Abstract:

This study presents a comprehensive analysis of sentiment on Asian's all over the world. The social sentiment was conducted on tweets gathered from twitter during COVID-19's peak in April of 2020. The focus of this research is to shed light on the negative social impact that COVID-19 has had on Asians. The aim is to prove that negative sentiment exists, and to further educate people on the issue.

Our Motivation

As COVID-19 continues in it's destructive path all across the world, it continues to leave no aspect of life untampered. However, racism was not a typical byproduct of a virus. As the rhetoric against Asians has become more hostile from American politicians, the FBI now warns of potential surge in hate crimes against Asian Americans.
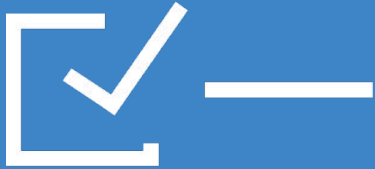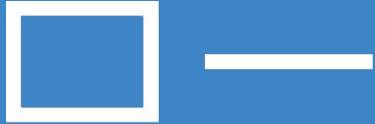

Sources:

https://www.cnn.com/2020/04/10/opinions/how-to-fight-bias-against-asian-americans-covid-19-liu/index.html

https://abcnews.go.com/US/fbi-warns-potential-surge-hate-crimes-asian-americans/story?id=69831920

Sentiment Analysis of Social Media Towards Asian Ethnic Groups

Methods

1. Cleaning datasets
2. Computing polarity of cleaned text
3. Create distribution plots and other visual aid for better understanding of data
4. Conduct further analysis

Using Twitter's API

```python
def search_for_hashtags(consumer_key, consumer_secret, access_token, access_token_secret, hashtag_phrase):

    #create authentication for accessing Twitter
    auth = tweepy.OAuthHandler(consumer_key, consumer_secret)
    auth.set_access_token(access_token, access_token_secret)

    #initialize Tweepy API
    api = tweepy.API(auth)

    #get the name of the spreadsheet we will write to
    fname = '_'.join(re.findall(r"#(\w+)",  hashtag_phrase))

    #open the spreadsheet we will write to
    with open('hashtag%s.csv' % (fname), 'w', encoding ='utf-8') as file:

        w = csv.writer(file)

        #write header row to spreadsheet
        w.writerow(['timestamp', 'tweet_text', 'username', 'all_hashtags', 'followers_count', 'location'])

        #for each tweet matching our hashtags, write relevant info to the spreadsheet
        for tweet in tweepy.Cursor(api.search, q=hashtag_phrase+' -filter:retweets', \
                                    lang="en", tweet_mode='extended').items(1000):
            w.writerow([tweet.created_at, tweet.full_text.replace('\n',' ').encode('utf-8'), tweet.user.screen_name.encode('utf-8'),
                        [e['text'] for e in tweet._json['entities']['hashtags']],
                        tweet.user.followers_count, tweet.user.location.encode('utf-8')])
```

```python
consumer_key = input('consumer_key')
consumer_secret = input('consumer_secret')
access_token = input('acess_token')
access_token_secret = input('acess_token_secret')
hashtag_phrase = input('Hashtag Phrase ')

if __name__ == '__main__':
    search_for_hashtags(consumer_key, consumer_secret, access_token, access_token_secret, hashtag_phrase)
```

Data

- **Data Source**:
  - ~2000 Twitter postings from April 14, 2020
  - Each tweet contains at least one of the following hashtags: Coronavirus, Covid19, Asian, Asians, Kungflu, Chinesevirus

- **Columns of CSV file:**
  - Timestamp
  - Tweet_text
  - Username
  - All_hashtags
  - Followers_count
  - Location

timestamp	tweet_text	username	all_hashtags	followers_count	location
2020-04-14 23:18:40	b"....The #COVID19	b'JoanMClements'	['COVID19', 'China', '	418	b"
2020-04-14 23:12:07	b'Some \xe2\x80\x9c	b'Uyghur_Oghly'	['Chinese', 'EastTurki	1479	b'United States'
2020-04-14 23:07:24	b'#WHO head had #	b'PXullo'	['WHO', 'CPP', 'COVI	6	b"
2020-04-14 23:02:38	b'Let's match what tl	b'pauldibartolo'	['ChiComs', 'WHO', 'C	833	b"
2020-04-14 23:02:08	b'@Catmandu50 Thi	b'9ERSorBUST'	['ChineseCommunist	9044	b'California, USA'
2020-04-14 23:00:51	b"@sav_says_ @Tri\	b'pauldibartolo'	['ChiComs', 'WHO', 'C	833	b"
2020-04-14 22:51:49	b'#DonaldJTrump de	b'krishnakant_75'	['DonaldJTrump', 'Ch	790	b'Delhi, India'
2020-04-14 22:50:08	b'@JasonMillerinDC	b'Alam_Chaudry'	['Chinese', 'Mafia', 'W	849	b"
2020-04-14 22:40:35	b'Now the country wc	b'Alam_Chaudry'	['RussianCollusion', 'I	849	b"
2020-04-14 22:36:01	b'#Chinese own asse	b'ATMarieBeatrice'	['Chinese', 'RealEstat	36	b'North Miami '
2020-04-14 22:30:04	b"@nypost #WHO @	b'Revolution_Air'	['WHO', 'China', 'Chir	3	b'New York City and :
2020-04-14 22:22:19	b'Trump is about to t	b'jimfannon'	['Wuhan', 'China', 'Cl	8059	b"
2020-04-14 22:16:30	b'Shameless #Chine	b'Ecstatic_tweet'	['ChineseCommunist	0	b"
2020-04-14 21:54:37	b'@WestJournalism I	b'GabrielC2116'	['China', 'Democrats',	51	b'San Diego, Califor
2020-04-14 21:54:06	b'#Beijin,#China - A	b'paywahun'	['Beijin', 'China', 'Chi	168	b"
2020-04-14 21:53:49	b"@Tre34688671 @	b'Chris_E_Qld_Au'	['War', 'Australia', 'Ch	251	b'Queensland, Austra
2020-04-14 21:25:55	b'Is it just me or has	b'TrudiSm78727125	['china', 'economic',	0	b"

