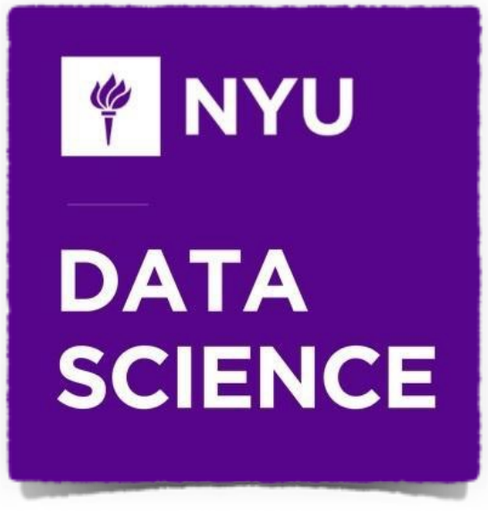
https://github.com/bmtgoncalves/Mining-Georeferenced-Data

Mining Georeferenced Data:
Location-based Services and the Sharing Economy

Bruno Gonçalves
www.bgoncalves.com



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- Introduction to Twitter
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- Parse URLs (urlparse)
- Register a Foursquare Application
- Query Checkin Information (foursquare)
- Parse webpages (requests, BeautifulSoup) and extract Checkin Information

Anatomy of a Tweet

Anatomy of a Tweet


```
[u'contributors',
 u'truncated',
 u'text',
 u'in_reply_to_status_id',
 u'id',
 u'favorite_count',
 u'source',
 u'retweeted',
 u'coordinates',
 u'entities',
 u'in_reply_to_screen_name',
 u'in_reply_to_user_id',
 u'retweet_count',
 u'id_str',
 u'favorited',
 u'user',
 u'geo',
 u'in_reply_to_user_id_str',
 u'possibly_sensitive',
 u'lang',
 u'created_at',
 u'in_reply_to_status_id_str',
 u'place',
 u'metadata']
```

Anatomy of a Tweet

```
[u'contributors',
 u'truncated',
 u'text',
 u'in_reply_to_status_id',
 u'id',
 u'favorite_count',
 u'source',
 u'retweeted',
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 u'user',
 u'geo',
 u'in_reply_to_user_id_str',
 u'possibly_sensitive',
 u'lang',
 u'created_at',
 u'in_reply_to_status_id_str',
 u'place',
 u'metadata']
```

```
[u'follow_request_sent',
 u'profile_use_background_image',
 u'default_profile_image',
 u'id',
 u'profile_background_image_url_https',
 u'verified',
 u'profile_text_color',
 u'profile_image_url_https',
 u'profile_sidebar_fill_color',
 u'entities',
 u'followers_count',
 u'profile_sidebar_border_color',
 u'id_str',
 u'profile_background_color',
 u'listed_count',
 u'is_translation_enabled',
 u'utc_offset',
 u'statuses_count',
 u'description',
 u'friends_count',
 u'location',
 u'profile_link_color',
 u'profile_image_url',
 u'following',
 u'geo_enabled',
 u'profile_banner_url',
 u'profile_background_image_url',
 u'screen_name',
 u'lang',
 u'profile_background_tile',
 u'favourites_count',
 u'name',
 u'notifications',
 u'url',
 u'created_at',
 u'contributors_enabled',
 u'time_zone',
 u'protected',
 u'default_profile',
 u'is_translator']
```

Anatomy of a Tweet

```
[u'contributors',
 u'truncated',
 u'text',
 u'in_reply_to_status_id',
 u'id',
 u'favorite_count',
 u'source',
 u'retweeted',
 u'coordinates',
 u'entities',
 u'in_reply_to_screen_name',
 u'in_reply_to_user_id',
 u'retweet_count',
 u'id_str',
 u'favorited',
 u'user',
 u'geo',
 u'in_reply_to_user_id_str',
 u'possibly_sensitive',
 u'lang',
 u'created_at',
 u'in_reply_to_status_id_str',
 u'place',
 u'metadata']
```

```
u"I'm at Terminal Rodovi\xe1rio de Feira de Santana
 (Feira de Santana, BA) http://t.co/WirvdHwYMq"
```

```
u'<a href="http://foursquare.com" rel="nofollow">
  foursquare</a>'
```

```
[u'symbols',
 u'user_mentions',
 u'hashtags',
 u'urls']
```

```
[u'type',
 u'coordinates']
```

Anatomy of a Tweet

```
[u'contributors',
 u'truncated',
 u'text',
 u'in_reply_to_status_id',
 u'id',
 u'favorite_count',
 u'source',
 u'retweeted',
 u'coordinates',
 u'entities',
 u'in_reply_to_screen_name',
 u'in_reply_to_user_id',
 u'retweet_count',
 u'id_str',
 u'favorited',
 u'user',
 u'geo',
 u'in_reply_to_user_id_str',
 u'possibly_sensitive',
 u'lang',
 u'created_at',
 u'in_reply_to_status_id_str',
 u'place',
 u'metadata']
```

```
u"I'm at Terminal Rodovi\xe1rio de Feira de Santana
 (Feira de Santana, BA) http://t.co/WirvdHwYMq"
```

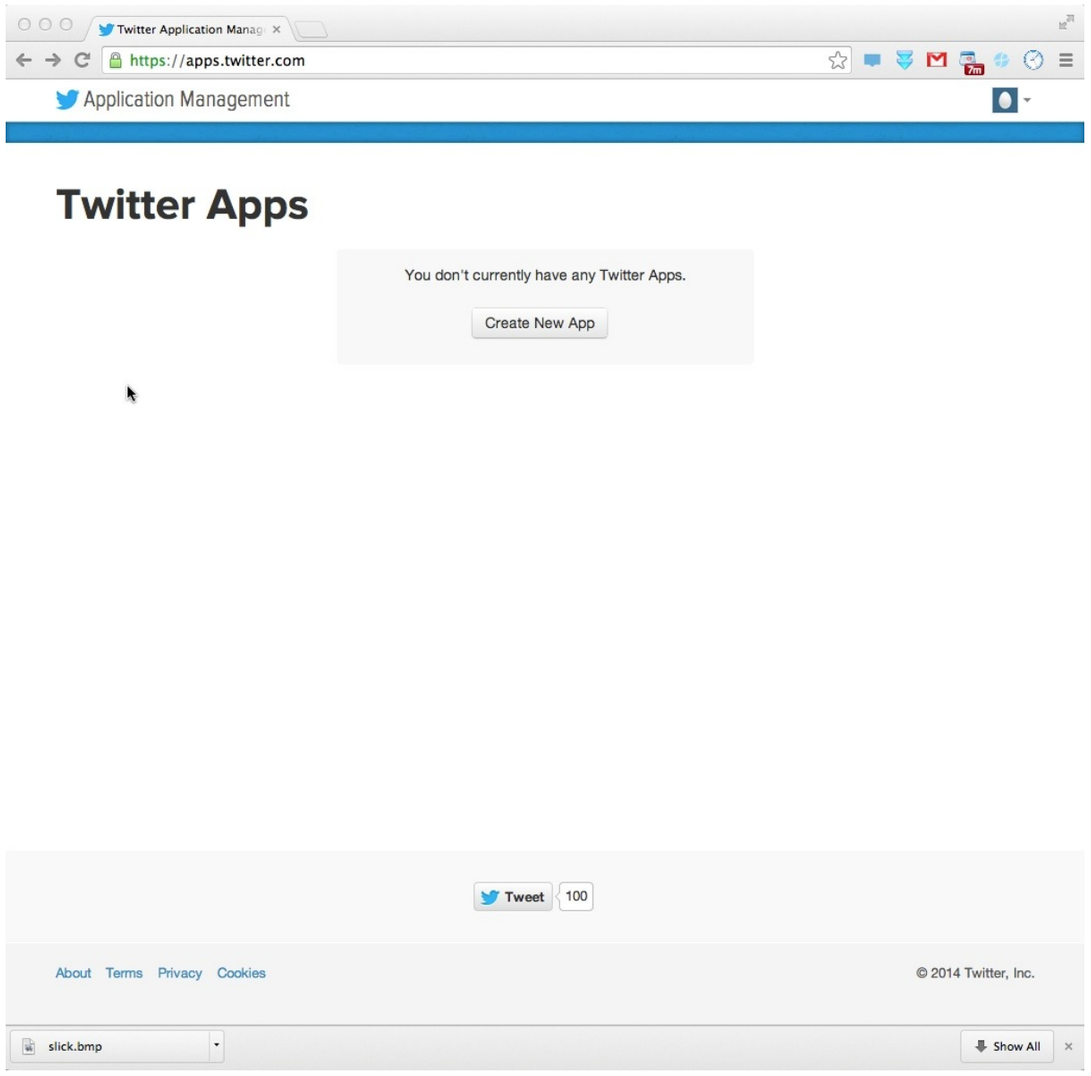
```
u'<a href="http://foursquare.com" rel="nofollow">
  foursquare</a>'
```

```
[u'symbols',
 u'user_mentions',
 u'hashtags',
 u'urls']
```

