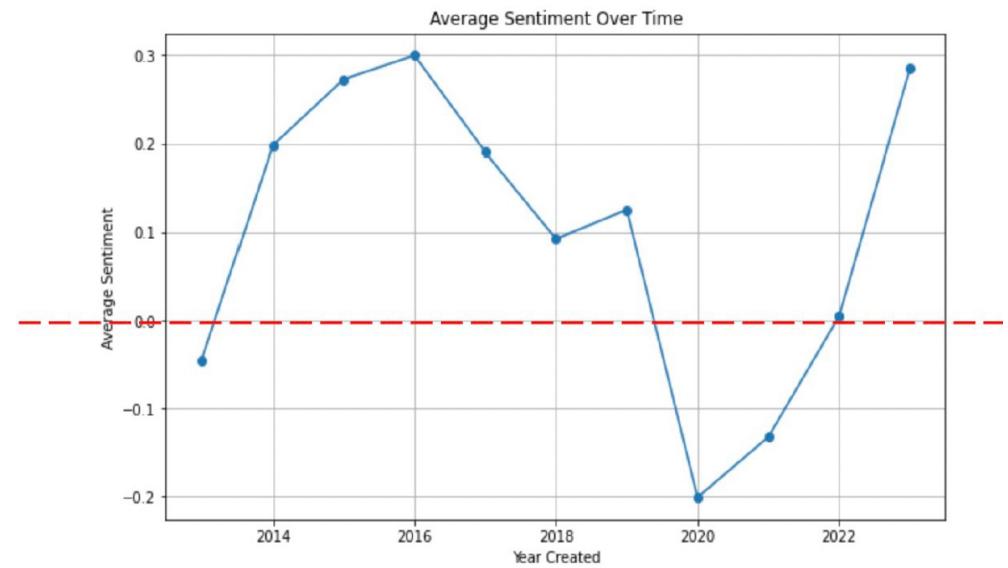
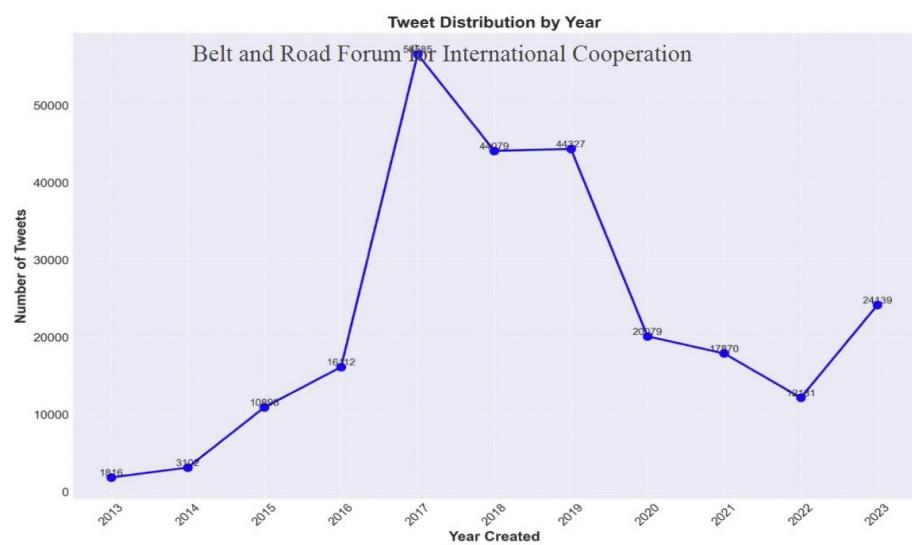
Each jsonline has keys "tweet\_id", "Q1","Q2". Check JSON format very carefully.

For example:

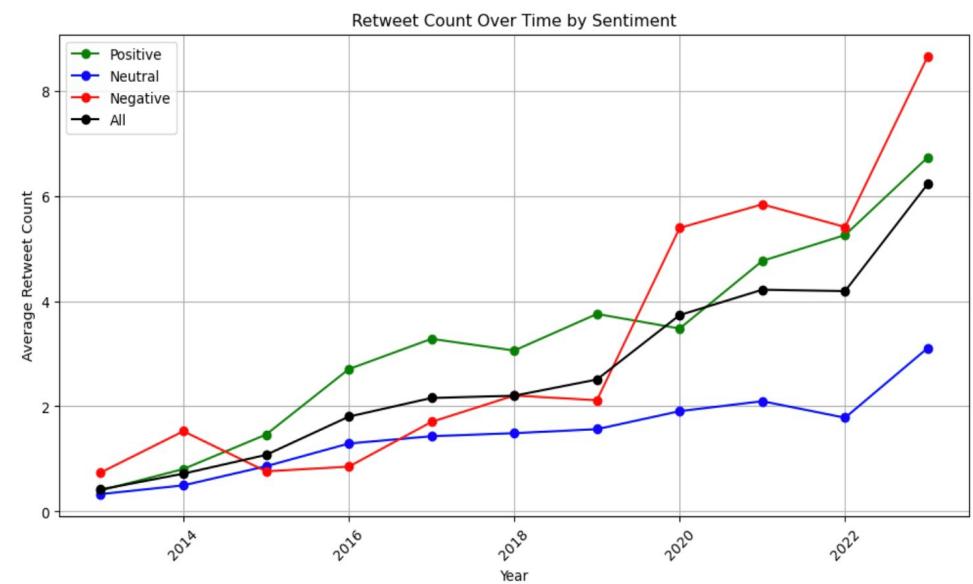
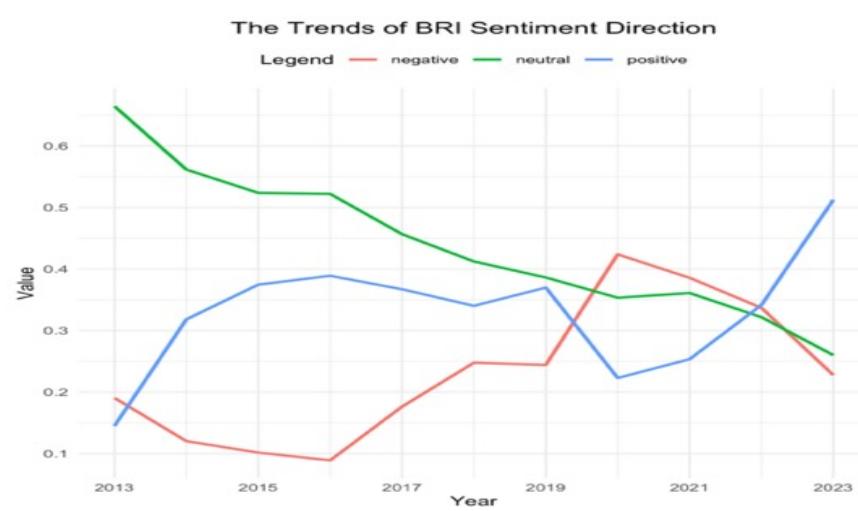
{ {"tweet\_id": "XX", "Q1": "XX", "Q2": "XX"} }

