Final Project - Twitter Adapter Report

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Introduction:

This is a twitter adapter project with both server side in php and mysql database and front-side user interface by html/css/JS. Basically, we retrieve bunch of data from twitter server in real-time down to our local database and then parse them into our local normalized database. Then we render all data onto the webpage through html/css/js and then analyze sentimental and location information of every single tweet by the php_nlp bases classifier and google geo coding API.

How to implement?

First, I will give a short workflow of how whole project works. Then I will clarify that which part of coding are responsible for in the this project.
There are Three parts of this project.
The first part is for retrieve data from twitter server to local database. The database is populated in two steps: getting the tweets, and parsing them into multiple tables. It is important to separate these operations, because tweets may be sent by the Twitter API at a very fast rate. If each tweet is parsed and inserted into multiple tables as it is received, the code and database may not be able to keep up with the data flow, and tweets will be lost. My solution is to store the tweets as they are received in a simple cache table without doing any parsing. A separate process does the parsing and storage into separate tables.

The first step of collecting tweets is done by get_tweets.php, which is run as a continuous background process. When a new tweet is received the Twitter streaming API, get_tweets.php uses db_lib.php to insert it into the json_cache table. The connection with the Twitter streaming API is maintained by the Phirehose library.

The Twitter streaming API returns data in JSON format. To make the collection process as fast as possible, the entire JSON payload for a single tweet is saved to the database as a single string without any parsing.

A separate background process is run for parse_tweets.php, which gets the JSON data for each tweet from the json_cache table, parses it into it's component parts, and inserts them into separate table for use by the other modules in the Twitter adapter. Once again, db_lib.php is used to manage the MySQL code.

The rest of the modules of this project then are able to rely on this database of tweets and supporting data without having any direct contact with the Twitter API. Once you install the

Twitter database server code, then can build my own Twitter apps that are assured of a real-time source of Twitter data.

The second part is for displaying which is a webpage the users directly interact with. Let's follow the flow of tweet data from web server to browser using the sample Web page included with this code, index.php:
When index.php is opened by a web browser, it uses require_once() to call twitter_display.php in the plugin directory.
Twitter_display.php loads tweet_list_template.txt, which defines the HTML structure of the list of tweets. This template has macros that show where to include all the tweet data.
When the macro for the list of recent tweets is reached, get_tweet_list.php is called with require_once().
Get_tweet_list.php extracts the most recent tweets from the tweets table in the MySQL database, and loops through them. For each set of tweet data it uses tweet_template.txt to assemble an HTML version of the tweet.
The text of each tweet is passed to the linkify() function. The linkify() function in display_lib.php converts each entity (@mentions, tags, and URLs) into formatted hyperlinks.
When get_tweet_list.php has a complete set of tweets in HTML format, it returns it to twitter_display.php, and the list appears in the Web page.
After the page loads, site.js starts and sets up parts of the interface, including a More Tweets button at the bottom of the tweet list and a count of new tweets link at the top of the list. It also establishes a refresh interval for calling the Web server with Ajax to get the count of new tweets.
Every time the refresh interval is reached, site.js calls get_new_tweet_count.php with Ajax, gets the count of new tweets, and displays them in the new tweets count.
If the user clicks the More Tweets button, site.js requests a set of older tweets from get_tweet_list.php. These are returned as HTML, and appended to the end of the tweet list.
All of the interactions with the Twitter database server are done through the db_lib.php script in the db directory.

After we retrieve the data from the twitter server with tweeter streaming API and then render the content onto our webpage. The next is to do the data analysis in both sentiment analysis and the geo-location analysis.
We use the Naive Bayes trainer and classier to gather all the words in positive, negate or neutral and then classify the single sentence based on the probability of being positive or positive. This process including language prepress and classifying is done by invoke the API which is provided by php_nlp_tools.
As far as the geolocation part, we first get the dataset of all cities over the world which contails about 2 or 3 millions records and store them into our database for later detecting if the particular word in a tweet is a location information or not. For the query efficiency we need to create the index for the cityname column in that table we just created since there is too much data there and It's necessary to create such a index for that column. Then we just look up every word in one sentence in database. Suppose we have 100 words in one tweet(which is not alway the case) and we have 20 tweets showing on the page. Then we most have 2000 words in one page and the time for each select query is approximately 0.0001 seconds so it won't take above 1 seconds to execute these operations which process all words on the page at the same time. After we get he location words then simply merge them together and then input the location information into google geo API. Then we will get the latitude and longitude and invoke the google API again, then we can finally show the tweet location on the google map.
That's basically the workflow of the whole project.

Following is what every file specifically dose:

- Twitter Database Server Source Code Files:

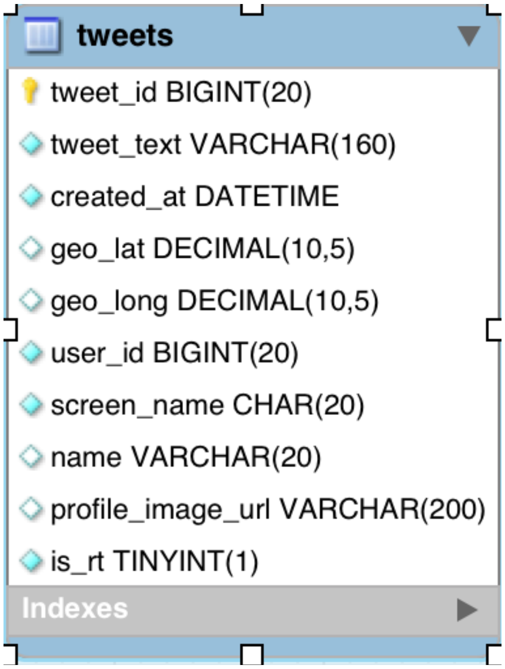
Phirehose Library - Phirehose library for capturing tweets from the Twitter streaming API.
config.php - General configuration options for the this Twitter adapter.
db_config.php - Database configuration options for the Twitter database server.
db_lib.php - Database library used by the entire Twitter adapter.
db_test.php - Simple test script for the Twitter database server.
get_tweets.php - Gather tweets in real-time using the Twitter streaming API.
monitor_tweets.php - Run as cron job that reports errors by email if the tweet collection fails.
parse_tweets.php - Parse tweets into a normalized database schema.

- Twitter Display Source Code Files:

lib - php_Insight library for sentiment analysis using Naive Bayes classifier algorithm.
NlpTools - Another tools for natural language processing library used for tokenizing sentence.
default.css - CSS style sheet for the Twitter display plugin.
get_new_tweet_count.php - Return the count of new tweets as text/HTML.
get_tweet_list.php - Return the most recent tweets as HTML.
index.html - Example of a Web page using the Twitter display plugin.
twitter_display.php - Main module of the Twitter display plugin.
display_lib.php - Functions used to display tweets: linkify() and twitter_time().
site.js - Use Ajax to refresh the new tweet count and load more tweets.
tweet_list_template.txt - Text template for formatting a complete list of tweets on a Web page.
tweet_template.txt - Text template for formatting a single tweet.
twitter_display_config.php - Configuration options for the Twitter display plugin.

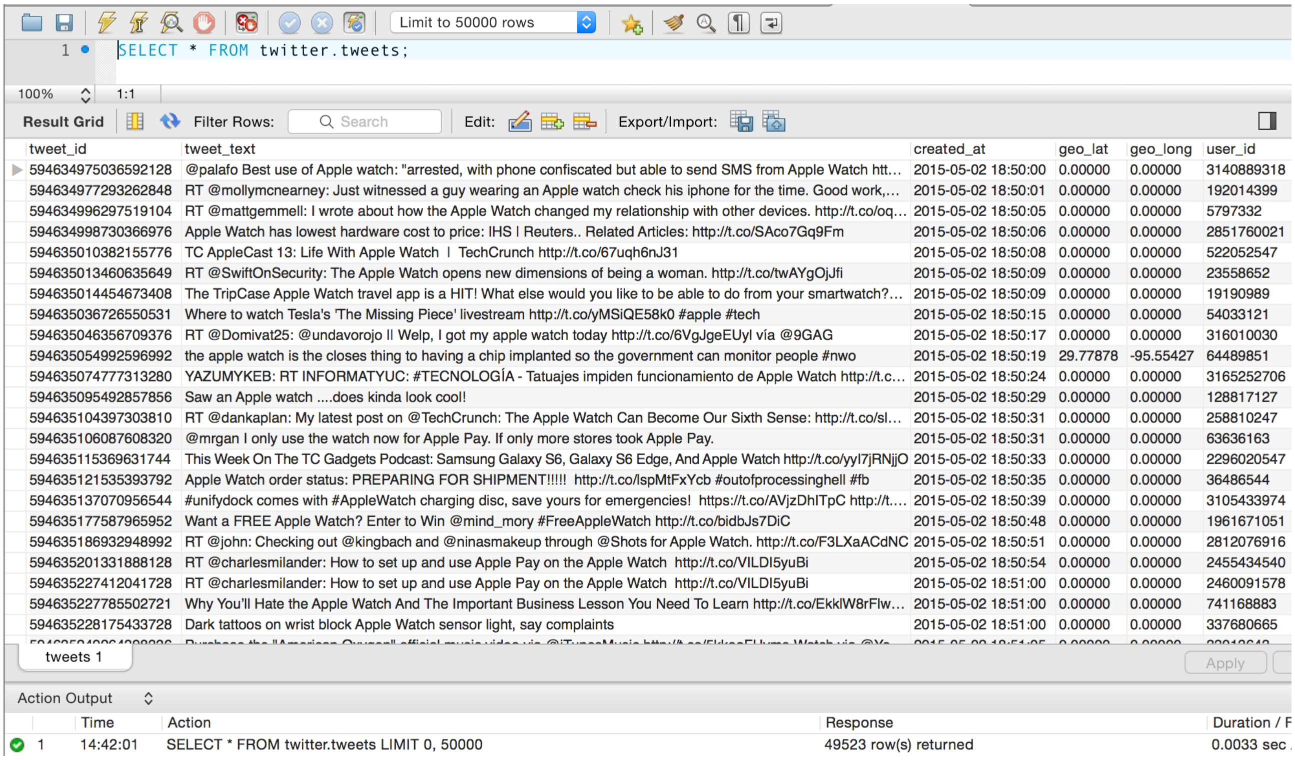
Database tables:

Tweets table:



tweets

tweet_id BIGINT(20)
tweet_text VARCHAR(160)
created_at DATETIME
geo_lat DECIMAL(10,5)
geo_long DECIMAL(10,5)
user_id BIGINT(20)
screen_name CHAR(20)
name VARCHAR(20)
profile_image_url VARCHAR(200)
is_rt TINYINT(1)

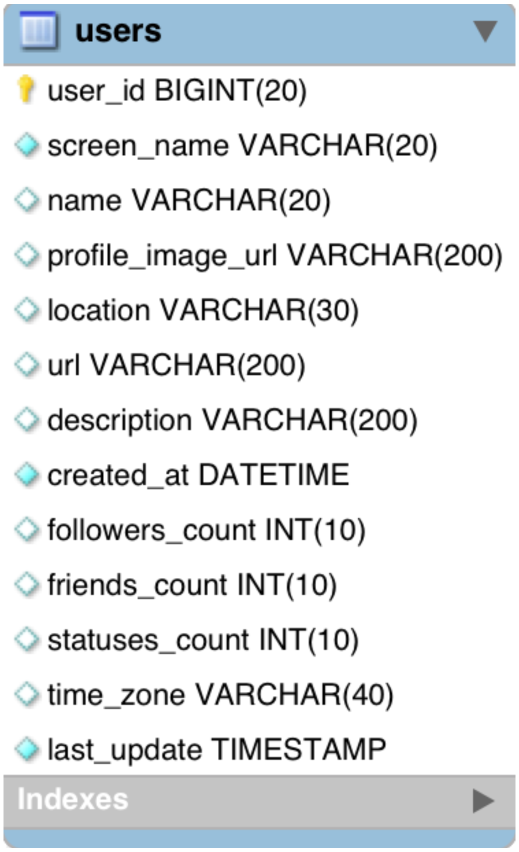


```
1  SELECT * FROM twitter.tweets;
```

tweet_id	tweet_text	created_at	geo_lat	geo_long	user_id
594634975036592128	@palafo Best use of Apple watch: "arrested, with phone confiscated but able to send SMS from Apple Watch htt…	2015-05-02 18:50:00	0.00000	0.00000	3140889318
594634977293262848	RT @mollymcnearney: Just witnessed a guy wearing an Apple watch check his iphone for the time. Good work,…	2015-05-02 18:50:01	0.00000	0.00000	192014399
594634996297519104	RT @mattgemmell: I wrote about how the Apple Watch changed my relationship with other devices. http://t.co/oq…	2015-05-02 18:50:05	0.00000	0.00000	5797332
594634998730366976	Apple Watch has lowest hardware cost to price: IHS I Reuters.. Related Articles: http://t.co/SAco7Gq9Fm	2015-05-02 18:50:06	0.00000	0.00000	2851760021
594635010382155776	TC AppleCast 13: Life With Apple Watch I TechCrunch http://t.co/67uqh6nJ31	2015-05-02 18:50:08	0.00000	0.00000	522052547
594635013460635649	RT @SwiftOnSecurity: The Apple Watch opens new dimensions of being a woman. http://t.co/twAYgOjJfi	2015-05-02 18:50:09	0.00000	0.00000	23558652
594635014454673408	The TripCase Apple Watch travel app is a HIT! What else would you like to be able to do from your smartwatch?…	2015-05-02 18:50:09	0.00000	0.00000	19190989
594635036726550531	Where to watch Tesla's 'The Missing Piece' livestream http://t.co/yMSiQE58k0 #apple #tech	2015-05-02 18:50:15	0.00000	0.00000	54033121
594635046356709376	RT @Domivat25: @undavorojo ll Welp, I got my apple watch today http://t.co/6VgJgeEUyl vía @9GAG	2015-05-02 18:50:17	0.00000	0.00000	316010030
594635054992596992	the apple watch is the closes thing to having a chip implanted so the government can monitor people #nwo	2015-05-02 18:50:19	29.77878	-95.55427	64489851
594635074777313280	YAZUMYKEB: RT INFORMATYUC: #TECNOLOGÍA - Tatuajes impiden funcionamiento de Apple Watch http://t.c…	2015-05-02 18:50:24	0.00000	0.00000	3165252706
594635095492857856	Saw an Apple watch ....does kinda look cool!	2015-05-02 18:50:29	0.00000	0.00000	128817127
594635104397303810	RT @dankaplan: My latest post on @TechCrunch: The Apple Watch Can Become Our Sixth Sense: http://t.co/sl…	2015-05-02 18:50:31	0.00000	0.00000	258810247
594635106087608320	@mrgan I only use the watch now for Apple Pay. If only more stores took Apple Pay.	2015-05-02 18:50:31	0.00000	0.00000	63636163
594635115369631744	This Week On The TC Gadgets Podcast: Samsung Galaxy S6, Galaxy S6 Edge, And Apple Watch http://t.co/yyI7jRNjjO	2015-05-02 18:50:33	0.00000	0.00000	2296020547
594635121535393792	Apple Watch order status: PREPARING FOR SHIPMENT!!!!! http://t.co/lspMtFxYcb #outofprocessinghell #fb	2015-05-02 18:50:35	0.00000	0.00000	36486544
594635137070956544	#unifydock comes with #AppleWatch charging disc, save yours for emergencies! https://t.co/AVjzDhITpC http://t.…	2015-05-02 18:50:39	0.00000	0.00000	3105433974
594635177587965952	Want a FREE Apple Watch? Enter to Win @mind_mory #FreeAppleWatch http://t.co/bidbJs7DiC	2015-05-02 18:50:48	0.00000	0.00000	1961671051
594635186932948992	RT @john: Checking out @kingbach and @ninasmakeup through @Shots for Apple Watch. http://t.co/F3LXaACdNC	2015-05-02 18:50:51	0.00000	0.00000	2812076916
594635201331888128	RT @charlesmilander: How to set up and use Apple Pay on the Apple Watch http://t.co/VILDI5yuBi	2015-05-02 18:50:54	0.00000	0.00000	2455434540
594635227412041728	RT @charlesmilander: How to set up and use Apple Pay on the Apple Watch http://t.co/VILDI5yuBi	2015-05-02 18:51:00	0.00000	0.00000	2460091578
594635227785502721	Why You'll Hate the Apple Watch And The Important Business Lesson You Need To Learn http://t.co/EkklW8rFlw…	2015-05-02 18:51:00	0.00000	0.00000	741168883
594635228175433728	Dark tattoos on wrist block Apple Watch sensor light, say complaints	2015-05-02 18:51:00	0.00000	0.00000	337680665