VADER Lexicon

The tool we are using to measure the sentiment is the Valence Aware Dictionary and sEntiment Reasoner(VADER) lexicon. The tool is specifically attuned to sentiment expressed via social media, making it a perfect tool for tweets.

The creators of VADER describe the tool's assessment of polarity, or "compound score," in the following way:

"The compound score is computed by summing the valence scores of each word in the lexicon, adjusted according to the rules, and then normalized to be between -1 (most extreme negative) and +1 (most extreme positive). This is the most useful metric if you want a single unidimensional measure of sentiment for a given sentence. Calling it a 'normalized, weighted composite score' is accurate."

VADER doesn't "read" sentences, but works by parsing sentences into words assigning a preset generalized score from their testing sets to each word separately.

Computing Polarity

To compute the polarity with Vader:

1. Split each cleaned tweets into a list of words
2. Reformat each list into a tidy_format
3. Identify polarity score of each word using Vader's txt file of polarity scores
4. Compute compound score

Replaced Vader's SentimentIntensityAnalyzer method with our own algorithm

- Want non-normalized polarity scores
- Normalized polarity scores may cause problems when analyzing multiple datasets

```
tidy_format = (tweets_df["clean_text"].str.split(expand=True).stack()
                .reset_index(level=1).rename(columns={'level_1': 'num', 0: 'word'}))
tweets_df['polarity'] = tidy_format.merge(vader_lex, how='left', left_on='word', right_index=True)
                .reset_index().loc[:, ['index', 'polarity']].groupby('index').sum().fillna(0)
```

Resulting DataFrame

tweet_text	username	all_hashtags	followers_count	location	clean_text	asian_ref	normalized_polarity	verified_user	polarity
ets up every day? asn\xe2\x80\x99t caug...	b'bigmusicfan71'	['coronavirus', 'COVID19', '25thAmendmentNow']	354	b''	gets every day xe2 x80 x99t caught coronavirus...	0.0	0.0000	False	0.0
'@Welptheresthat rthmanTrader Not when the...	b'GKeeto'	['china', 'ChinaMustExplain', 'ChinaVirus', 'C...	6	b''	product complete chinese made garbage accounts...	1.0	0.0000	False	0.0
'\xf0\x9f\x92\xa9 \xa6@VanityFai...	b'DrumpfsLies'	['INCOMPETENCEKILLS', 'COVID19', 'coronavirus'...	230	b'California, USA'	holy scorchingly amazing incompetencekills cov...	0.0	0.5859	False	2.8
could be the end e line for cruise...	b'1petermartin'	['COVID19', 'coronavirus', 'ausecon', 'auspol']	32382	b''	could end line cruise ships covid19 coronaviru...	0.0	0.0000	True	0.0
@CNN, Can you sincerely claim @realDon...	b'WarmMonkey'	['coronavirus', 'COVID19']	651	b'Out of The Closet'	dear sincerely claim handling coronavirus cris...	0.0	0.6584	False	1.3
...	...	...	...	...	...	...	...	...	...
limWTAE @WTAE nd here is a third Smithfiel...	b'realhumanrights'	['Wisconsin', 'Cudahy', 'COVID19', 'coronaviru...	2853	b'Washington DC'	third smithfield food plant wisconsin cudahy 2...	0.0	0.5574	False	2.6
ruthBeTold Abso- -lutly!!! #Heartb...	b'AltBadDude'	['TruthBeTold', 'Heartbreaking', 'trumpsameric...	1308	b'Maryland, USA'	truthbetold abso fucking lutly heartbreaking l...	0.0	-0.5829	False	-2.5
np assembles his of X-Men to save us...	b'BoneKnightmare'	['EndOfDays', 'apocalypse2020', 'COVID19', 'co...	3760	b'Parts Unknown'	trump assembles crew x men save us doomed endo...	0.0	-0.2500	False	-1.0
ameful incident of pur, this is how ...	b'itemads'	['CoronaVirus', 'CoronaVirusPandemic', 'Corona...	63	b'Jeddah'	shameful incident jaunpur misuse power happens...	0.0	-0.4939	False	-2.2
x9f\x94\xa5FACT: S NOT DEATHS R HIG...	b'SleepyAddicts'	['coronavirus', 'COVID19', 'WHO', 'CDC', 'viru...	4150	b'Seattle'	xf0 x9f x94 xa5fact cases deaths r high 118k d...	0.0	-0.6124	False	-3.0

Top 5 Most Positive:

```python
tweets_asian = pd.DataFrame(tweets_df[tweets_df['asian_ref'] == 1.0])
print('Most positive tweets regarding #Coronavirus and #Covid19:')
t = tweets_asian.sort_values(by = ['polarity'], ascending=False)[['polarity', 'tweet_text']].head
(5).reset_index()
for i in range(len(t)):
    print('\nPolarity: ', t['polarity'][i], "\nTweet Text: ", t['tweet_text'][i])
```