{ {"tweet\_id": "XX", "Q1": "XX", "Q2": "XX"} }

# Research Findings



## Research Findings

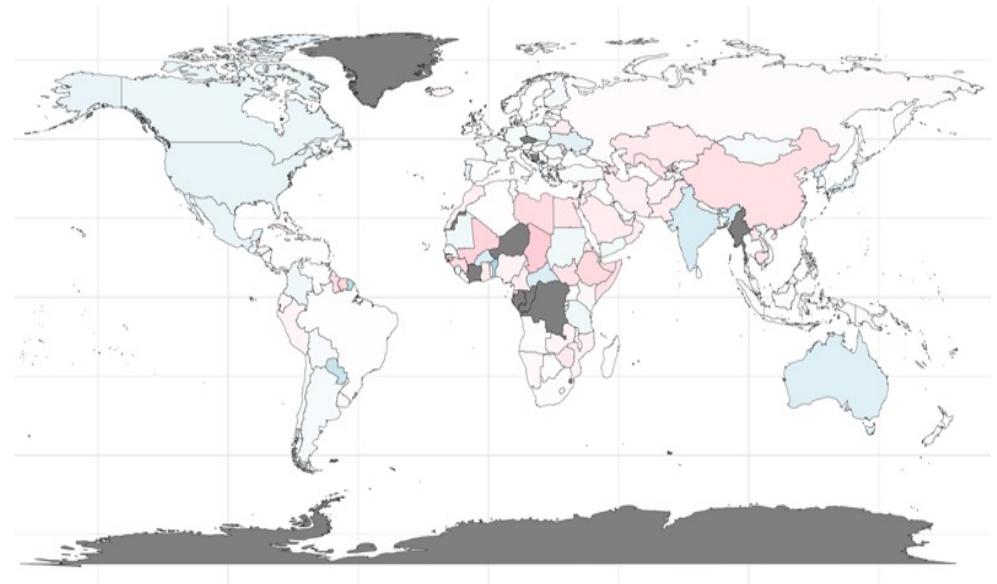


## Research Findings



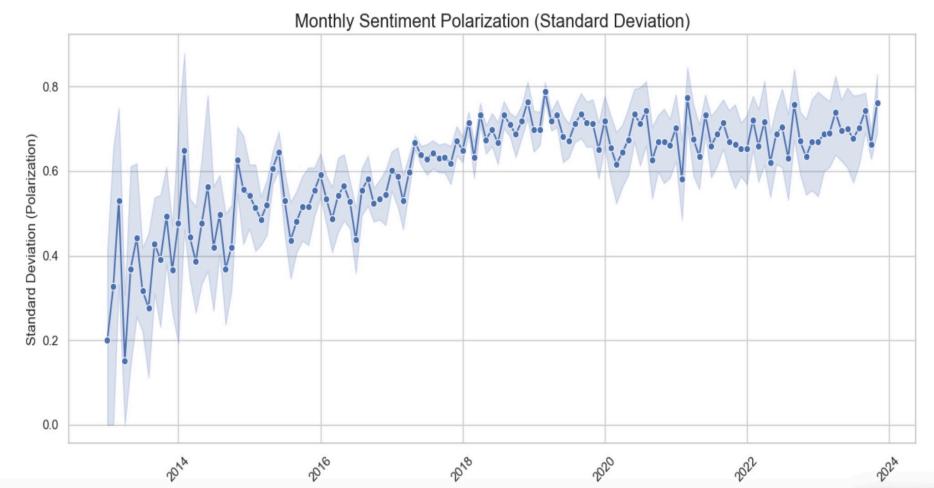
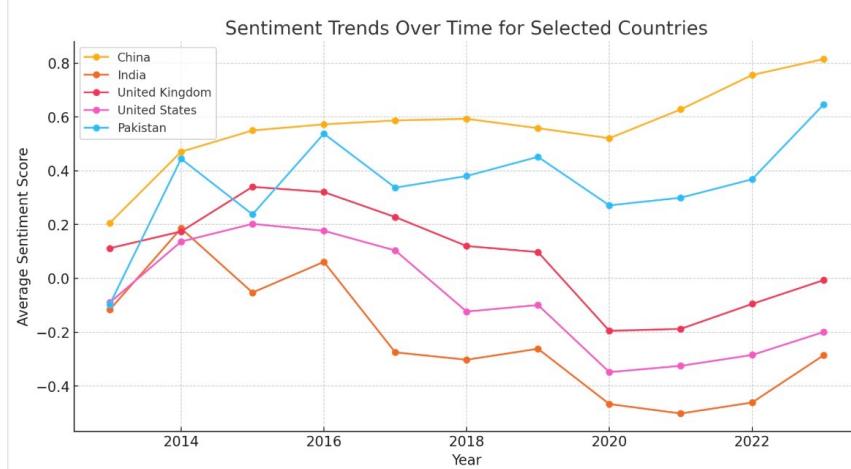
Tweet Count by Country