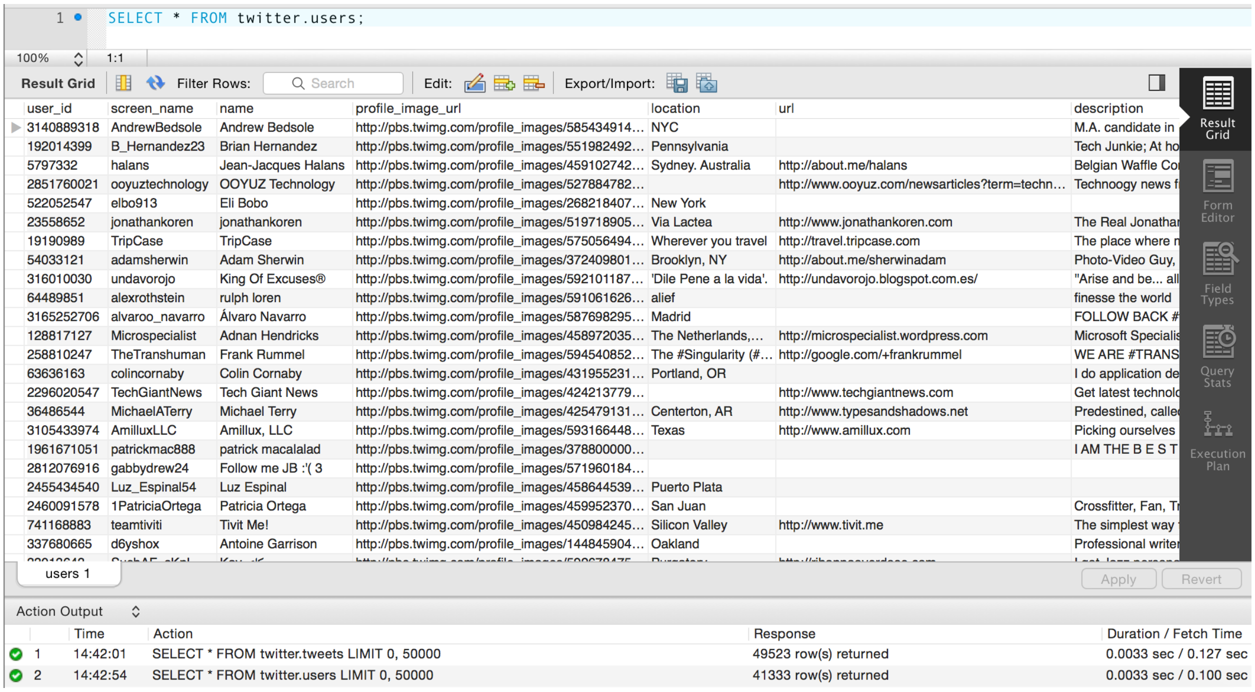
	Time	Action	Response	Duration / F
✓ 1	14:42:01	SELECT * FROM twitter.tweets LIMIT 0, 50000	49523 row(s) returned	0.0033 sec

Twitter user table:



users

- user_id BIGINT(20)
- screen_name VARCHAR(20)
- name VARCHAR(20)
- profile_image_url VARCHAR(200)
- location VARCHAR(30)
- url VARCHAR(200)
- description VARCHAR(200)
- created_at DATETIME
- followers_count INT(10)
- friends_count INT(10)
- statuses_count INT(10)
- time_zone VARCHAR(40)
- last_update TIMESTAMP

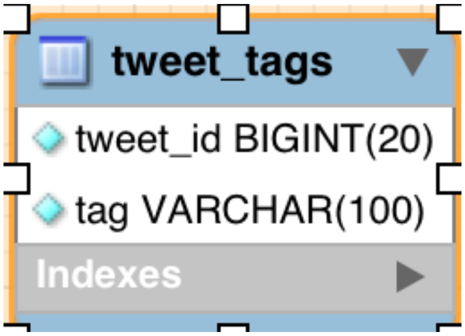


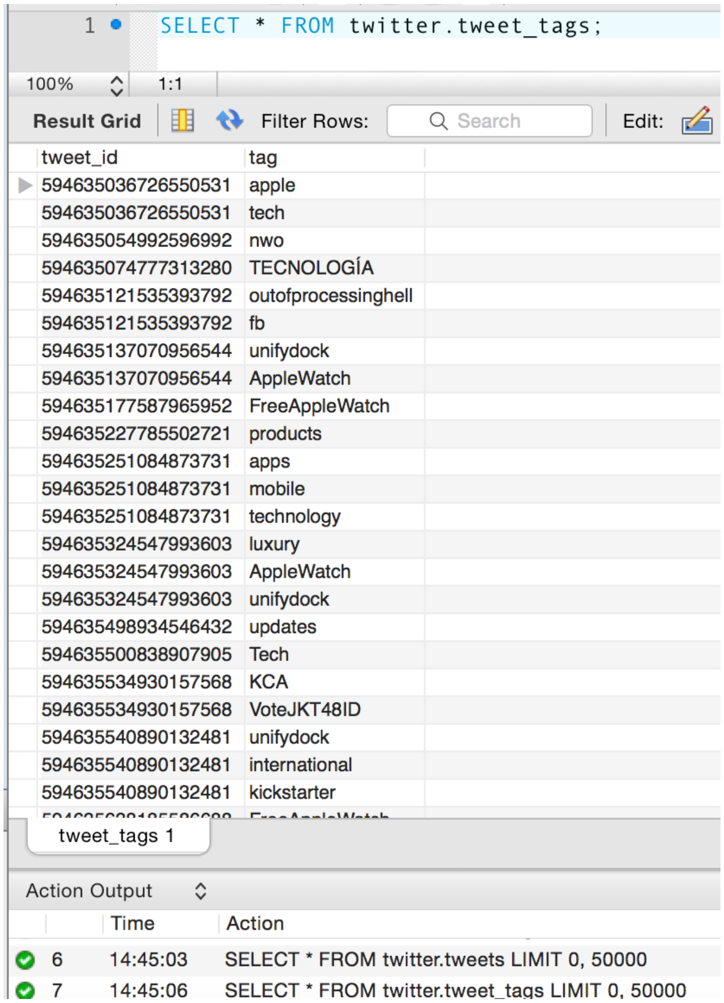
```
SELECT * FROM twitter.users;
```

user_id	screen_name	name	profile_image_url	location	url	description
3140889318	AndrewBedsole	Andrew Bedsole	http://pbs.twimg.com/profile_images/585434914…	NYC		M.A. candidate in
192014399	B_Hernandez23	Brian Hernandez	http://pbs.twimg.com/profile_images/551982492…	Pennsylvania		Tech Junkie; At ho
5797332	halans	Jean-Jacques Halans	http://pbs.twimg.com/profile_images/459102742…	Sydney. Australia	http://about.me/halans	Belgian Waffle Co
2851760021	ooyuztechnology	OOYUZ Technology	http://pbs.twimg.com/profile_images/527884782…		http://www.ooyuz.com/newsarticles?term=techn…	Technoogy news f
522052547	elbo913	Eli Bobo	http://pbs.twimg.com/profile_images/268218407…	New York		
23558652	jonathankoren	jonathankoren	http://pbs.twimg.com/profile_images/519718905…	Via Lactea	http://www.jonathankoren.com	The Real Jonathar
19190989	TripCase	TripCase	http://pbs.twimg.com/profile_images/575056494…	Wherever you travel	http://travel.tripcase.com	The place where n
54033121	adamsherwin	Adam Sherwin	http://pbs.twimg.com/profile_images/372409801…	Brooklyn, NY	http://about.me/sherwinadam	Photo-Video Guy,
316010030	undavorojo	King Of Excuses®	http://pbs.twimg.com/profile_images/592101187…	'Dile Pene a la vida'.	http://undavorojo.blogspot.com.es/	"Arise and be... all
64489851	alexrothstein	rulph loren	http://pbs.twimg.com/profile_images/591061626…	alief		finesse the world
3165252706	alvaroo_navarro	Álvaro Navarro	http://pbs.twimg.com/profile_images/587698295…	Madrid		FOLLOW BACK #
128817127	Microspecialist	Adnan Hendricks	http://pbs.twimg.com/profile_images/458972035…	The Netherlands,…	http://microspecialist.wordpress.com	Microsoft Specialis
258810247	TheTranshuman	Frank Rummel	http://pbs.twimg.com/profile_images/594540852…	The #Singularity (#…	http://google.com/+frankrummel	WE ARE #TRANS
63636163	colincornaby	Colin Cornaby	http://pbs.twimg.com/profile_images/431955231…	Portland, OR		I do application de
2296020547	TechGiantNews	Tech Giant News	http://pbs.twimg.com/profile_images/424213779…		http://www.techgiantnews.com	Get latest technolo
36486544	MichaelATerry	Michael Terry	http://pbs.twimg.com/profile_images/425479131…	Centerton, AR	http://www.typesandshadows.net	Predestined, callec
3105433974	AmilluxLLC	Amillux, LLC	http://pbs.twimg.com/profile_images/593166448…	Texas	http://www.amillux.com	Picking ourselves
1961671051	patrickmac888	patrick macalalad	http://pbs.twimg.com/profile_images/378800000…			I AM THE B E S T
2812076916	gabbydrew24	Follow me JB :'(3	http://pbs.twimg.com/profile_images/571960184…			
2455434540	Luz_Espinal54	Luz Espinal	http://pbs.twimg.com/profile_images/458644539…	Puerto Plata		
2460091578	1PatriciaOrtega	Patricia Ortega	http://pbs.twimg.com/profile_images/459952370…	San Juan		Crossfitter, Fan, Tr
741168883	teamtiviti	Tivit Me!	http://pbs.twimg.com/profile_images/450984245…	Silicon Valley	http://www.tivit.me	The simplest way
337680665	d6yshox	Antoine Garrison	http://pbs.twimg.com/profile_images/144845904…	Oakland		Professional writer

		Time	Action	Response	Duration / Fetch Time
✓	1	14:42:01	SELECT * FROM twitter.tweets LIMIT 0, 50000	49523 row(s) returned	0.0033 sec / 0.127 sec
✓	2	14:42:54	SELECT * FROM twitter.users LIMIT 0, 50000	41333 row(s) returned	0.0033 sec / 0.100 sec