Most positive tweets regarding #Coronavirus and #Covid19:

Polarity: 4.7
Tweet Text: b'@peterbakernyt #COVID19 #CoronaVirus #Corona #SARSCoV2 #Corona19 \xf0\x9f\x98\xb7
Lol Approximately 1.4 billion Chinese around the world call it \xe2\x80\x9cWuhan pneumonia\xe2\x8
0\x9d   \xe6\xad\xa6\xe6\xb1\x89\xe8\x82\xba\xe7\x82\x8e There\xe2\x80\x99s your Chinese lesson f
or today. \xf0\x9f\xa6\xa0'

Polarity: 3.4
Tweet Text: b'#Japan offers $2.2B to help domestic companies move production from #China, but wil
l it help the imaging industry? https://t.co/SdNdcPG2TC #Coronavirus #Covid19 #economy'

Polarity: 3.3000000000000003
Tweet Text: b'These Asian artists are using their lockdown downtime to create music inspired by t
he coronavirus. #COVID19 #coronavirus #lockdown #quarantine'

Polarity: 3.1
Tweet Text: b'CORONAVIRUS UPDATE: STUNNING! US Gave Wuhan Lab $3.7 Million Grant to Study Horses
hoe Bats that Carry Coronavirus #COVID19 #COVID2019 #coronavirus #COVID #Covid19usa #CoronavirusUS
A #CoronavirusPandemic #ChinaVirus #ChineseVirus19 #ChinaLiedAndPeopleDied https://t.co/0wWXa5Poi
9'

Polarity: 3.1
Tweet Text: b'@realDonaldTrump CORONAVIRUS UPDATE: STUNNING! US Gave Wuhan Lab $3.7 Million Gran
t to Study Horseshoe Bats that Carry Coronavirus #COVID19 #COVID2019 #coronavirus #COVID #Covid19u
sa #CoronavirusUSA #CoronavirusPandemic #ChinaVirus #ChineseVirus19 https://t.co/0wWXa5Poi9'

Top 5 Most Negative

```python
print('Most negative tweets regarding #Coronavirus and #Covid19:')
t = tweets_asian.sort_values(by = ['polarity'], ascending=True)[['polarity', 'tweet_text']].head
(5).reset_index()
for i in range(len(t)):
    print('\nPolarity: ', t['polarity'][i], "\nTweet Text: ", t['tweet_text'][i])
```

Most negative tweets regarding #Coronavirus and #Covid19:

Polarity: -10.2
Tweet Text: b'When Chinese are accusing Taiwanese of racial abuse to Tedros, they are even more r
acist to people with dark skin. How ironic. #fuckchina #wuhanvirus #chinavirus #ccpvirus #COVID19
#coronavirus #cardib #bitch https://t.co/ntEj8vgCki'

Polarity: -6.6
Tweet Text: b'The death rate in Italy, Spain and France - three of the countries worst-affected b
y the coronavirus - appears to be slowing. #coronavirus #CoronaOutbreak #Wuhan #China #COVID19 #I
ndia #COVID #CoronaVirusUpdate #ChineseVirus #WuhanVirus #US #Italy #Spain #Germany #France'

Polarity: -5.2
Tweet Text: b'Fighting fake news: The new front in the coronavirus battle @AJENews   #coronavirus
#CoronaOutbreak #Wuhan #China #COVID19 #India #COVID #CoronaVirusUpdate #ChineseVirus #WuhanVirus
#US #Italy #Spain #Germany #France #UK #Iran #WHO #FakeNews   https://t.co/Ks4lKhlxsL'

Polarity: -3.8
Tweet Text: b"#Trump claims 'total authority' and attacks media in chaotic coronavirus briefing
#coronavirus #coronarvirues #CoronaOutbreak #Wuhan #China #COVID19 #COVID #CoronaVirusUpdate #Chin
eseVirus #WuhanVirus #US   https://t.co/XS95nJYODJ"

Polarity: -3.6000000000000005
Tweet Text: b'The CNN has alot of Trump supporters mad \xf0\x9f\xa4\x94\xf0\x9f\x98\x82 Q: What
was Trump doing in Feb? Having rallies , golfing ... Feb 7 th gave 17 tons of PPE to China without
restocking/replacing PPE \xf0\x9f\xa4\x94 calling #COVID19 a hoax blaming the media ... #TrumpMelt
down #PressBriefing #coronavirus #UBI'