US (57162) CN (39706) GB (20211) IN (19976) PK(14569)



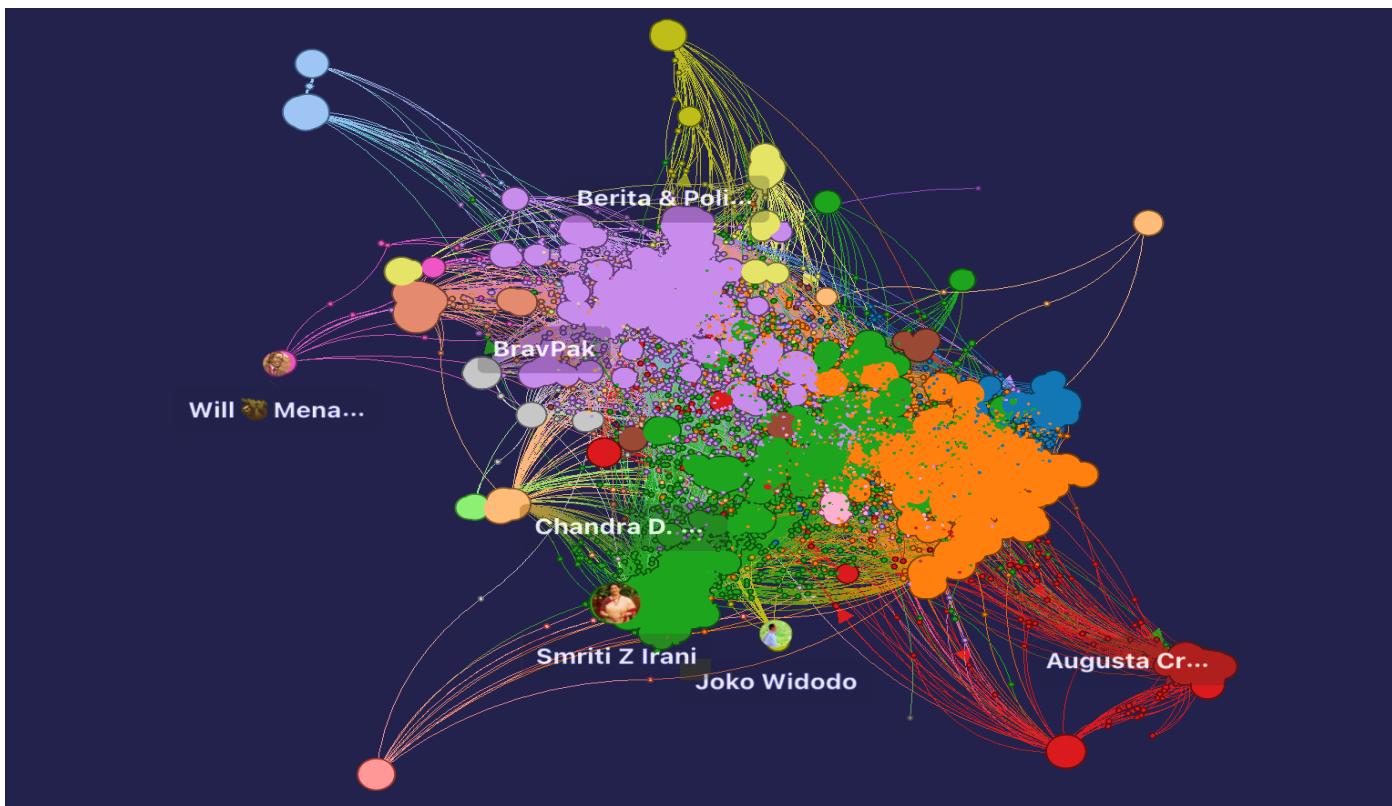
Tweet Sentiment by Country

## Research Findings



US (57162) CN (39706) GB (20211) IN (19976) PK(14569)