Tweet Hashtag table:



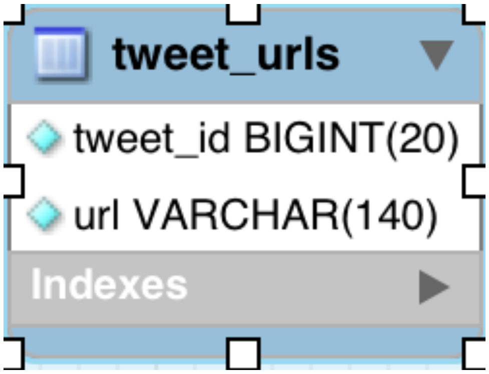


```
SELECT * FROM twitter.tweet_tags;
```

tweet_id	tag
594635036726550531	apple
594635036726550531	tech
594635054992596992	nwo
594635074777313280	TECNOLOGÍA
594635121535393792	outofprocessinghell
594635121535393792	fb
594635137070956544	unifydock
594635137070956544	AppleWatch
594635177587965952	FreeAppleWatch
594635227785502721	products
594635251084873731	apps
594635251084873731	mobile
594635251084873731	technology
594635324547993603	luxury
594635324547993603	AppleWatch
594635324547993603	unifydock
594635498934546432	updates
594635500838907905	Tech
594635534930157568	KCA
594635534930157568	VoteJKT48ID
594635540890132481	unifydock
594635540890132481	international
594635540890132481	kickstarter

	Time	Action
6	14:45:03	SELECT * FROM twitter.tweets LIMIT 0, 50000
7	14:45:06	SELECT * FROM twitter.tweet_tags LIMIT 0, 50000

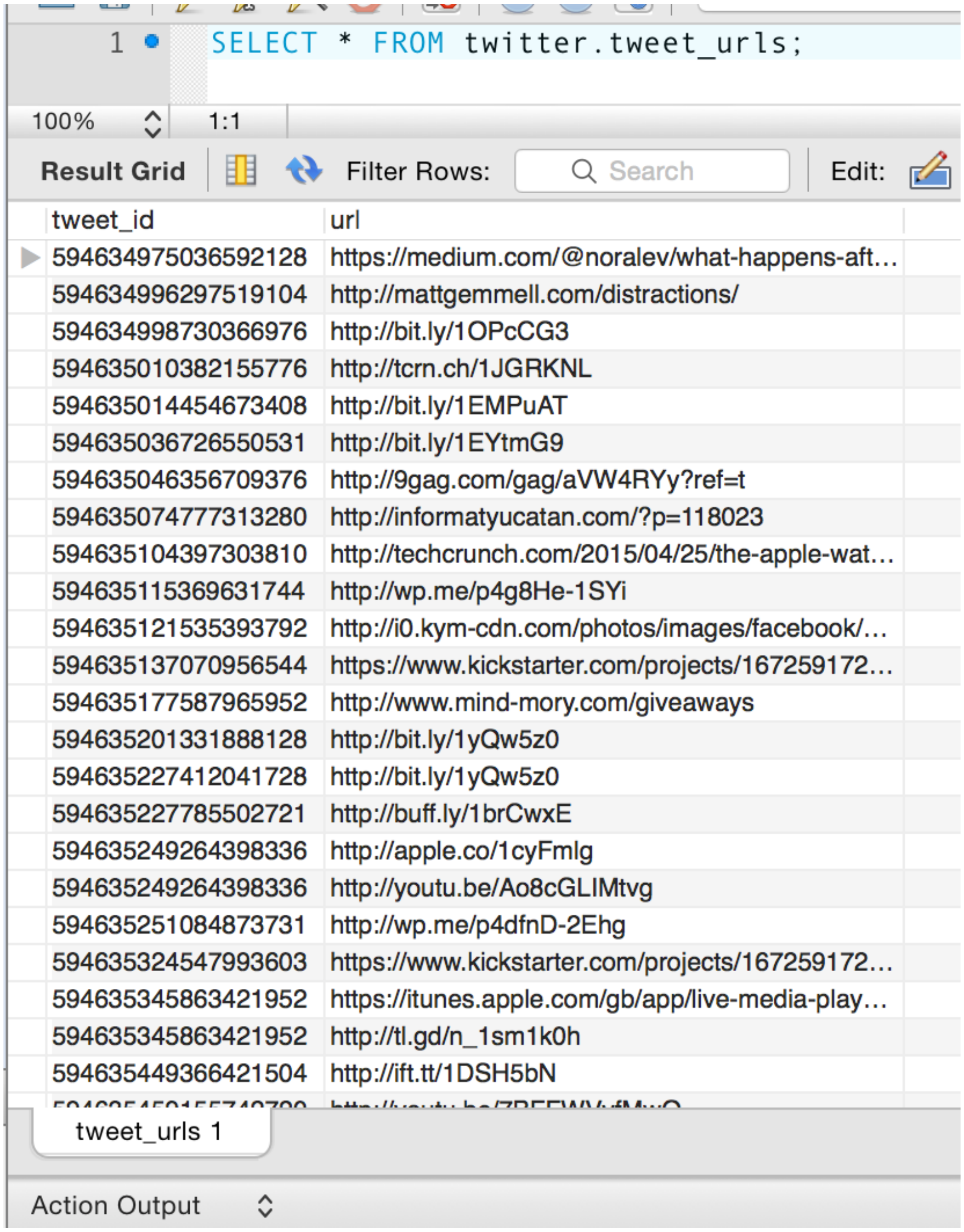
Tweet URLS table:



tweet_urls

tweet_id BIGINT(20)

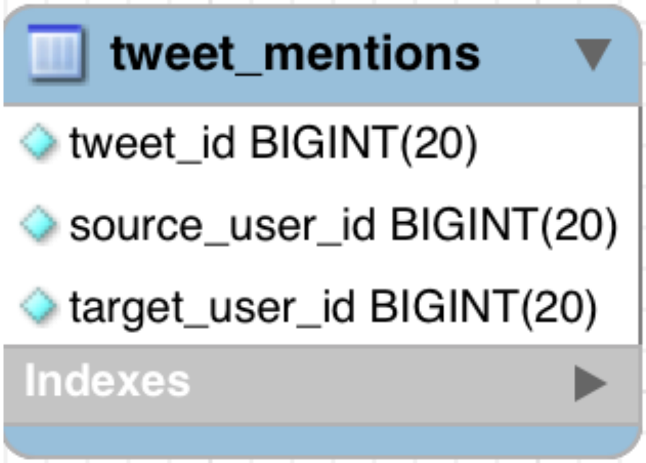
url VARCHAR(140)



```
SELECT * FROM twitter.tweet_urls;
```

tweet_id	url
594634975036592128	https://medium.com/@noralev/what-happens-aft…
594634996297519104	http://mattgemmell.com/distractions/
594634998730366976	http://bit.ly/1OPcCG3
594635010382155776	http://tcrn.ch/1JGRKNL
594635014454673408	http://bit.ly/1EMPuAT
594635036726550531	http://bit.ly/1EYtmG9
594635046356709376	http://9gag.com/gag/aVW4RYy?ref=t
594635074777313280	http://informatyucatan.com/?p=118023
594635104397303810	http://techcrunch.com/2015/04/25/the-apple-wat…
594635115369631744	http://wp.me/p4g8He-1SYi
594635121535393792	http://i0.kym-cdn.com/photos/images/facebook/…
594635137070956544	https://www.kickstarter.com/projects/167259172…
594635177587965952	http://www.mind-mory.com/giveaways
594635201331888128	http://bit.ly/1yQw5z0
594635227412041728	http://bit.ly/1yQw5z0
594635227785502721	http://buff.ly/1brCwxE
594635249264398336	http://apple.co/1cyFmlg
594635249264398336	http://youtu.be/Ao8cGLIMtvg
594635251084873731	http://wp.me/p4dfnD-2Ehg
594635324547993603	https://www.kickstarter.com/projects/167259172…
594635345863421952	https://itunes.apple.com/gb/app/live-media-play…
594635345863421952	http://tl.gd/n_1sm1k0h
594635449366421504	http://ift.tt/1DSH5bN

User mentions table:

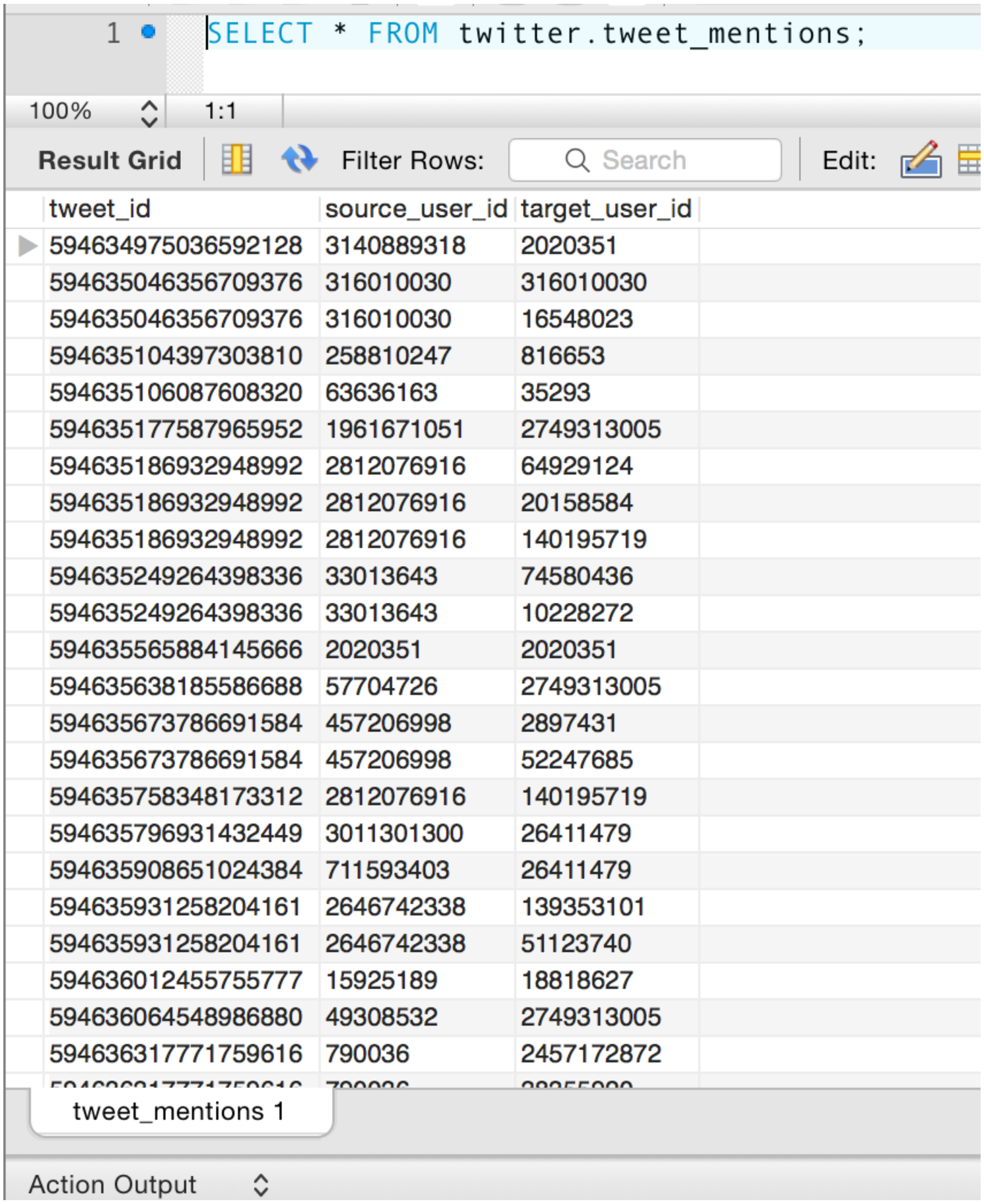


tweet_mentions

tweet_id BIGINT(20)

source_user_id BIGINT(20)

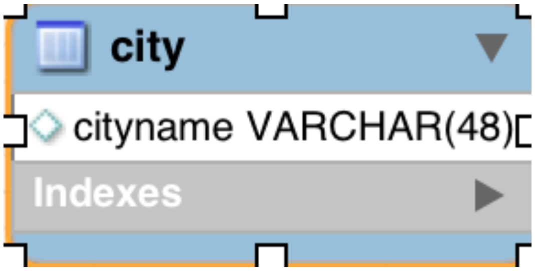
target_user_id BIGINT(20)



```
SELECT * FROM twitter.tweet_mentions;
```

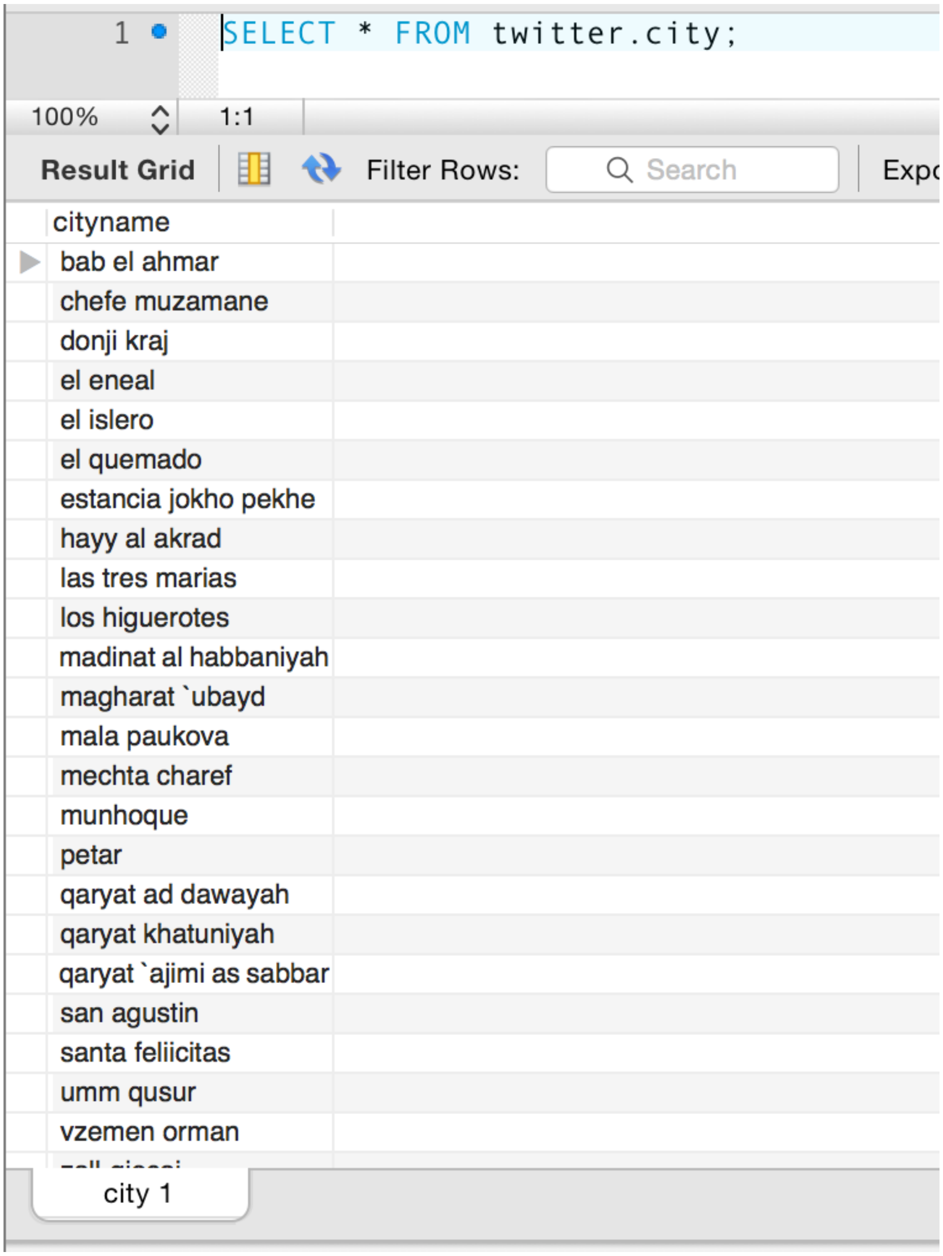
tweet_id	source_user_id	target_user_id
594634975036592128	3140889318	2020351
594635046356709376	316010030	316010030
594635046356709376	316010030	16548023
594635104397303810	258810247	816653
594635106087608320	63636163	35293
594635177587965952	1961671051	2749313005
594635186932948992	2812076916	64929124
594635186932948992	2812076916	20158584
594635186932948992	2812076916	140195719
594635249264398336	33013643	74580436
594635249264398336	33013643	10228272
594635565884145666	2020351	2020351
594635638185586688	57704726	2749313005
594635673786691584	457206998	2897431
594635673786691584	457206998	52247685
594635758348173312	2812076916	140195719
594635796931432449	3011301300	26411479
594635908651024384	711593403	26411479
594635931258204161	2646742338	139353101
594635931258204161	2646742338	51123740
594636012455755777	15925189	18818627
594636064548986880	49308532	2749313005
594636317771759616	790036	2457172872