Distribution of Tweet Polarities

Distributions of Coronavirus/Covid19 Tweet Polarities
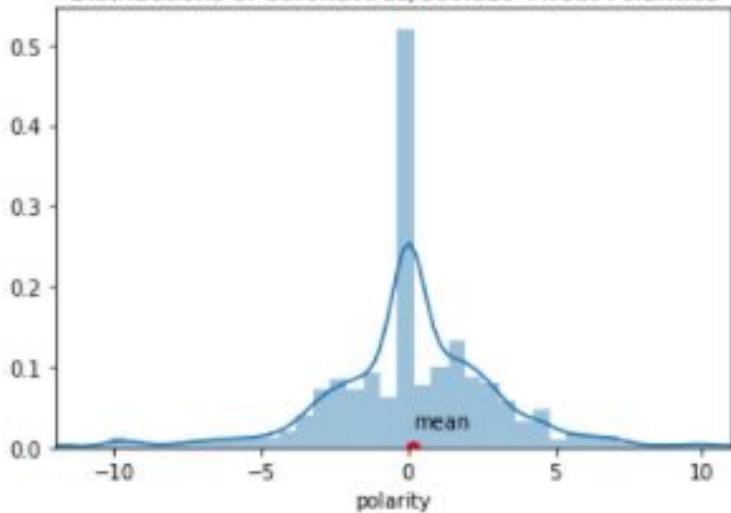
Distributions of Coronavirus/Covid19 With Asian Reference Tweet Polarities
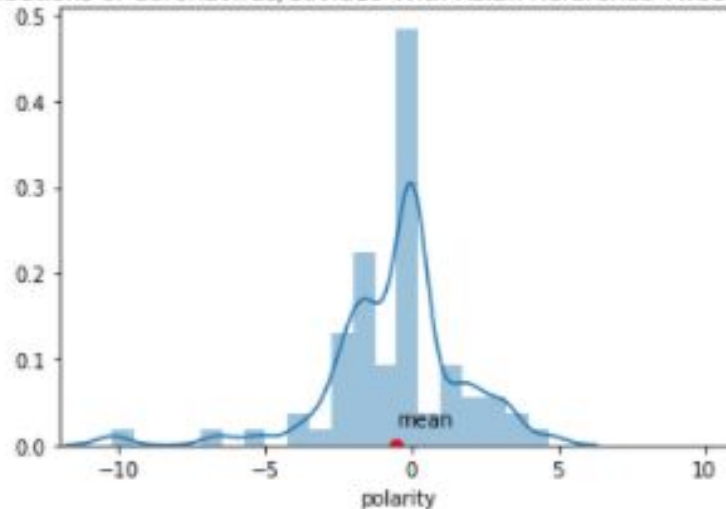
```
mean_no_asian:   0.21185344827586206
mean_asian:     -0.5194444444444444
```

Distribution of Tweet Polarities

Distributions of Tweet Polarities (Asian References With/Without)
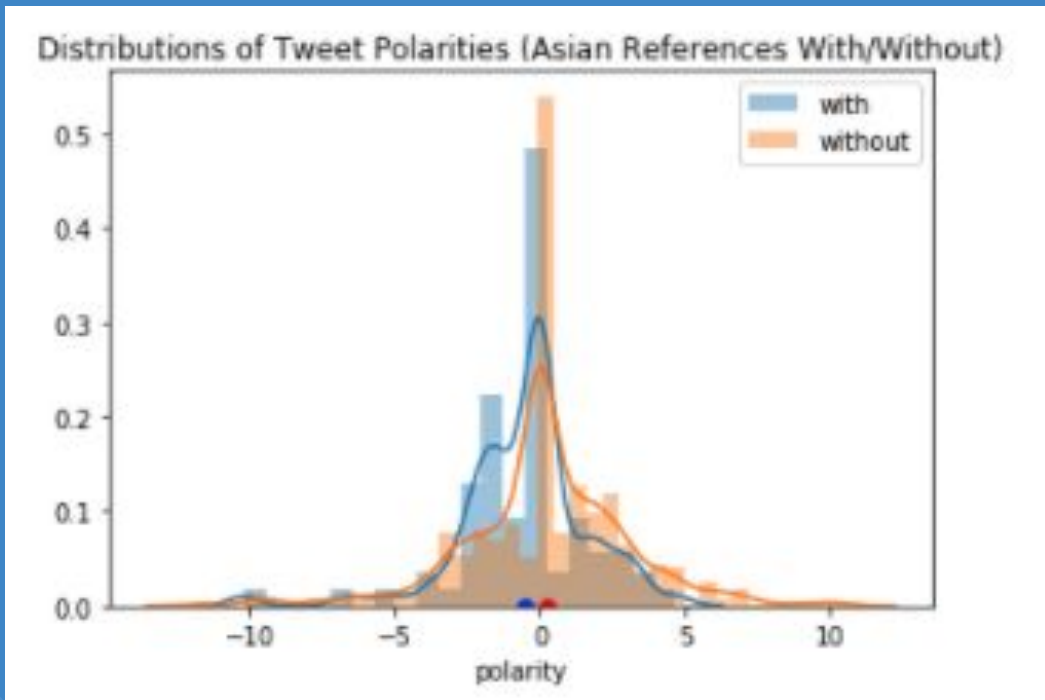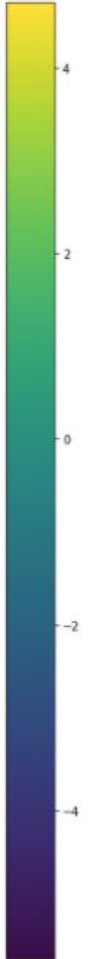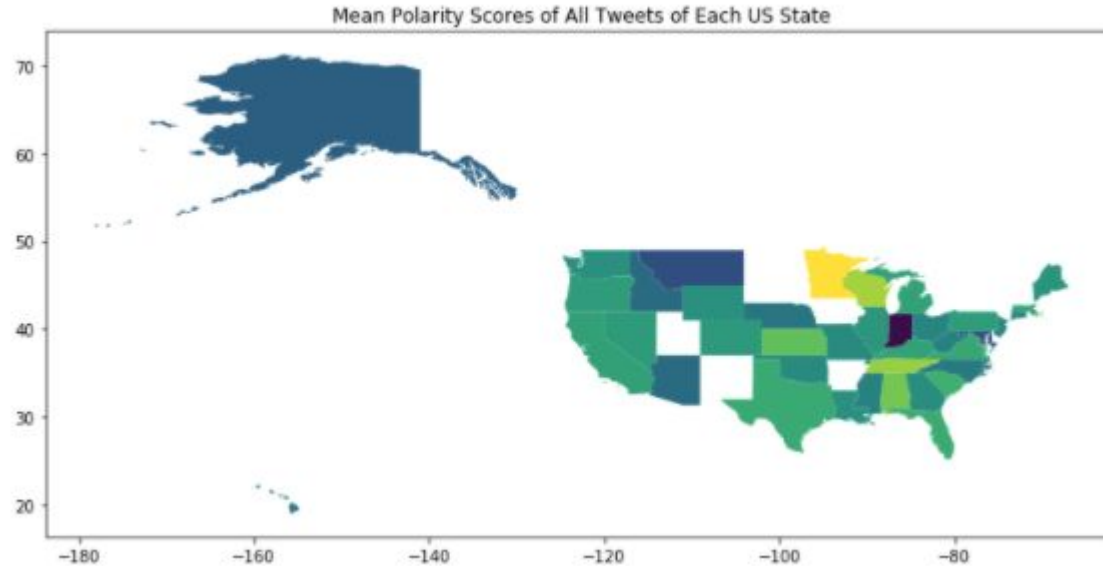
```
mean_no_asian:  0.21185344827586206
mean_asian:    -0.5194444444444444
```