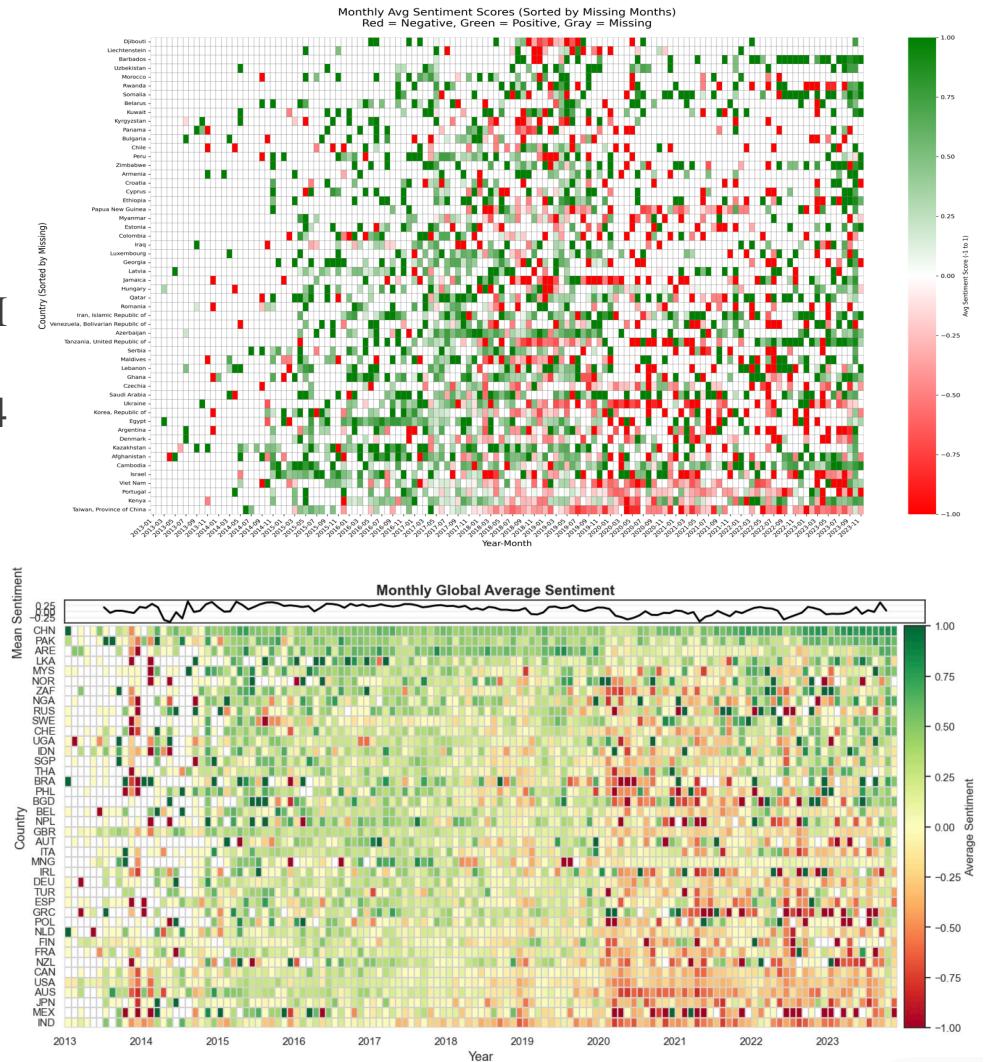
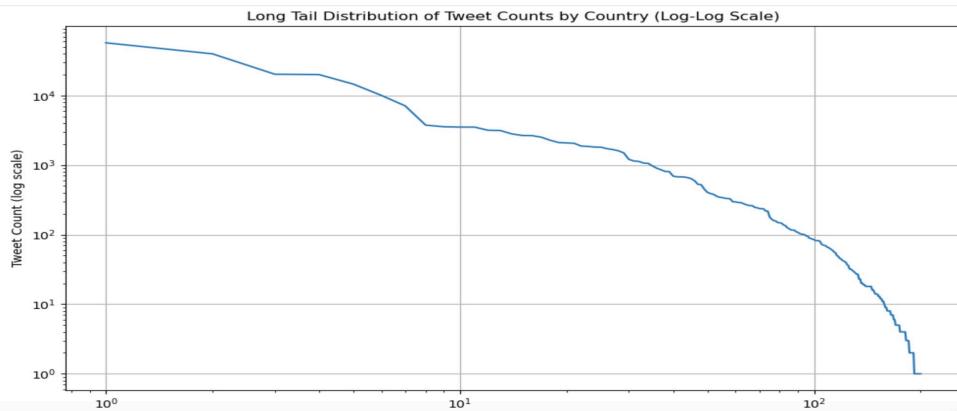
## Research Findings