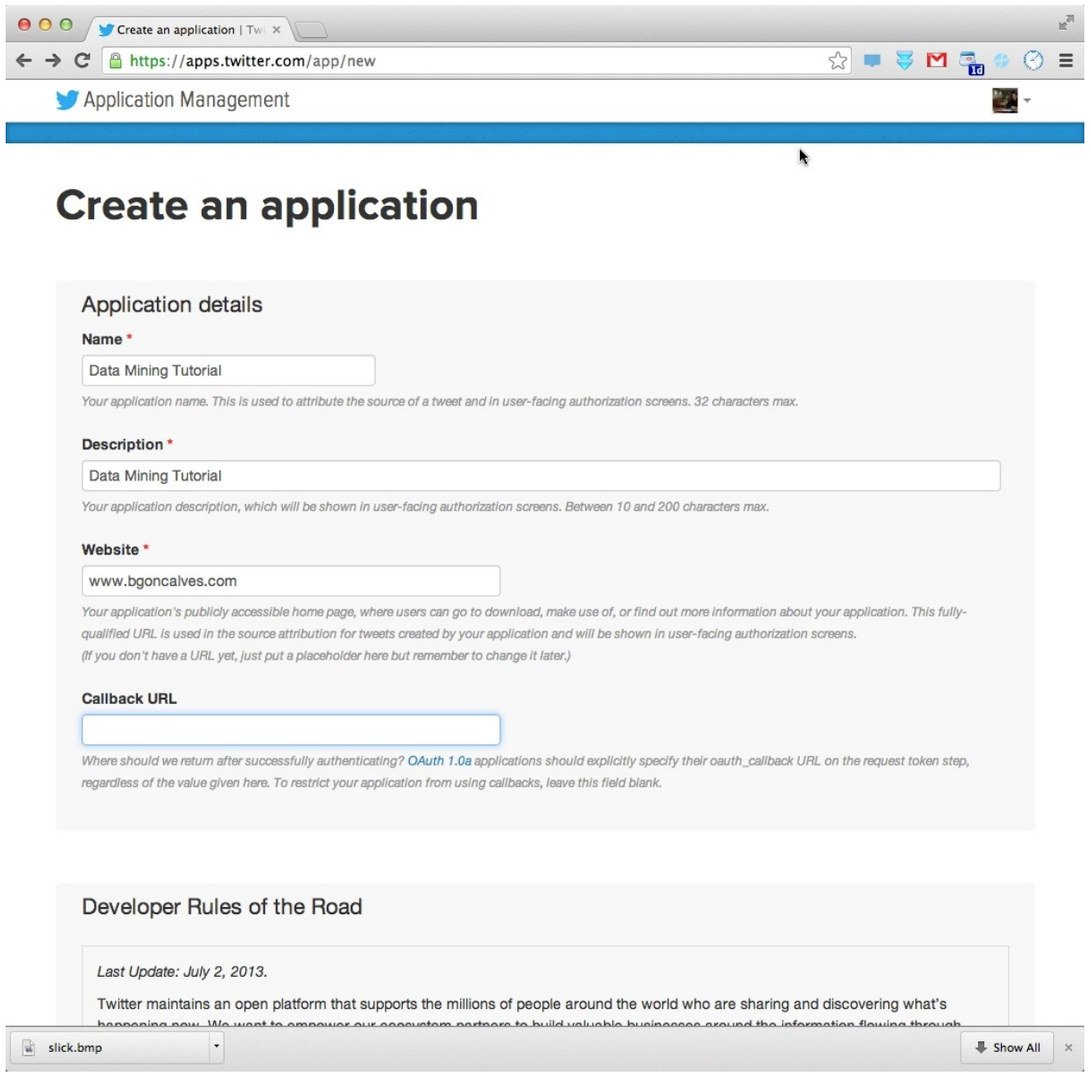
```
{u'display_url': u'4sq.com/1k5MeYF',
 u'expanded_url': u'http://4sq.com/1k5MeYF',
 u'indices': [70, 92],
 u'url': u'http://t.co/WirvdHwYMq'}
```

```
[u'type',
 u'coordinates']
```