CITY_NAME Table(for location analysis):



city

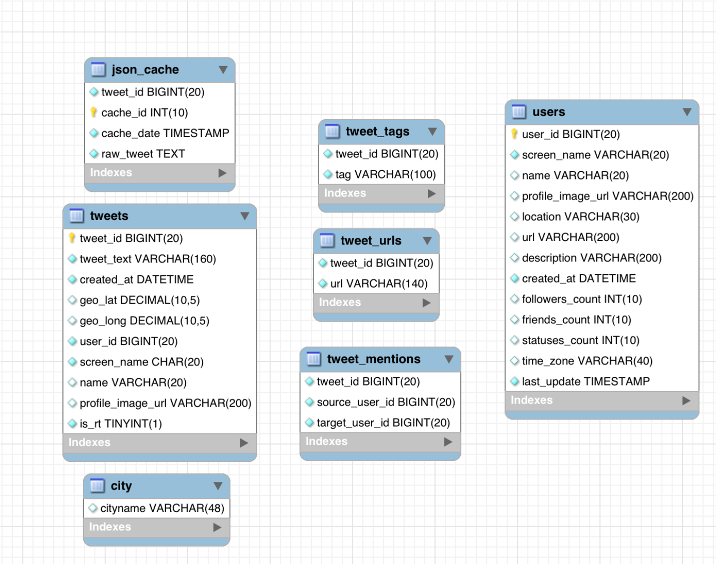
cityname VARCHAR(48)



```
SELECT * FROM twitter.city;
```

cityname
bab el ahmar
chefe muzamane
donji kraj
el eneal
el islero
el quemado
estancia jokho pekhe
hayy al akrad
las tres marias
los higuerotes
madinat al habbaniyah
magharat `ubayd
mala paukova
mechta charef
munhoque
petar
qaryat ad dawayah
qaryat khatuniyah
qaryat `ajimi as sabbar
san agustin
santa feliicitas
umm qusur
vzemen orman
[illegible]

EER Diagram:



json_cache
tweet_id BIGINT(20)
cache_id INT(10)
cache_date TIMESTAMP
raw_tweet TEXT
Indexes

tweets
tweet_id BIGINT(20)
tweet_text VARCHAR(160)
created_at DATETIME
geo_lat DECIMAL(10,5)
geo_long DECIMAL(10,5)
user_id BIGINT(20)
screen_name CHAR(20)
name VARCHAR(20)
profile_image_url VARCHAR(200)
is_rt TINYINT(1)
Indexes

city
cityname VARCHAR(48)
Indexes

tweet_tags
tweet_id BIGINT(20)
tag VARCHAR(100)
Indexes

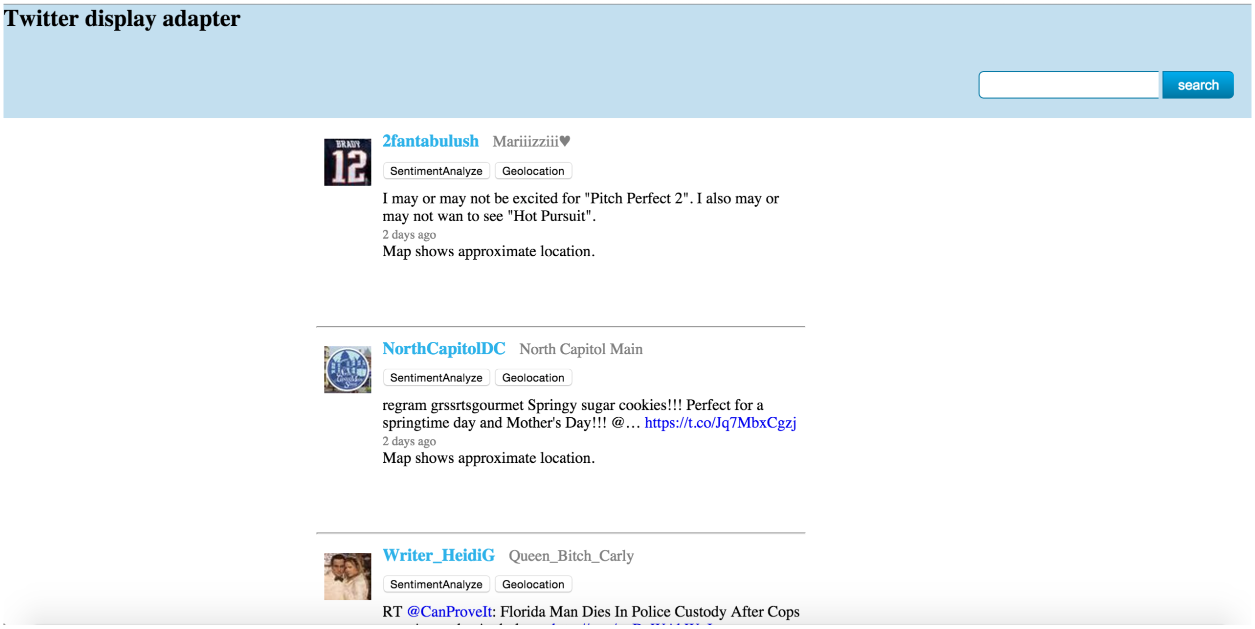
tweet_urls
tweet_id BIGINT(20)
url VARCHAR(140)
Indexes

tweet_mentions
tweet_id BIGINT(20)
source_user_id BIGINT(20)
target_user_id BIGINT(20)
Indexes

users
user_id BIGINT(20)
screen_name VARCHAR(20)
name VARCHAR(20)
profile_image_url VARCHAR(200)
location VARCHAR(30)
url VARCHAR(200)
description VARCHAR(200)
created_at DATETIME
followers_count INT(10)
friends_count INT(10)
statuses_count INT(10)
time_zone VARCHAR(40)
last_update TIMESTAMP
Indexes

Project Sample input/out snapshot:

Homepage index.php:



Twitter display adapter

2fantabulush Mariiizziii♥

I may or may not be excited for "Pitch Perfect 2". I also may or may not wan to see "Hot Pursuit".
2 days ago
Map shows approximate location.

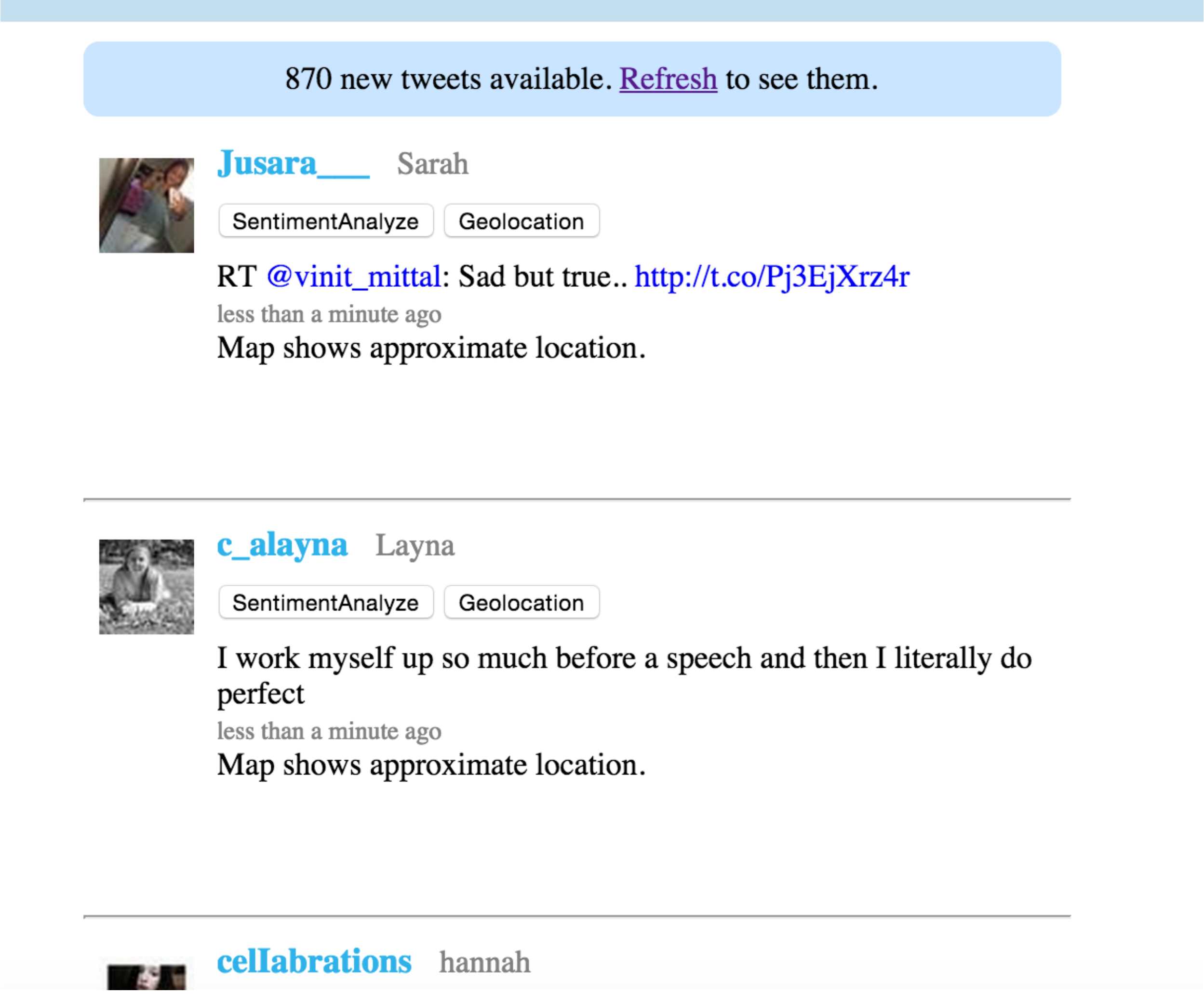
NorthCapitolDC North Capitol Main

regram grssrtsgourmet Springy sugar cookies!!! Perfect for a springtime day and Mother's Day!!! @… https://t.co/Jq7MbxCgzj
2 days ago
Map shows approximate location.