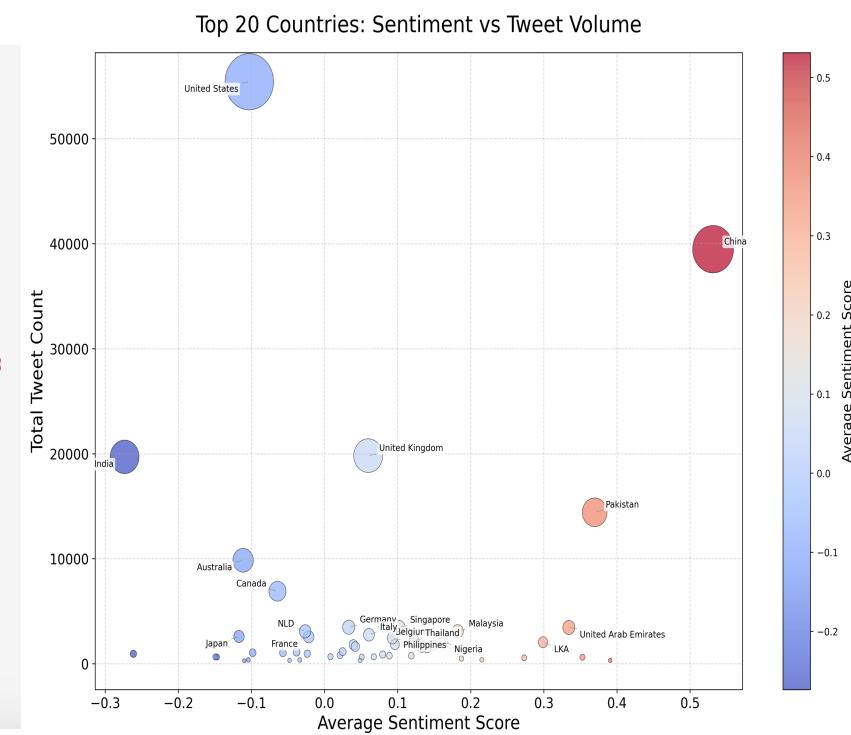
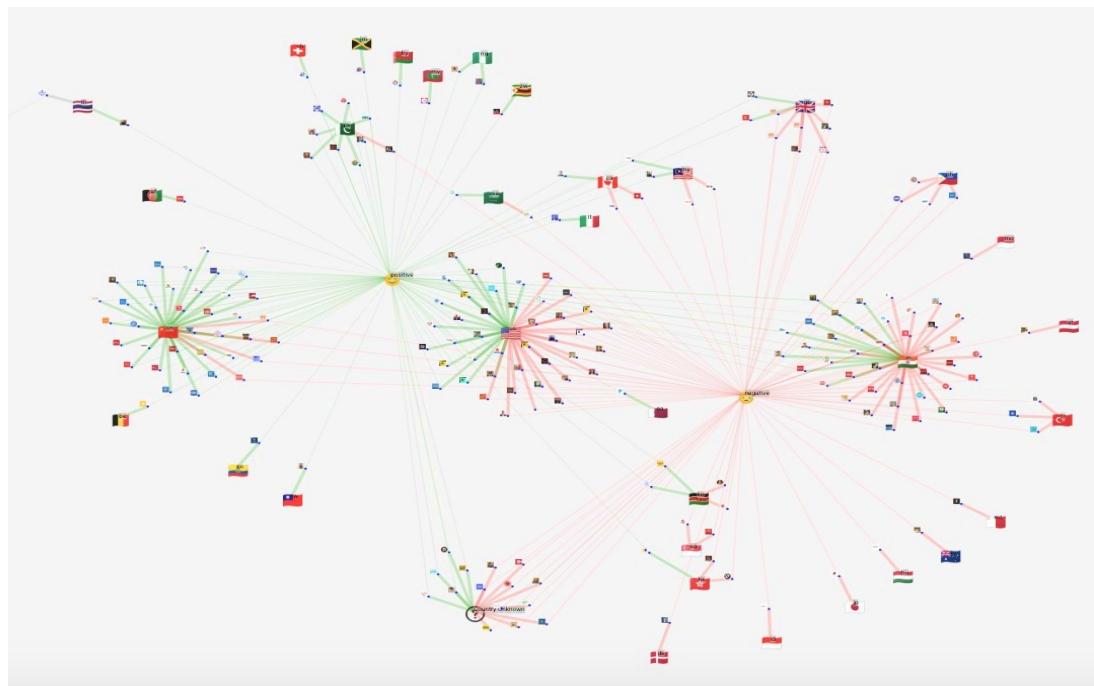
# Research Findings

## Building the Panel Dataset (Country level)

- Volume Threshold Countries with  $\geq 100$  total BRI tweets ( $153 \rightarrow 94$  countries)
- Temporal Continuity Excluded countries missing  $> 24$  months ( $94 \rightarrow 54$  countries)
- Period Selection: Removed 2013-2014 ( $54 \rightarrow 40$ )
- Final:  $40 \text{ countries} \times 96 \text{ months} = 3840 \text{ observations}$



# Research Findings: Who Leads the Sentiment



# Research Findings: Who Leads the Sentiment



## Three Emotional Drivers

### China: The Positive Anchor

- Average sentiment: +0.531 (consistently positive)
- Lowest volatility: 0.153 std dev
- Original sentiment manufacturer setting the narrative tone