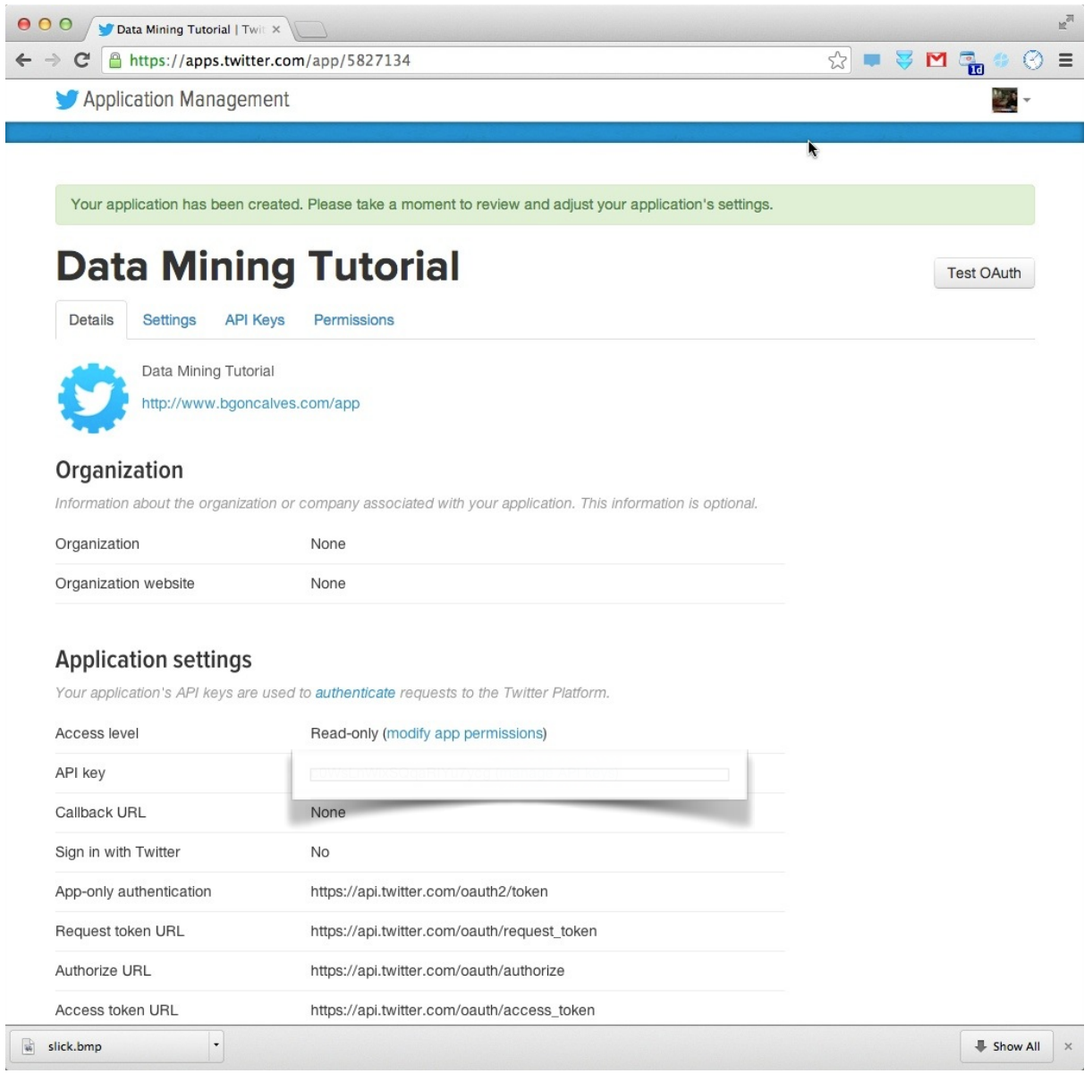
Registering an Application



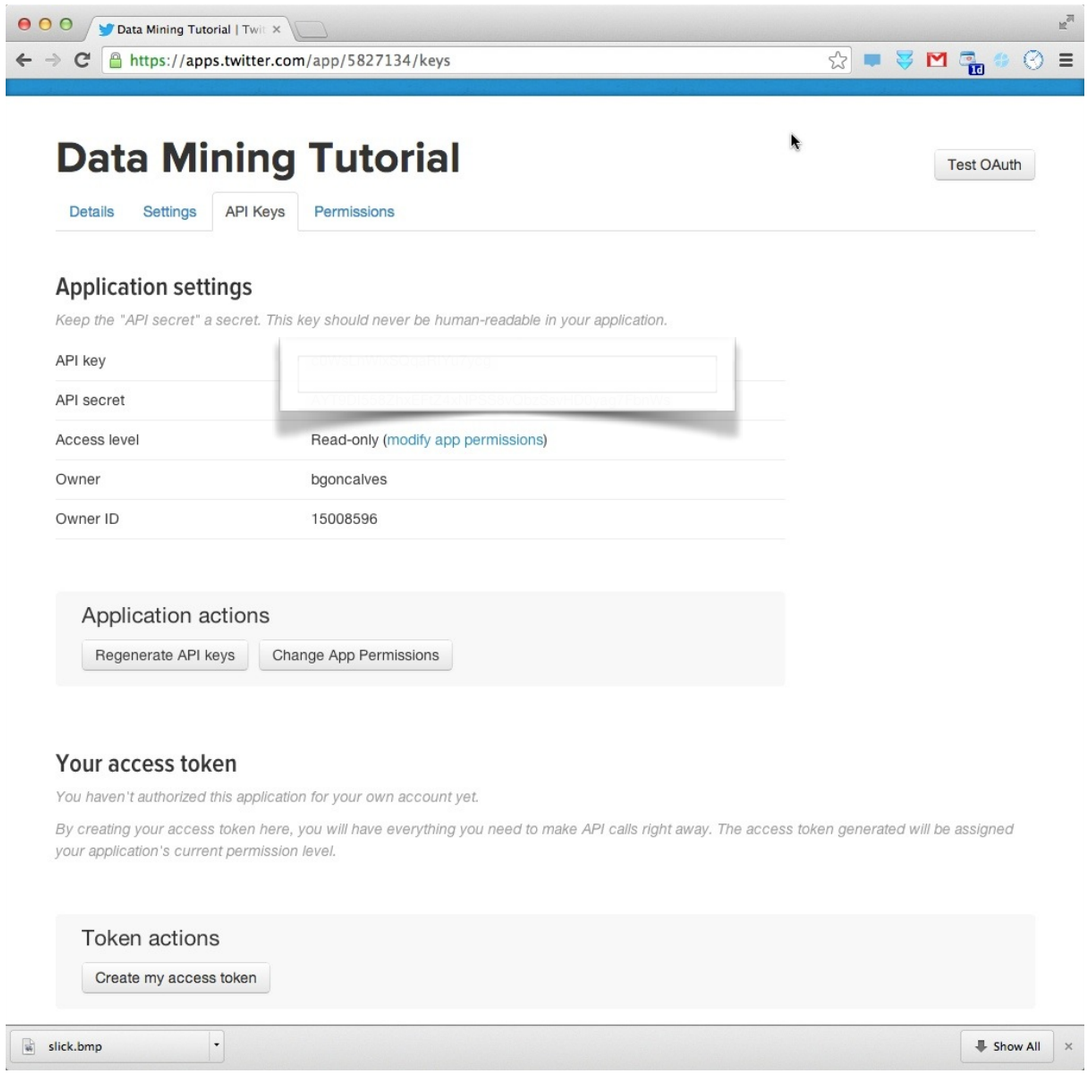
Registering an Application



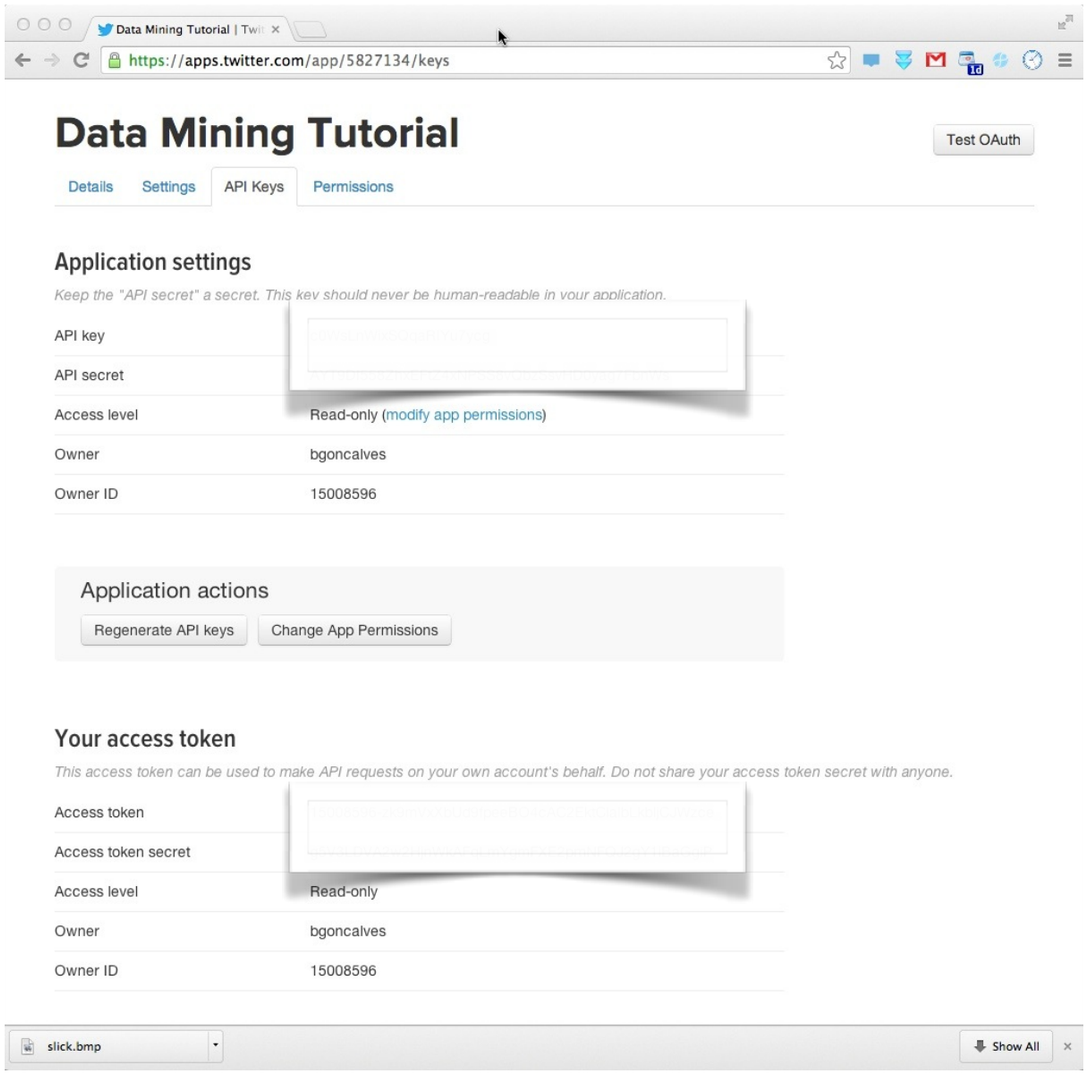
Registering an Application



Registering an Application



Registering an Application



API Basics

https://dev.twitter.com/docs

- The twitter module provides the oauth interface. We just need to provide the right credentials.
- Best to keep the credentials in a dict and parametrize our calls with the dict key. This way we can switch between different accounts easily.
- .Twitter(auth) takes an OAuth instance as argument and returns a Twitter object that we can use to interact with the API
- Twitter methods mimic API structure
- 4 basic types of objects:
    - Tweets
    - Users
    - Entities

Authenticating with the API

```
import twitter

accounts = {
    "social" : { 'api_key' : 'API_KEY',
                 'api_secret' : 'API_SECRET',
                 'token' : 'TOKEN',
                 'token_secret' : 'TOKEN_SECRET'
                },
}

app = accounts["social"]

auth = twitter.oauth.OAuth(app["token"],
                           app["token_secret"],
                           app["api_key"],
                           app["api_secret"])

twitter_api = twitter.Twitter(auth=auth)
```

- In the remainder of this lecture, the accounts dict will live inside the twitter_accounts.py file

authentication_twitter.py

Searching for Tweets

https://dev.twitter.com/docs/api/1.1/get/search/tweets

- .search.tweets(query, count)
  - query is the content to search for
  - count is the maximum number of results to return
- returns dict with a list of "statuses" and "search_metadata"


```
{u'completed_in': 0.027,
 u'count': 15,
 u'max_id': 438088492577345536,
 u'max_id_str': u'438088492577345536',
 u'next_results': u'?max_id=438088485145034752&q=soccer&include_entities=1',
 u'query': u'soccer',
 u'refresh_url': u'?since_id=438088492577345536&q=soccer&include_entities=1',
 u'since_id': 0,
 u'since_id_str': u'0'}
```


- search_results["search_metadata"]["next_results"] can be used to get the next page of results

Searching for Tweets

https://dev.twitter.com/docs/api/1.1/get/search/tweets

Credentials -->

```
import twitter
from twitter_accounts import accounts
import urllib2

app = accounts["social"]

auth = twitter.oauth.OAuth(app["token"],
                           app["token_secret"],
                           app["api_key"],
                           app["api_secret"])

twitter_api = twitter.Twitter(auth=auth)

query = "foursquare"
count = 200

search_results = twitter_api.search.tweets(q = query, count = count)

statuses = search_results["statuses"]

while True:
    try:
        next_results = search_results["search_metadata"]["next_results"]

        args = urllib2.urlparse.parse_qs(next_results[1:])

        search_results = twitter_api.search.tweets(**args)
        statuses += search_results["statuses"]
    except:
        break
```

search_twitter.py

Streaming data

https://dev.twitter.com/docs/api/1.1/post/statuses/filter

- The Streaming api provides realtime data, subject to filters
- Use TwitterStream instead of Twitter object (.TwitterStream(auth=twitter_api.auth))
- .status.filter(track=q) will return tweets that match the query q in real time
- Returns generator that you can iterate over

User profiles

https://dev.twitter.com/docs/api/1.1/get/users/lookup