Mapping Mean Polarity Scores to Location

In order to create a map such as the following, we must tackle faulty Twitter data

Mean Polarity Scores of All Tweets of Each US State

Mapping Mean Polarity Scores to Location

```
                    b''
                    b''
      b'California, USA'
                    b''
    b'Out of The Closet'
        b'Dayton, OH'
                    b''
          b'Singapore'
                    b''
             b'Japan'
                    b''
       b'Seattle, WA'
      b'Dallas, Texas'
     b'Anywhere, USA'
                    b''
                    b''
               b'NYC'
         b'14th State '
       b'Doha, Qatar'
          b'Tanzania'
         b'Australia'
                    b''
         b'Ghaziabad'
     b'USA and Canada'
         b'Mobile, AL'
          b'Worldwide'
          b'Worldwide'
               b'USA'
         b'Chicago, IL'
                    b''
         b'Houston, TX'
     b'Kansas City, MO'
```

Problems with Location Data:

1. Many users choose not to include their location
2. Many invalid locations such as "Out of The Closet"
3. If exists, locations are written in various formats (not standardized)

Solution Attempt To Handle Faulty Location Data

Recognized that most valid locations contain at least one of the following:
- State names
- State abbreviations
- Major city names
- Any of the above, but either all lowercase or one uppercase

Solution:
- Import and combine multiple databases to obtain all existing state names and abbreviations as well as major cities in the US
- Parse through each given location and identify at least one of the keywords given above derived from the combined imported and modified databases

	State_short	State_full	City	lower_state_short	lower_state_full	lower_city
1	MD	Maryland	Aberdeen	md	maryland	aberdeen
2	NC	North Carolina	Aberdeen	nc	north carolina	aberdeen
3	MS	Mississippi	Aberdeen	ms	mississippi	aberdeen
4	KY	Kentucky	Aberdeen	ky	kentucky	aberdeen
5	OH	Ohio	Aberdeen	oh	ohio	aberdeen
6	SD	South Dakota	Aberdeen	sd	south dakota	aberdeen
7	ID	Idaho	Aberdeen	id	idaho	aberdeen
8	WA	Washington	Aberdeen	wa	washington	aberdeen
9	KS	Kansas	Abilene	ks	kansas	abilene
10	TX	Texas	Abilene	tx	texas	abilene
11	NY	New York	Akron	ny	new york	akron
12	PA	Pennsylvania	Akron	pa	pennsylvania	akron
13	AL	Alabama	Akron	al	alabama	akron
14	OH	Ohio	Akron	oh	ohio	akron
15	IN	Indiana	Akron	in	indiana	akron
16	MI	Michigan	Akron	mi	michigan	akron
17	IA	Iowa	Akron	ia	iowa	akron
18	CO	Colorado	Akron	co	colorado	akron
19	VT	Vermont	Albany	vt	vermont	albany
20	NY	New York	Albany	ny	new york	albany
21	GA	Georgia	Albany	ga	georgia	albany
22	KY	Kentucky	Albany	ky	kentucky	albany
23	OH	Ohio	Albany	oh	ohio	albany
24	IN	Indiana	Albany	in	indiana	albany
25	WI	Wisconsin	Albany	wi	wisconsin	albany

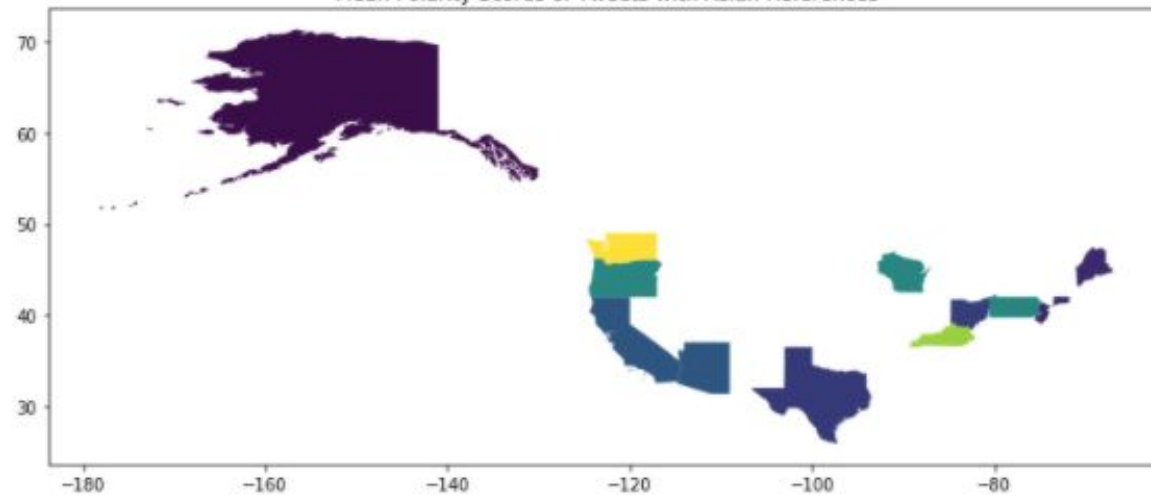# Mapping Mean Polarity Scores to Location