### USA: The Volume Leader

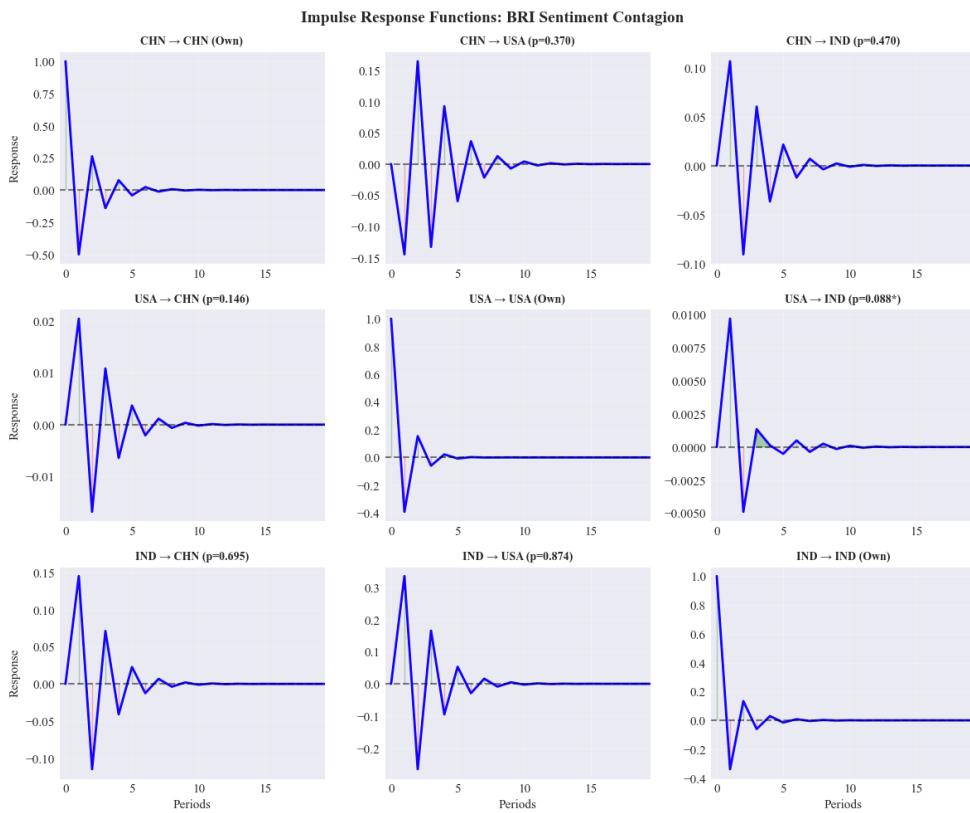
- Average sentiment: -0.103 (slightly negative)
- Highest tweet volume: 55,437 tweets
- Limited emotional influence despite digital dominance

### India: The Negative Pole

- Average sentiment: -0.274 (strongly negative)
- Highest volatility: 0.263 std dev
- Reactive sentiment expresser responding to others

Country	Influence on Others	Influenced by Others	Net Influence
China	39.3%	4.0%	+35.2%
USA	12.3%	12.9%	-0.6%
India	6.5%	41.1%	-34.6%

# Research Findings: Who Leads the Sentiment



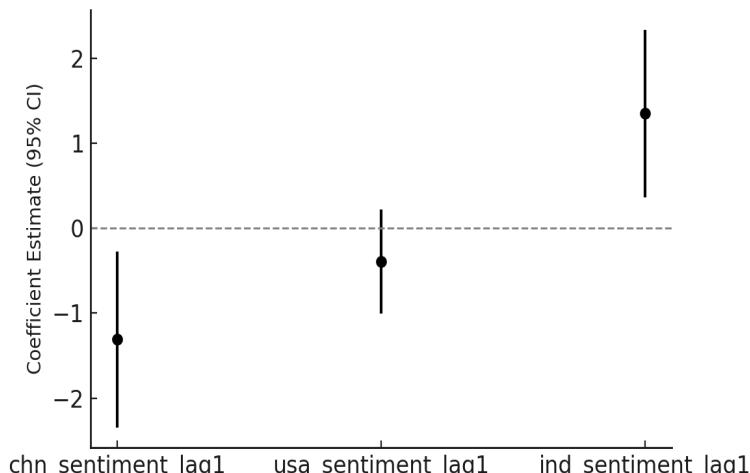
## Contagion is Immediate, Not Lagged

- Maximum responses occur in Period 1-2
- Effects dissipate within 5 periods

## Strongest Emotional Transmissions

1. IND → USA: 0.335 response (Period 1)
2. CHN → USA: 0.164 response (Period 2)
3. CHN → IND: 30.2% variance explained

## Research Findings: Who Follows the Sentiment



### Model Specification:

Unit of Analysis: Country-month panel (40 countries, 2015-2023)

Dependent Variable: country i's average monthly sentiment

Independent Variables: Lagged sentiment of 3 leaders (chn, usa, ind)

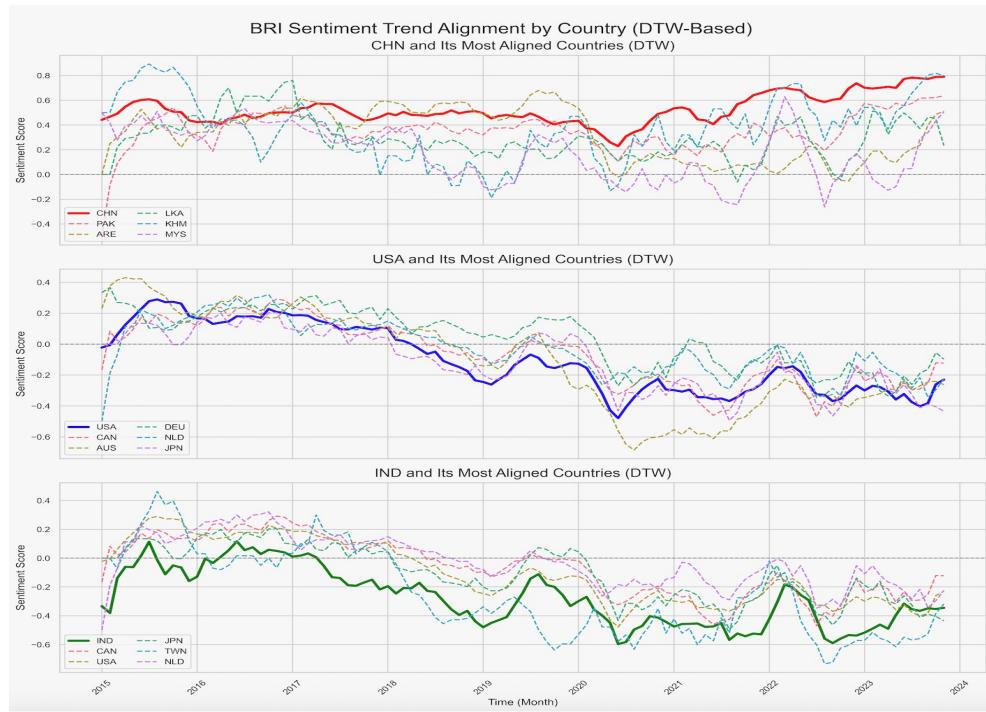
Controls: GDP (log); Population (log); Military expenditure (log);