- .users.lookup() returns user profile information for a list of user_ids or screen_names

- list should be comma separated and provided as a string

```
import twitter
from twitter_accounts import accounts

app = accounts["social"]

auth = twitter.oauth.OAuth(app["token"],
                           app["token_secret"],
                           app["api_key"],
                           app["api_secret"])

twitter_api = twitter.Twitter(auth=auth)

screen_names = ",".join(["bgoncalves", "tnoulas"])

search_results = twitter_api.users.lookup(screen_name=screen_names)

for user in search_results:
  print user["screen_name"], "has", user["followers_count"], "followers"
```

Social Connections

https://dev.twitter.com/docs/api/1.1/get/friends/ids
https://dev.twitter.com/docs/api/1.1/get/followers/ids

- .friends.ids() and .followers.ids() returns a list of up to 5000 of a users friends or followers for a given screen_name or user_id

- result is a dict containing multiple fields:

```
[u'next_cursor_str',
 u'previous_cursor',
 u'ids',
 u'next_cursor',
 u'previous_cursor_str']
```

- ids are contained in results[“ids”].

- results[“next_cursor”] allows us to obtain the next page of results.

- .friends.ids(screen_name=screen_name, cursor=results[“next_cursor”]) will return the next page of results

- cursor=0 means no more results

Social Connections

https://dev.twitter.com/docs/api/1.1/get/friends/ids
https://dev.twitter.com/docs/api/1.1/get/followers/ids

```
import twitter
from twitter_accounts import accounts

app = accounts["social"]

auth = twitter.oauth.OAuth(app["token"],
                           app["token_secret"],
                           app["api_key"],
                           app["api_secret"])

twitter_api = twitter.Twitter(auth=auth)

screen_name = "stephen_wolfram"

cursor = -1
followers = []

while cursor != 0:
    result = twitter_api.followers.ids(screen_name=screen_name, cursor=cursor)

    followers += result["ids"]
    cursor = result["next_cursor"]

print "Found", len(followers), "Followers"
```

User Timeline

https://dev.twitter.com/docs/api/1.1/get/statuses/user_timeline

- .statuses.user_timeline() returns a set of tweets posted by a single user
- Important options:
  - include_rts='true' to Include retweets by this user
  - count=200 number of tweets to return in each call
  - trim_user='true' to not include the user information (save bandwidth and processing time)
  - max_id=1234 to include only tweets with an id lower than 1234
- Returns at most 200 tweets in each call. Can get all of a users tweets (up to 3200) with multiple calls using max_id

User Timeline

https://dev.twitter.com/docs/api/1.1/get/statuses/user_timeline

```
import twitter
from twitter_accounts import accounts

app = accounts["social"]

auth = twitter.oauth.OAuth(app["token"],
                           app["token_secret"],
                           app["api_key"],
                           app["api_secret"])

twitter_api = twitter.Twitter(auth=auth)
screen_name = "bgoncalves"

args = { "count" : 200,
         "trim_user": "true",
         "include_rts": "true"
        }

tweets = twitter_api.statuses.user_timeline(screen_name = screen_name, **args)
tweets_new = tweets

while len(tweets_new) > 0:
    max_id = tweets[-1]["id"] - 1
    tweets_new = twitter_api.statuses.user_timeline(screen_name = screen_name,
       max_id=max_id, **args)
    tweets += tweets_new

print "Found", len(tweets), "tweets"
```