Writer_HeidiG Queen_Bitch_Carly

RT @CanProveIt: Florida Man Dies In Police Custody After Cops

Get tweets of specific topics from tweet server in real-time:



870 new tweets available. Refresh to see them.

Jusara___ Sarah

SentimentAnalyze Geolocation

RT @vinit_mittal: Sad but true.. http://t.co/Pj3EjXrz4r

less than a minute ago

Map shows approximate location.

c_alayna Layna

SentimentAnalyze Geolocation

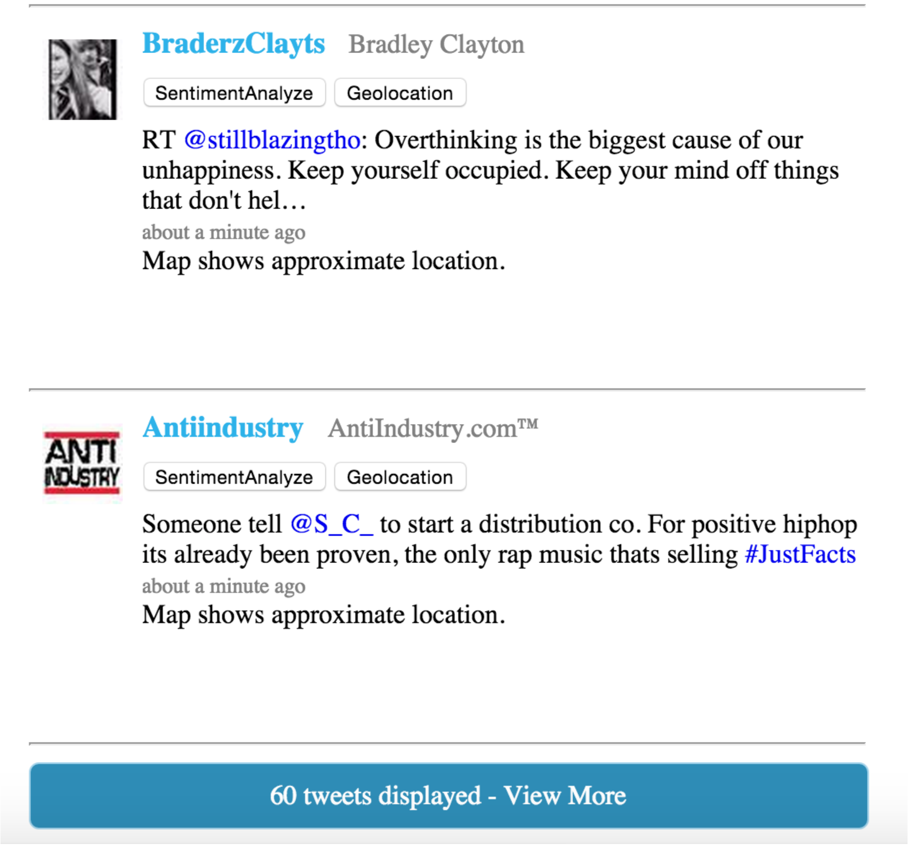
I work myself up so much before a speech and then I literally do perfect

less than a minute ago

Map shows approximate location.

cellabrations hannah

Asynchronously Get more tweets from database



BraderzClayts Bradley Clayton

RT @stillblazingtho: Overthinking is the biggest cause of our unhappiness. Keep yourself occupied. Keep your mind off things that don't hel…

about a minute ago

Map shows approximate location.

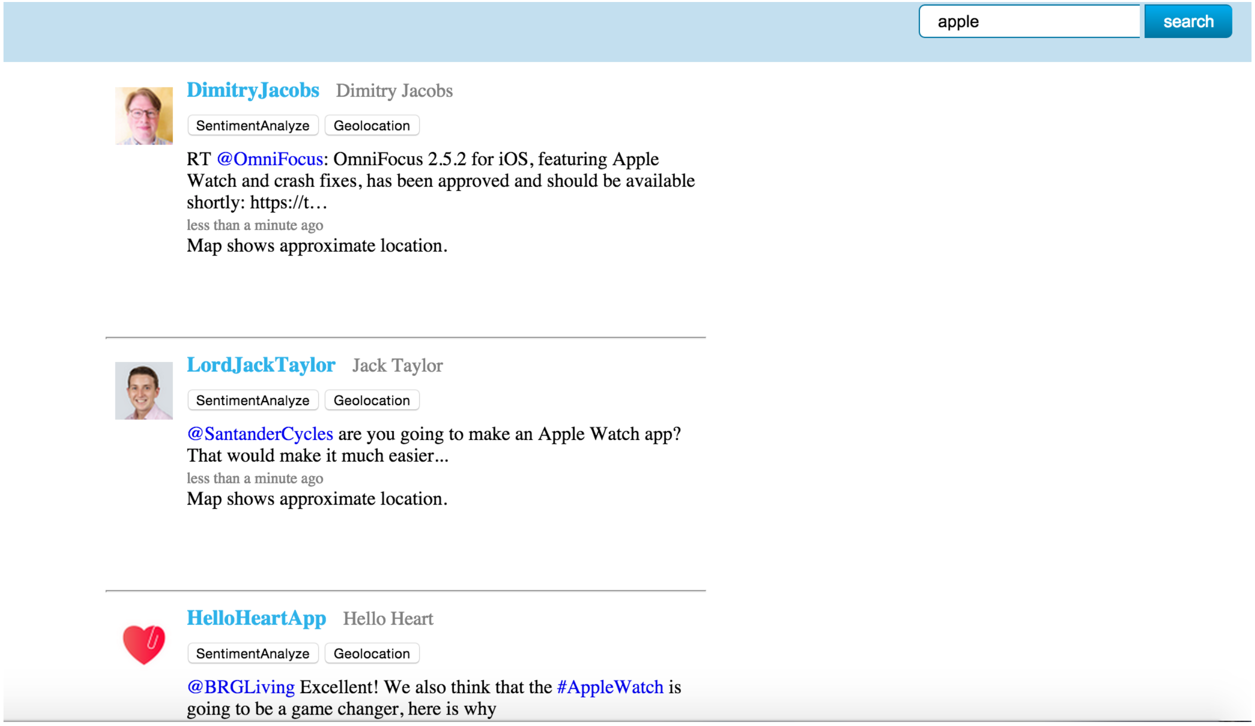
Antiindustry AntiIndustry.com™

Someone tell @S_C_ to start a distribution co. For positive hiphop its already been proven, the only rap music thats selling #JustFacts

about a minute ago

Map shows approximate location.

Search whatever topics you want:



DimitryJacobs Dimitry Jacobs

RT @OmniFocus: OmniFocus 2.5.2 for iOS, featuring Apple Watch and crash fixes, has been approved and should be available shortly: https://t…

less than a minute ago

Map shows approximate location.

LordJackTaylor Jack Taylor

@SantanderCycles are you going to make an Apple Watch app? That would make it much easier...