Polity2 score; Tweet count (log); Trade (log)

### Estimation Strategy:

- Fixed Effects: Country + Month
- Clustered standard errors by country
- Robustness: Multiple lag specifications

# Research Findings: Who Follows the Sentiment



## China-Led Group

- Pakistan, UAE, Brazil, South Africa
- Synchronized positive sentiment (0.4-0.8 range)
- Dominated by Global South and BRI recipients

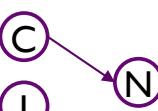
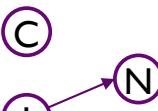
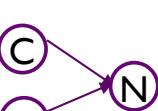
## US/India-Led Group

- G7 allies (Japan, UK, France, Canada, Australia)
- Coordinated negative trend accelerating post-2019
- Traditional Western alliance structure
- Sentiment drops from 0.2 to -0.4 over period

## Others: The Hedgers

- Neutral positioning around zero line
- Strategic ambiguity maintained
- Neither following China's optimism nor USA's criticism

## Research Findings: Who Follows the Sentiment

Positive-Responsive States (8)		ARE (阿联酋)、THA (泰国)、PHL (菲律宾)、PAK (巴基斯坦)、IDN (印度尼西亚)、CHE (瑞士)、ZAF (南非)、BRA (巴西)
Negative-Responsive States (16)		SGP (新加坡)、AUS (澳大利亚)、BEL (比利时)、TUR (土耳其)、NPL (尼泊尔)、MYS (马来西亚)、CAN (加拿大)、MNG (蒙古)、MEX (墨西哥)、ITA (意大利)、GBR (英国)、FRA (法国)、FIN (芬兰)、ESP (西班牙)、NOR (挪威)、JPN (日本)
Narrative Conflict Zone (5)		DEU (德国)、AUT (奥地利)、SWE (瑞典)、GRC (希腊)、NLD (荷兰)
Narrative Isolation Zone (8)		NGA (尼日利亚)、NZL (新西兰)、LKA (斯里兰卡)、POL (波兰)、IRL (爱尔兰)、BGD (孟加拉国)、UGA (乌干达)、RUS (俄罗斯)

## Summary

Key Findings Summary:

- In the digital age, the battle for hearts precedes the battle for minds
- Emotional contagion is immediate and traceable

Contributions:

- International Relations needs an affective turn → Integrating emotions into core analyses of power, alliances, and order
- Narrative competition is critical battleground of 21st-century great power rivalry → Requires “emotional strategy,” not merely “communication strategy”

Future Research Directions:

- Granular Analysis by account and topic
- Causal Identification by event



请各位老师同学批评指正！

吕蕙伊

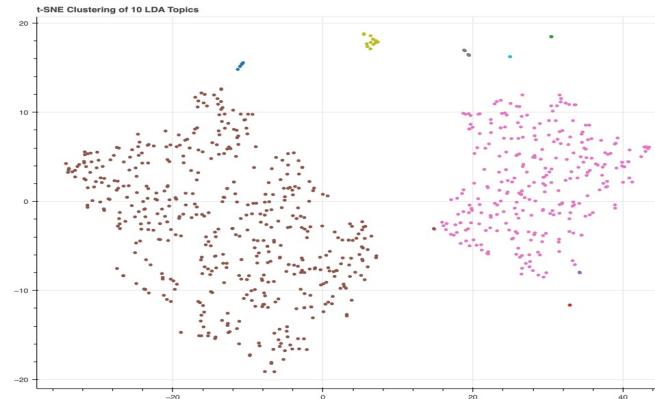
外交学院人工智能社会科学研究系列讲座

2025年10月28日

# NLP Analysis

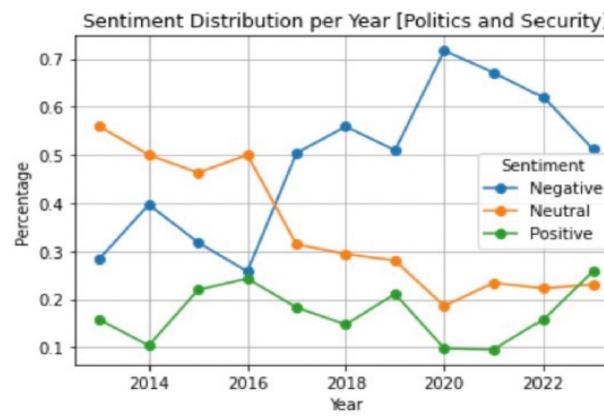
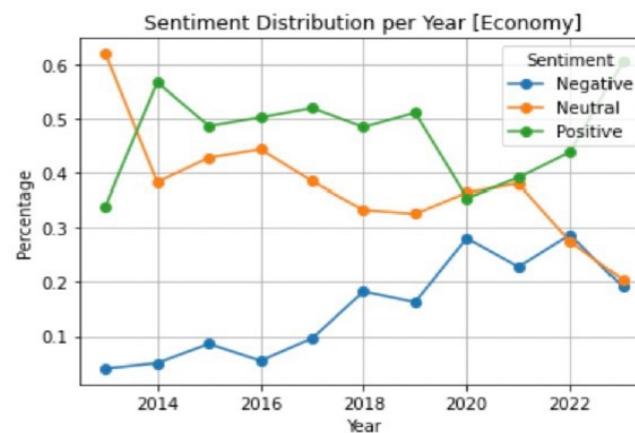
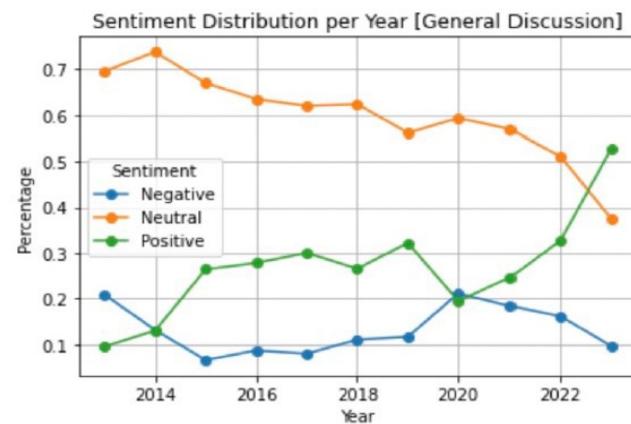


0-10	10-20	20-30	30-40	40-50
('国旗', 2883),	('旗帜', 199),	('英国', 137),	('日本', 102),	('印度', 85),
('美国', 1285),	('中国', 197),	('韩国', 137),	('澳大利亚', 99),	('巴西', 83),
('印度尼西亚', 864),	('新加坡', 189),	('西班牙', 135),	('泰国', 97),	('马来西亚', 83),
('土耳其', 645),	('以色列', 181),	('中国香港', 135),	('中国台湾', 97),	('中国澳门', 80),
('巴基斯坦', 518),	('越南', 173),	('俄罗斯', 133),	('乌克兰', 95),	('孟加拉国', 79),
('沙特阿拉伯', 455),	('美国', 166),	('意大利', 133),	('希腊', 91),	('伊拉克', 78),
('黎巴嫩', 445),	('地球', 157),	('法国', 129),	('葡萄牙', 90),	('土耳其', 76),
('约旦', 379),	('意大利', 155),	('印度', 106),	('匈牙利', 87),	('柬埔寨', 76),
('美国', 299),	('欧盟', 150),	('西班牙', 106),	('斯洛伐克', 87),	('老挝', 76),
('埃及', 270),	('巴西', 148),	('希腊', 105),	('爱沙尼亚', 86),	('玻利维亚', 76)]

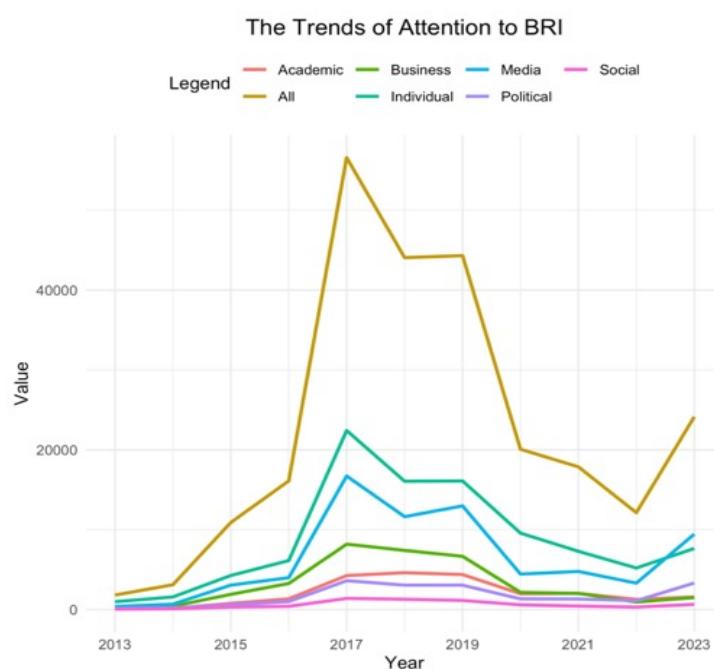


# Descriptive Analysis of BRI Tweet Data: Topic Trends

topic	
Economy	89970
General Discussion	78381
Politics and Security	58103
Cultural Exchange	8533
Ecology and Sustainable Development	5203
Technological Development	5027
Social Impact	3750
COVID-19	2258



# Descriptive Analysis of BRI Tweet Data: Account Trends



Individual	97269
Media	71407
Business	34705
Academic	22429
Political	18691
Social	6678