Expands the args dict

Social Interactions

```
import twitter
from twitter_accounts import accounts

app = accounts["social"]

auth = twitter.oauth.OAuth(app["token"], app["token_secret"], app["api_key"],
app["api_secret"])

twitter_api = twitter.Twitter(auth=auth)

screen_name = "bgoncalves"

args = { "count" : 200,
         "trim_user": "true",
         "include_rts": "true"}

tweets = twitter_api.statuses.user_timeline(screen_name = screen_name, **args)
tweets_new = tweets

while len(tweets_new) > 0:
    max_id = tweets[-1]["id"] - 1
    tweets_new = twitter_api.statuses.user_timeline(screen_name = screen_name,
max_id=max_id, **args)
    tweets += tweets_new

user = tweets[0]["user"]["id"]
for tweet in tweets:
    if "retweeted_status" in tweet:
        print user, "->", tweet["retweeted_status"]["user"]["id"]
    elif tweet["in_reply_to_user_id"]:
        print tweet["in_reply_to_user_id"], "->", user
```

Streaming data

https://dev.twitter.com/docs/api/1.1/post/statuses/filter

```
import twitter
from twitter_accounts import accounts

app = accounts["social"]

auth = twitter.oauth.OAuth(app["token"],
                           app["token_secret"],
                           app["api_key"],
                           app["api_secret"])

stream_api = twitter.TwitterStream(auth=auth)

query = "bieber"

stream_results = stream_api.statuses.filter(track=query)

for tweet in stream_results:
  print tweet["text"]
```


stream_twitter.py

Streaming Geocoded data

https://dev.twitter.com/streaming/overview/request-parameters#locations

- The Streaming api provides realtime data, subject to filters
- Use TwitterStream instead of Twitter object (.TwitterStream(auth=twitter_api.auth))
- .status.filter(track=q) will return tweets that match the query q in real time
- Returns generator that you can iterate over
- .status.filter(locations=bb) will return tweets that occur within the bounding box bb in real time
- bb is a comma separated pair of lat/lon coordinates.
  - -180,-90,180,90 - World
  - -74,40,-73,41 - NYC

Confirm if it's lat/lon or lon/lat?

Streaming Geocoded data

https://dev.twitter.com/streaming/overview/request-parameters#locations

```python
import twitter
from twitter_accounts import accounts
import gzip

app = accounts["social"]

auth = twitter.oauth.OAuth(app["token"],
                           app["token_secret"],
                           app["api_key"],
                           app["api_secret"])

stream_api = twitter.TwitterStream(auth=auth)

query = "-74,40,-73,41" # NYC

stream_results = stream_api.statuses.filter(locations = query)

tweet_count = 0
fp = gzip.open("NYC.json.gz", "a")

for tweet in stream_results:
    try:
        tweet_count += 1
        print tweet_count, tweet[“id”]

        print >> fp, tweet
    except:
        pass

    if tweet_count % 1000 == 0:
        print >> sys.stderr, tweet_count
```