Mean Polarity Scores of All Tweets of Each US State
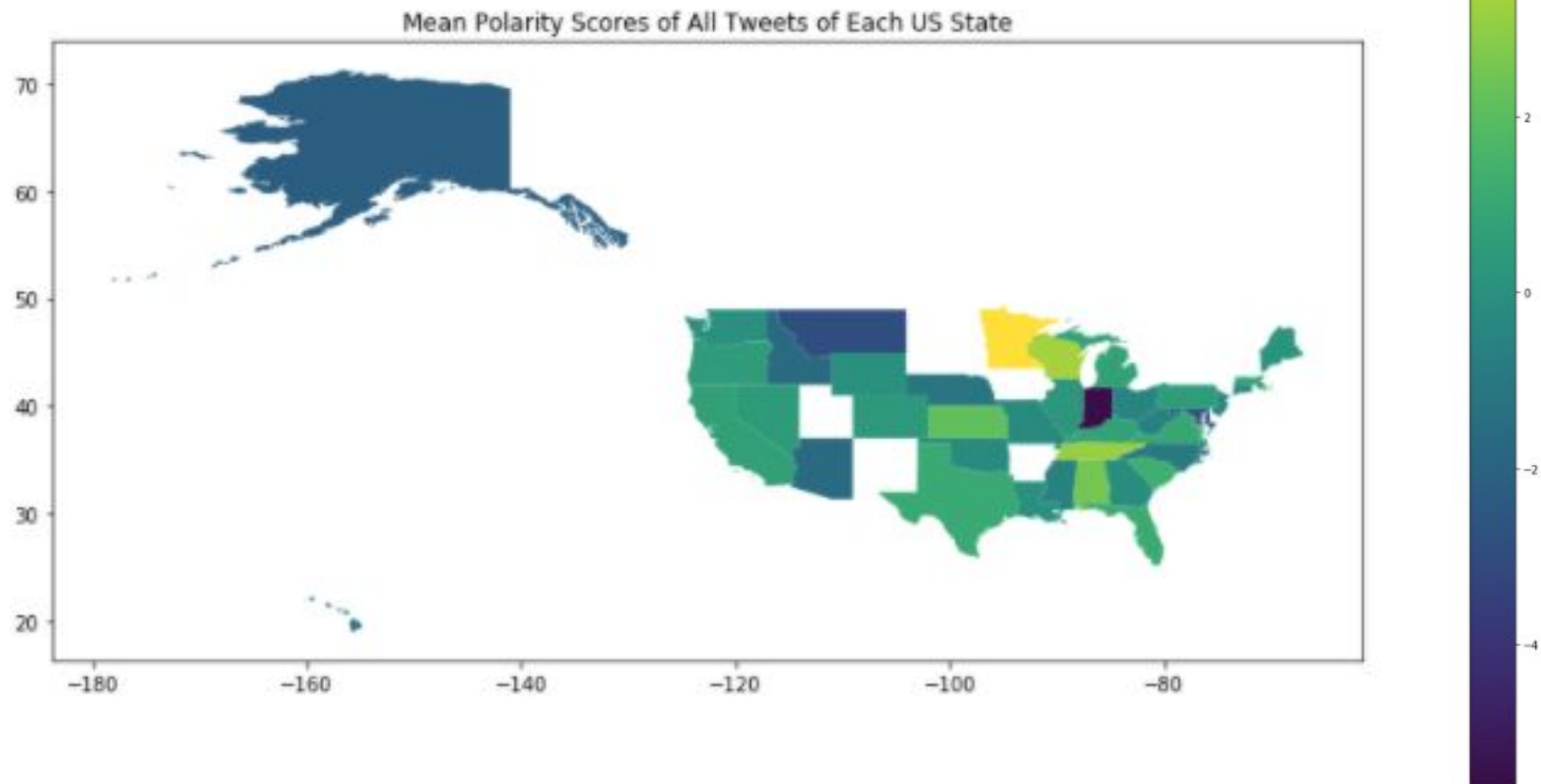
Mapping Number of Coronavirus Cases to Location
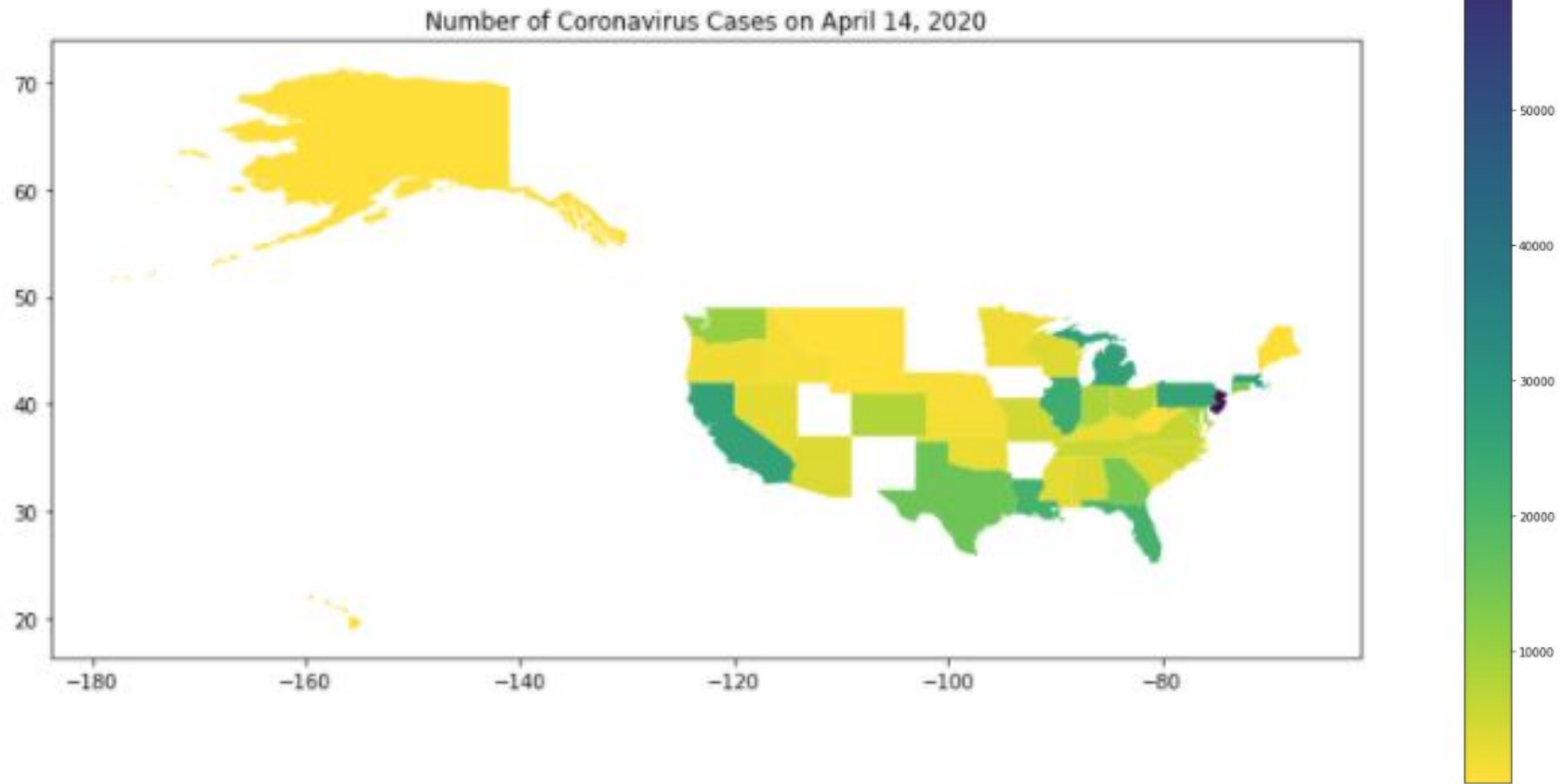
Mean Polarity Scores of Tweets with Asian References