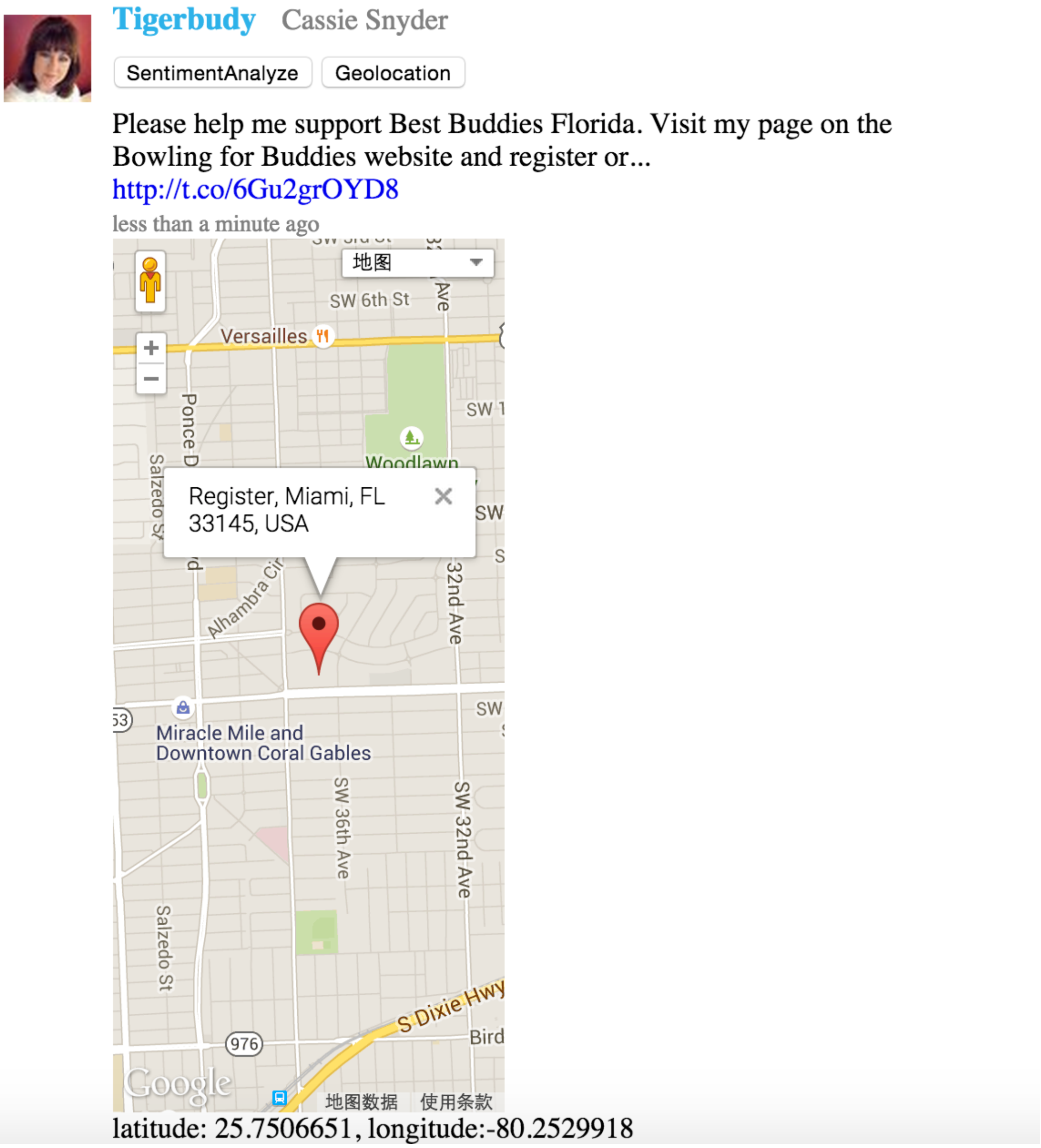
less than a minute ago

Map shows approximate location.

HelloHeartApp Hello Heart

@BRGLiving Excellent! We also think that the #AppleWatch is going to be a game changer, here is why

Geolocation analysis of a single tweet:



Tigerbudy Cassie Snyder

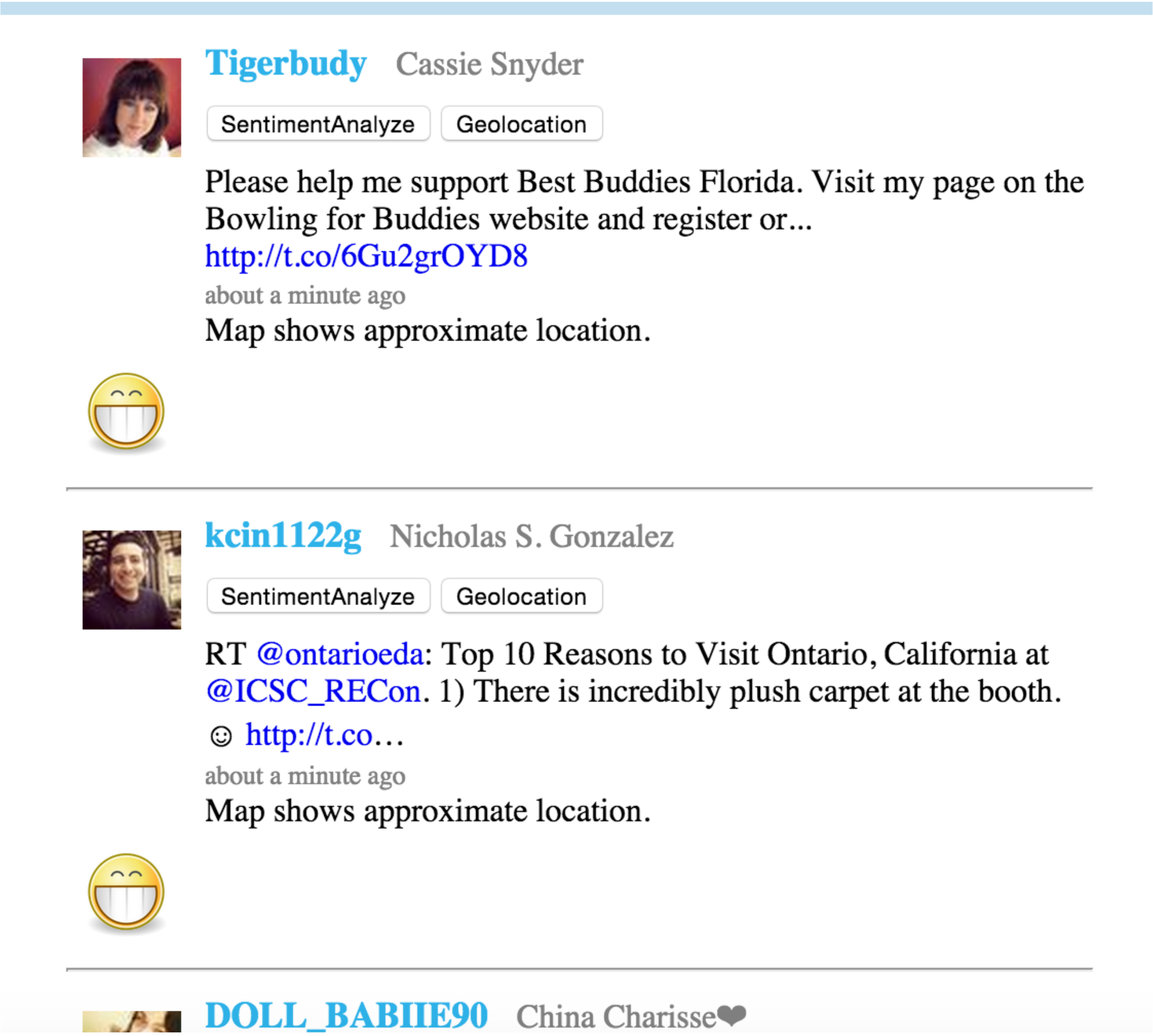
Please help me support Best Buddies Florida. Visit my page on the Bowling for Buddies website and register or... http://t.co/6Gu2grOYD8

less than a minute ago

Register, Miami, FL
33145, USA

latitude: 25.7506651, longitude:-80.2529918

Sentiment analysis of a single tweet:



Tigerbudy Cassie Snyder

Please help me support Best Buddies Florida. Visit my page on the Bowling for Buddies website and register or... http://t.co/6Gu2grOYD8

about a minute ago

Map shows approximate location.

kcin1122g Nicholas S. Gonzalez

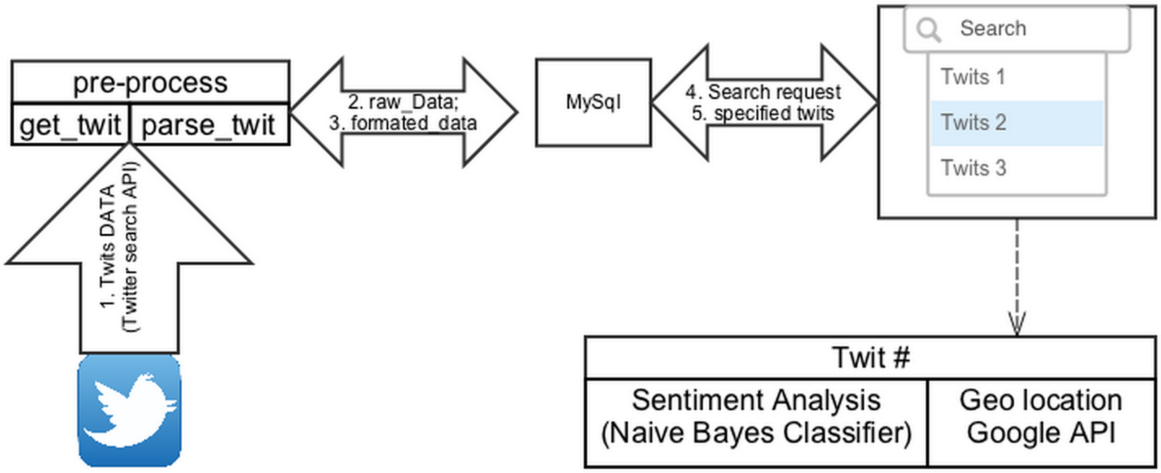
RT @ontarioeda: Top 10 Reasons to Visit Ontario, California at @ICSC_RECon. 1) There is incredibly plush carpet at the booth. ☺ http://t.co…

about a minute ago

Map shows approximate location.

DOLL_BABIIE90 China Charisse❤

workflow


pre-process
get_twit
parse_twit
2. raw_Data;
3. formated_data
MySql
4. Search request
5. specified twits
Search
Twits 1
Twits 2
Twits 3
1. Twits DATA
(Twitter search API)
Twit #
Sentiment Analysis
(Naive Bayes Classifier)
Geo location
Google API