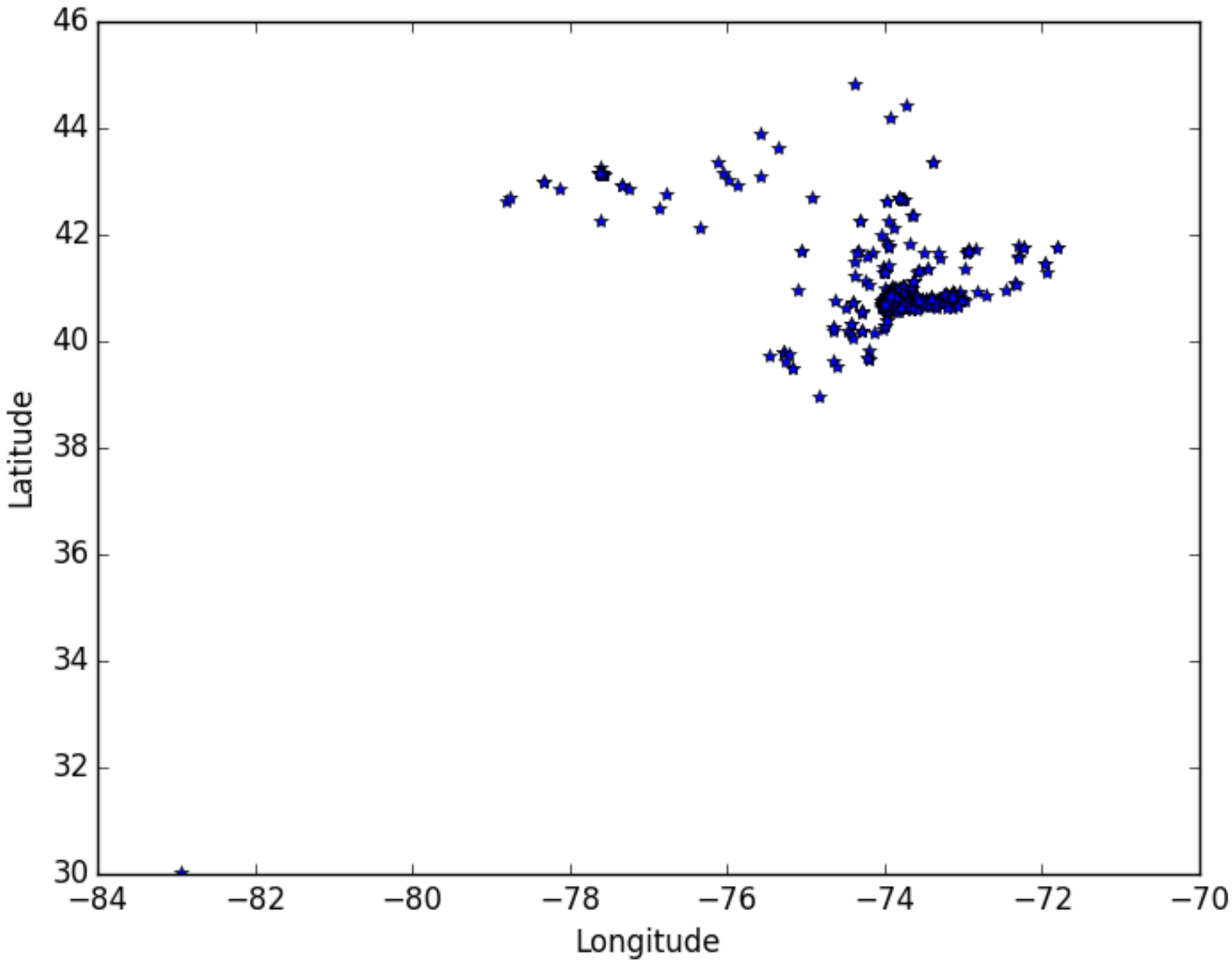
location_twitter.py

Plotting geolocated tweets

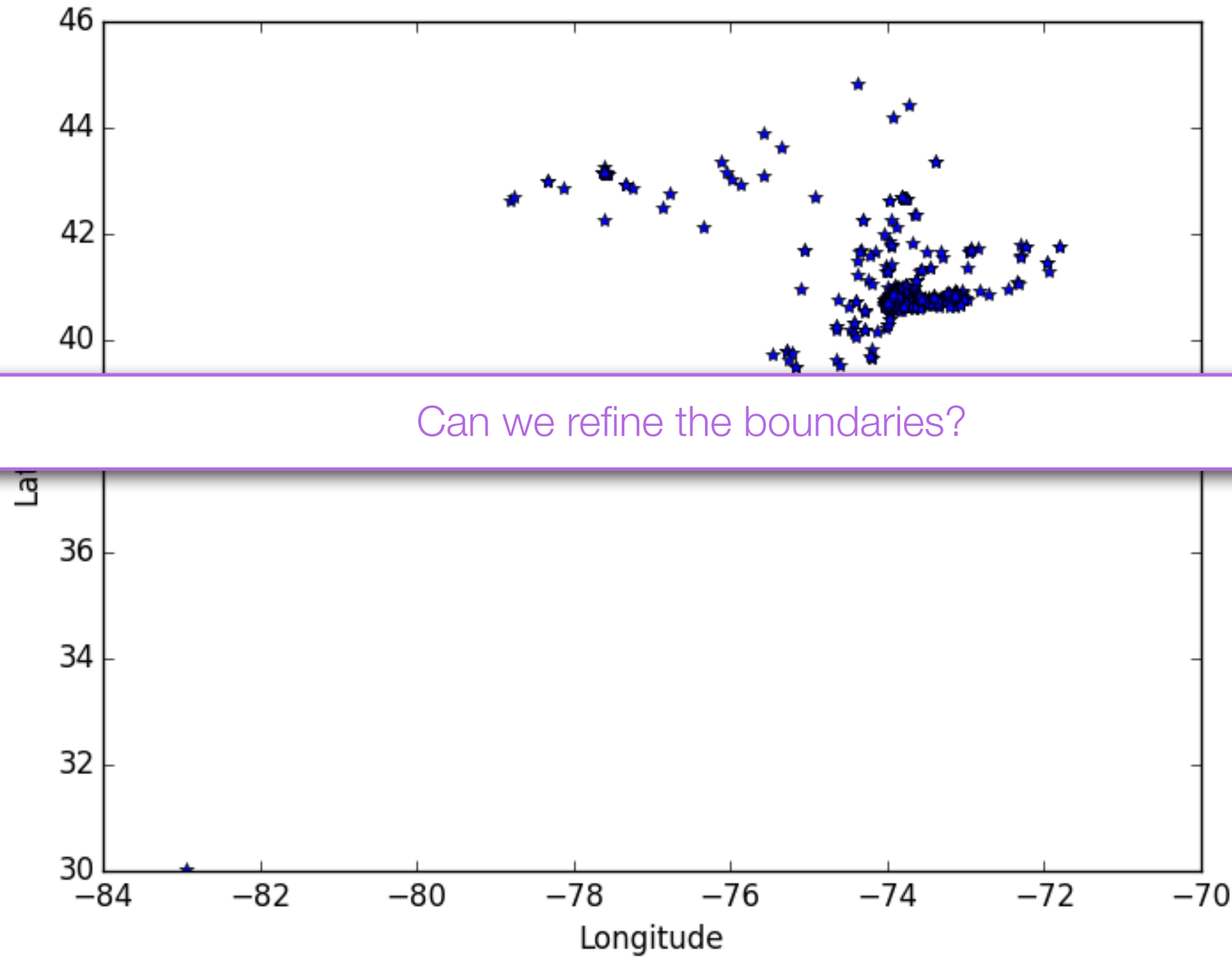
```
import sys
import gzip
import matplotlib.pyplot as plt

x = []
y = []

line_count = 0

try:
    for line in gzip.open(sys.argv[1]):
        try:
            tweet = eval(line.strip())
            line_count += 1

            if "coordinates" in tweet and tweet["coordinates"] is not None:
                x.append(tweet["coordinates"]["coordinates"][0])
                y.append(tweet["coordinates"]["coordinates"][1])
        except:
            pass
except:
    pass

print >> sys.stderr, "Read", line_count, "and found", len(x), "geolocated tweets"

plt.plot(x, y, '*')
plt.xlabel('Longitude')
plt.ylabel('Latitude')
plt.savefig(sys.argv[1] + '.png')
plt.close()
```

plot_tweets.py

Plotting geolocated tweets



Plotting geolocated tweets



Can we refine the boundaries?

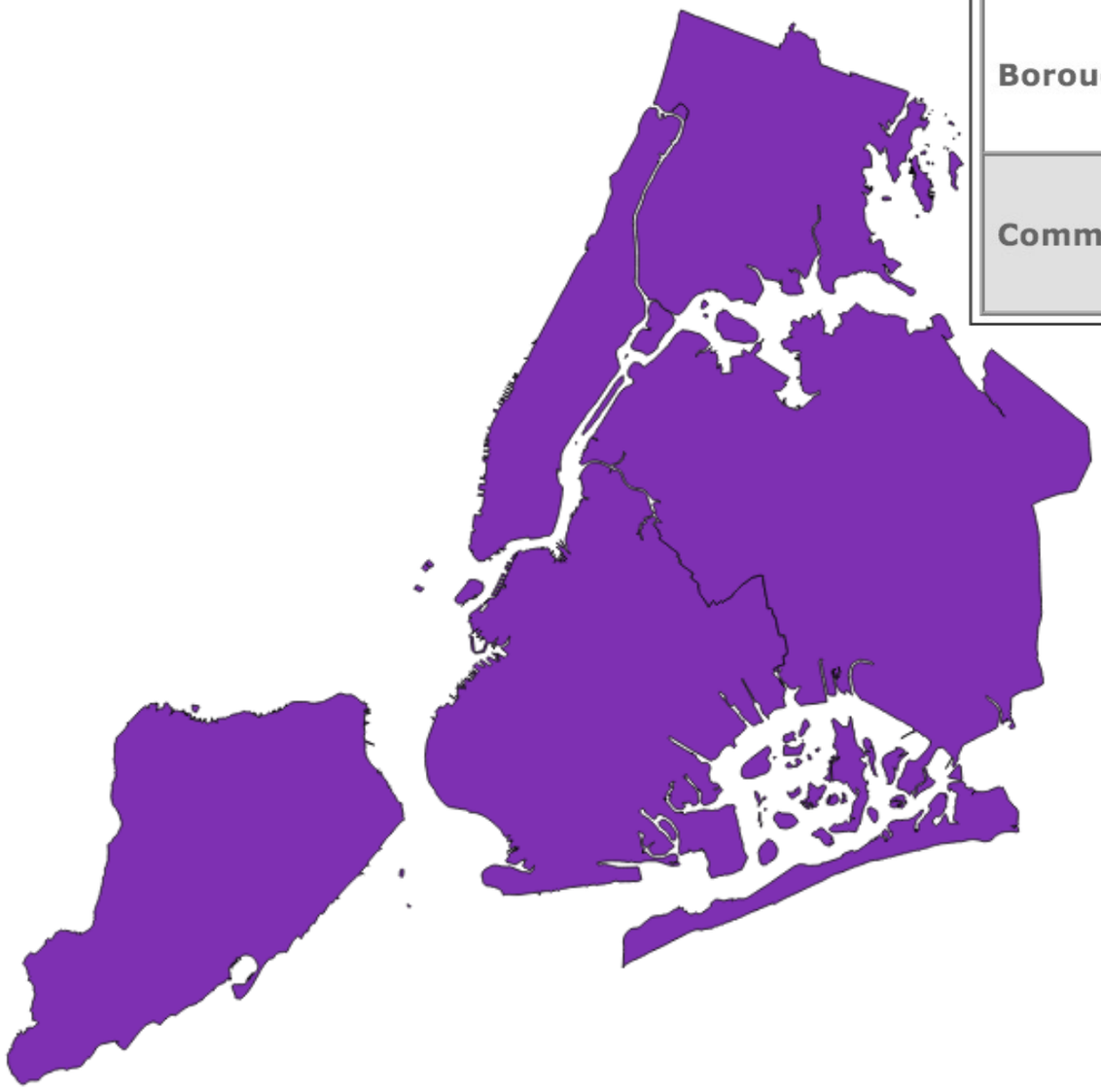
Shapefiles

http://www.nyc.gov/html/dcp/html/bytes/districts_download_metadata.shtml#bcd

Borough Boundaries & Community Districts	Download	Metadata
Borough Boundaries (Clipped to Shoreline)	(645k)	
Borough Boundaries (Water Areas Included)	(31k)	
Community Districts (Clipped to Shoreline)	(772k)	