Number of Coronavirus Cases on April 14, 2020

Computing Correlation Coefficients

- **cases** denotes the number of Coronavirus cases in each state
- **mean_polarity** denotes the mean polarity score of tweets with Asian references of each US state (if available)

```
1  # Computing Pearson's Correlation: (To understand strength of linear relationship between the two datasets)
2  p_corr, _ = pearsonr(cases, mean_polarity)
3  corr
```
−0.226606970260943

```
1  # Computing Spearman's Correlation: (To investigate if there may be a nonlinear relationship)
2  s_corr, _ = spearmanr(cases, mean_polarity)
3  s_corr
```
0.02209978480439319

Computing Correlation Coefficients

Pearson's Correlation Coefficient:
- Used to understand the strength of linear relationship between the two datasets
- More fitting to our datasets

Spearman's Correlation Coefficient:
- Used to investigate whether there may actually be a nonlinear relationship
- Less fitting to our datasets

Focusing on the Specifics

Examining tweets using certain hashtags:
#asian & #asians, #kungflu & #chinesevirus

The Data

- **Data Source**:
  - Tweets from April 14, 2020
  - Each tweet contains at least one of the following hashtags: Asian, Asians, Kungflu, Chinesevirus

- **Columns of CSV file:**
  - Timestamp
  - Tweet_text
  - Username
  - All_hashtags
  - Followers_count
  - Location