Shapefiles

http://www.nyc.gov/html/dcp/html/bytes/districts_download_metadata.shtml#bcd

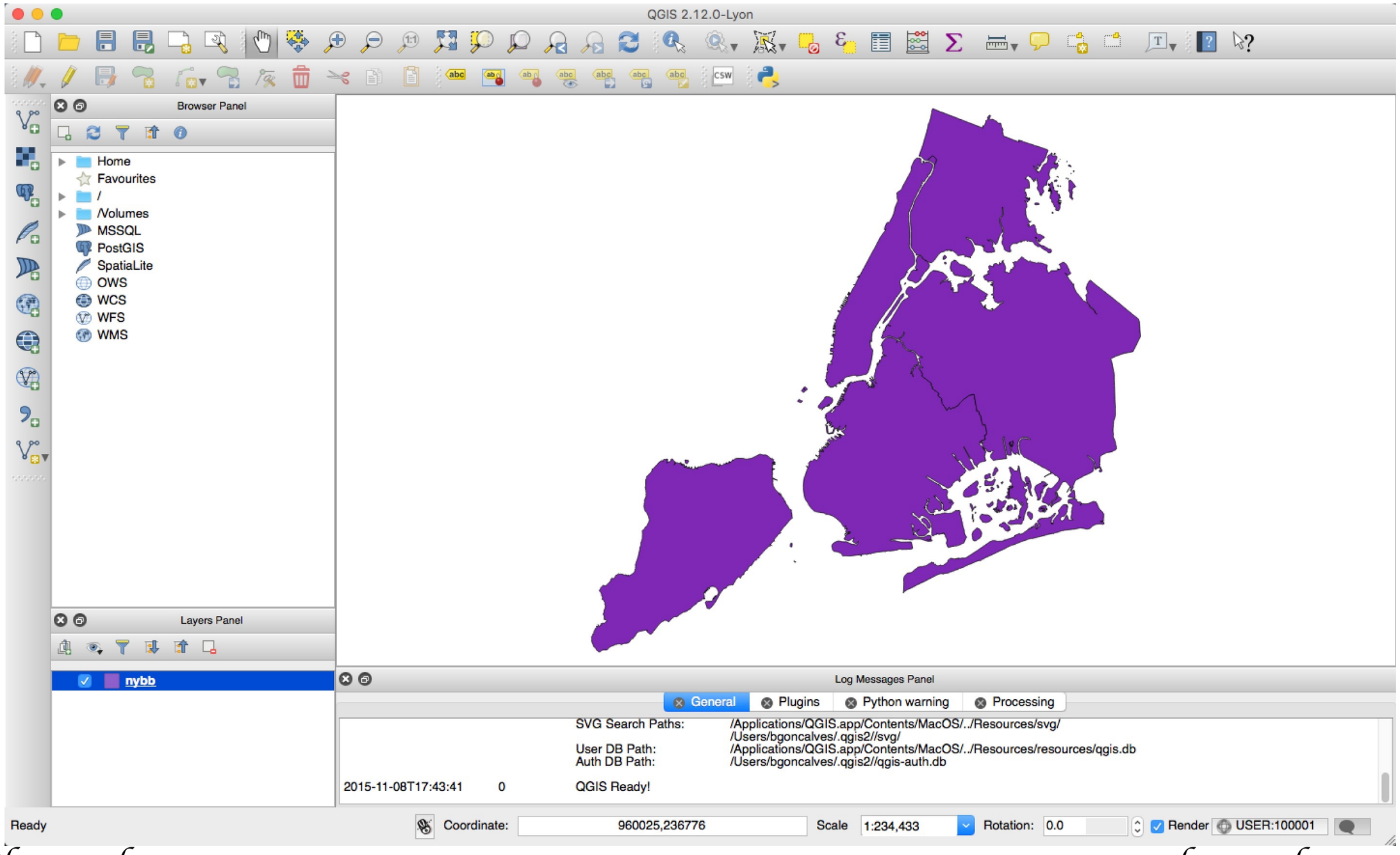


Borough Boundaries & Community Districts	Download	Metadata
Borough Boundaries (Clipped to Shoreline)	(645k)	
Borough Boundaries (Water Areas Included)	(31k)	
Community Districts (Clipped to Shoreline)	(772k)	

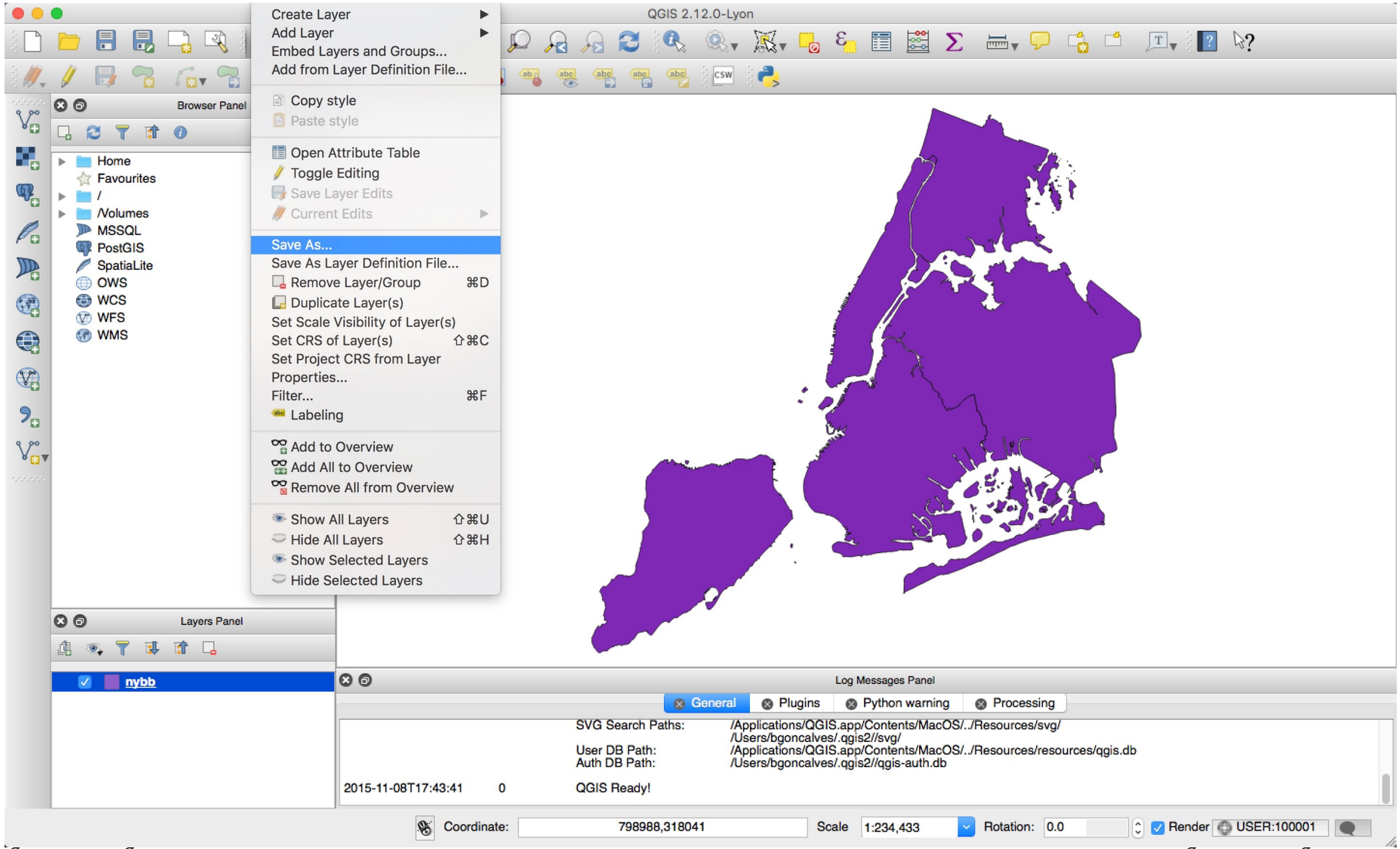
- Unfortunately it doesn't use the right projection (WGS84), so we must convert it.