tweet_text	username	all_hashtags	followers_count	location
...mmakers to write, film, and edit a movie in 3 days. they partner with abc, nbc, cinevision, and others to ...e prizes to emerging creatives. #filmcompetition #asian #hapa #filmmaking #actor #shortfilm #filmma...	b'opprime_tv'	['72HrSO', 'filmcompetition', 'asian', 'hapa', 'filmmaking', 'actor', 'shortfilm', 'filmmakers']	23492	b'Cambridge, MA'
...ian, #mexican, #asian i just love the heat. this vegetable #chilli is great either as a side or hold it's own as a main dish. full recipe here #dadshomekitchen #recipeoftheday	b'dadshomekitchen'	['Indian', 'mexican', 'asian', 'chilli', 'dadshomekitchen', 'RecipeOfTheDay']	1	b'Brisbane, Qld, Australia'
cantona >>> thanks for following me on twitter! #asianpornstar #asian #porn	b'asianpornstars'	['asianpornstar', 'asian', 'porn']	5592	b'World Wide Web'
...\xe2\x80\x9cthe successful warrior is the average man, with laser-like focus.\xe2\x80\x9d - bruce lee. ...\xf0\x9f\x8f\x86\xf0\x9f\x94\x9d\xf0\x9f\x91\x80\xf0\x9f\xa7\x98\xf0\x9f\x8f\xbc\xe2\x80\x8d\xe2\x99...	b'malikabuz'	['model', 'rapper', 'photoshoot', 'fallshoot', 'wintershoot', 'hiphop', 'rap', 'austin', 'texas', 'asian']	2	b'Austin, TX'
wait what gogoing and ggoong aren't the same fortune #cookie #asian #food #conspiracy..."	b'd0lphin_ebooks'	['cookie', 'asian', 'food', 'conspiracy']	2216	b''
...	...	...	...	...
@pm_nepal @narendramodi well said. unite we stand divide we fall. #asians'	b'ChandanRaman3'	['Asians']	5	b'Nepal'
...se,mouth,eyes,head. covid spread in #ireland 20% travellers 42% community #covid strain are same in ...kingham, cork n boston, limerick n copenhagen. \xe2\x80\x98he yah\xe2\x80\x99 from a #socialdista...	b'rajesh_GoGreen'	['asians', 'ireland', 'Covid', 'socialdistance', 'Stop']	0	b''
...oughts #motivation #comedy this is why you should smoke weed! respect #asians #iphones #trending'	b'MufasaKush'	['guessmyhighmoments', 'HMC', 'Hightthoughts', 'motivation', 'comedy', 'asians', 'iphones', 'Trending']	83	b'Cartoon Network'
...e by growing luffas in containers! it is a lot of fun and rewarding as well! #grow #luffa #containerhomes #vegetable #mondaymorning @mariao626 @margiewarrell	b'BGardenWeb'	['asians', 'grow', 'luffa', 'ContainerHomes', 'vegetable', 'MondayMorning']	2005	b''
		['coronavirus', 'coronavirusNederland'		

Top 5 most negative tweets regarding #asians and #asian

```python
print('Most negative tweets regarding #asian and #asians:')
for t in key_asianasians_df.sort_values('polarity').head(5)['tweet_text']:
    print('\n  ', t)
print('_____
_')
```

Most negative tweets regarding #asian and #asians:

   #people are receiving a lot of criticism for daring to talk about #china being the origin of the #covid #pandemic in a publi
c forum because it "causes #racism and harm to #asians". no. racist assholes are a threat to asians not evidentiary #facts.

   hey everybody, look at this filthy piece of pure evil. #kathaleenwall is going to make sure #asians are attacked because sh
e\xe2\x80\x99s a disgusting #racist. she knows how stupid her followers are and what the consequences are of hateful ads like h
ers. #texas reject her!

   the world needs to see this. when they call out people around the globe being racist and discriminating #chinese #asian, loo
k what they\xe2\x80\x99ve done inside the wall, they are racist themselves. #china #chinazi #racist #racism #chinesevirus #neev
vy #neevyy #nnevyy #ccp #ccpchina

   '#covid_19 and anti-asian #racism: how the language of disease produces hate and violence'   prejudice against #asians has b
een a staple feature of #northamerican society since the first #chinese workers arrived in the mid-19th century.   read:

   the deaths of #poor #blacklivesmatter #latinos #asians could had been avoided in #nyc but #trump negligence to take timely m
easures to stop #covid19 @nygovcuomo & @billdeblasio missed ball too #neoliberal policy produces #poverty #chronicillness &
amp; #death
_____

Top 5 most negative tweets regarding #kungflu and #chinesevirus

```python
print('Most negative tweets regarding #kungflu and #chinesevirus:')
for t in key_kungfluchinesevirus_df.sort_values('polarity').head(5)['tweet_text']:
    print('\n  ', t)
print('_____
__')
```

Most negative tweets regarding #kungflu and #chinesevirus:

   after feeding them with rats and bats, china is now feeding it's oppressed citizens with lies that africans are the cause of the #chinesevirus #chinesevirus19 or the #kungflu, evicting africans like the dogs they eat,,,we shall deal with your racist a ss #chinamustexplain"

   @davidlipson it's another horrible dirty disease that originated from china, the country whose image will suffer the most. n obody believes china doesn't have the most deaths. #chinesevirus #kungflu"

   @amnestyusa when did you go from "fighting the bad guys" to "defending and protecting the bad guys"??? \xf0\x9f\xa4\xa8 #chi nesevirus #chinesewuhanvirus #chineseviruscorona #chinesecoronavirus #kungflu #flumanchu #hongkongfluey #chineseflu #wuflu

   and #china calls everyone racist who questions their mishandling of #chinesevirus #wuflu #kungflu #racist

   time of plague 4 "govt non-essential workers to stay at home" somebody please explain to me what the hell is a "govt non-e ssential worker" & why the hell are we paying them our tax dollars if they\'re non-essential??? #chinesevirus #kungflu #ch icomvirus #wuhuflu #covid\xe3\x83\xbc19

_____

Challenges

- Facebook API is too difficult to utilize

- Twitter API is restrictive on number of tweets you can extract.

- Twitter also prevents you from collecting tweets over a long period of time

- COVID-19 disrupted workflow, preventing us from meeting up and coding together

Conclusion

The Future

Thank you!