This is a GIS File -- we can open it with QGIS

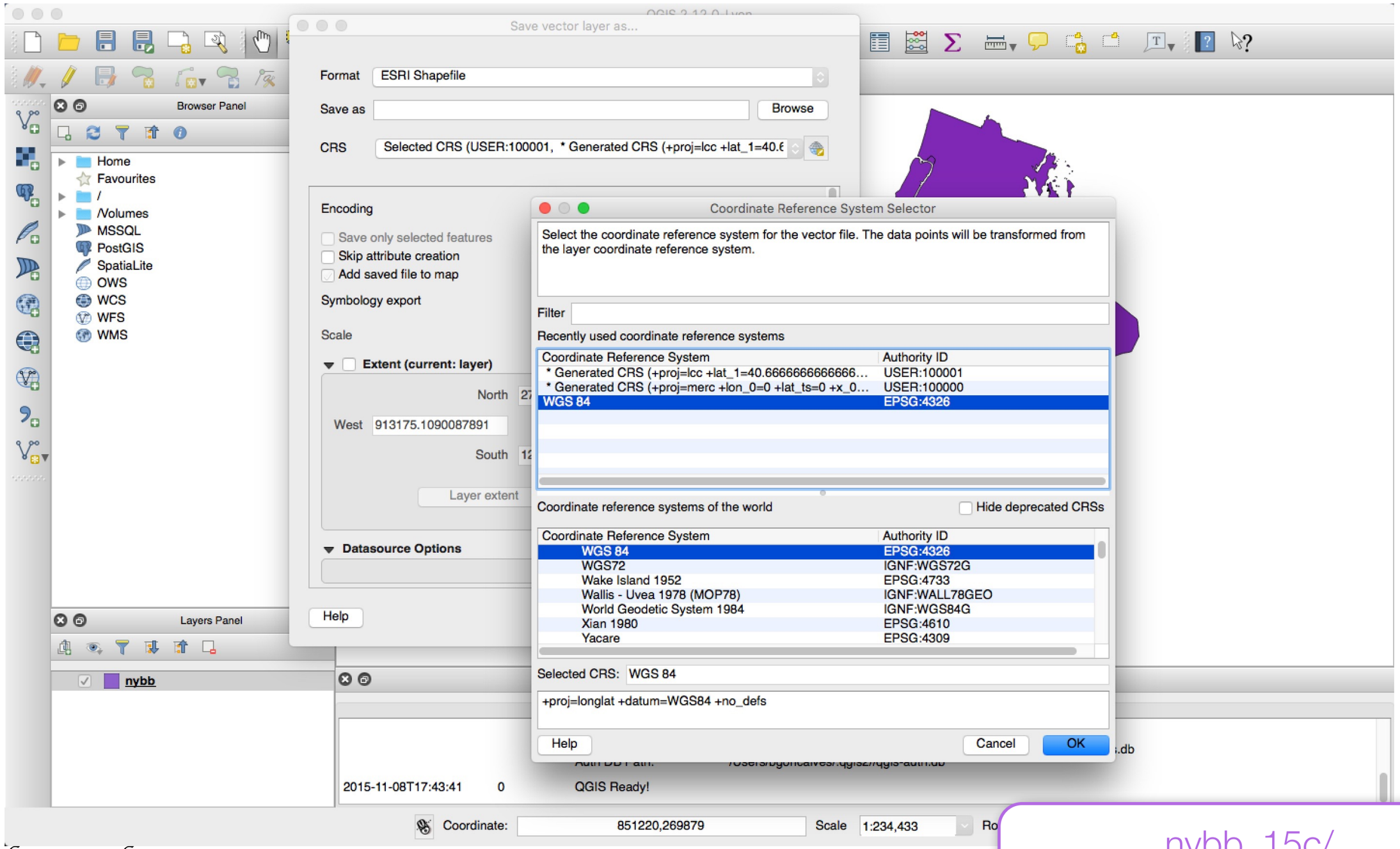
Shapefiles


QGIS 2.12.0-Lyon
Browser Panel
Home
Favourites
/
/Volumes
MSSQL
PostGIS
SpatiaLite
OWS
WCS
WFS
WMS
Layers Panel
nybb
Log Messages Panel
General
Plugins
Python warning
Processing
SVG Search Paths: /Applications/QGIS.app/Contents/MacOS/../Resources/svg/
/Users/bgoncalves/.qgis2//svg/
User DB Path: /Applications/QGIS.app/Contents/MacOS/../Resources/resources/qgis.db
Auth DB Path: /Users/bgoncalves/.qgis2//qgis-auth.db
2015-11-08T17:43:41 0 QGIS Ready!
Ready
Coordinate: 960025,236776
Scale 1:234,433
Rotation: 0.0
Render
USER:100001

Shapefiles


QGIS 2.12.0-Lyon
Browser Panel
Home
Favourites
/
/Volumes
MSSQL
PostGIS
SpatiaLite
OWS
WCS
WFS
WMS
Create Layer
Add Layer
Embed Layers and Groups...
Add from Layer Definition File...
Copy style
Paste style
Open Attribute Table
Toggle Editing
Save Layer Edits
Current Edits
Save As...
Save As Layer Definition File...
Remove Layer/Group ⌘D
Duplicate Layer(s)
Set Scale Visibility of Layer(s)
Set CRS of Layer(s) ⇧⌘C
Set Project CRS from Layer
Properties...
Filter... ⌘F
Labeling
Add to Overview
Add All to Overview
Remove All from Overview
Show All Layers ⇧⌘U
Hide All Layers ⇧⌘H
Show Selected Layers
Hide Selected Layers
Layers Panel
nybb
Log Messages Panel
General
Plugins
Python warning
Processing
SVG Search Paths: /Applications/QGIS.app/Contents/MacOS/../Resources/svg/
/Users/bgoncalves/.qgis2//svg/
User DB Path: /Applications/QGIS.app/Contents/MacOS/../Resources/resources/qgis.db
Auth DB Path: /Users/bgoncalves/.qgis2//qgis-auth.db
2015-11-08T17:43:41 0 QGIS Ready!
Coordinate: 798988,318041
Scale 1:234,433
Rotation: 0.0
Render
USER:100001

Shapefiles



@bgoncalves

nybb_15c/

pyshp

https://github.com/GeospatialPython/pyshp

- pyshp defines utility functions to load and manipulate Shapefiles programmatically.

- The shapefile module handles the most common operations:

    - .Reader(filename) - Returns a Reader object

    - Reader.records() Iterates over the different records present in the shapefile

    - Reader.shapes() Iterates over the different shapes present in the shapefile

shapely

https://pypi.python.org/pypi/Shapely

- Shapely defines geometric objects under shapely.geometry:
  - Point
  - Polygon
  - MultiPolygon
  - shape() Convenience function that creates the appropriate geometric object from a set of coordinates

- and common operations
  - .centroid()
  - .crosses()
  - .contains()
  - .within()
  - .touches()

Loading a Shapefile

```
import sys
import shapefile
from shapely.geometry import shape

shp = shapefile.Reader(sys.argv[1])

print "Found", shp.numRecords, "records:"

pos = None
count = 0
for record in shp.records():
    print "  ", record[1]
    if record[1] == sys.argv[2]:
        pos = count

    count += 1

if pos is None:
    print >> sys.stderr, sys.argv[2], "not found in shapefile"
    sys.exit()

print >> sys.stderr, "Using", sys.argv[2], "..."

manhattan = shape(shp.shapes()[pos])

print manhattan.contains(manhattan.centroid)
```

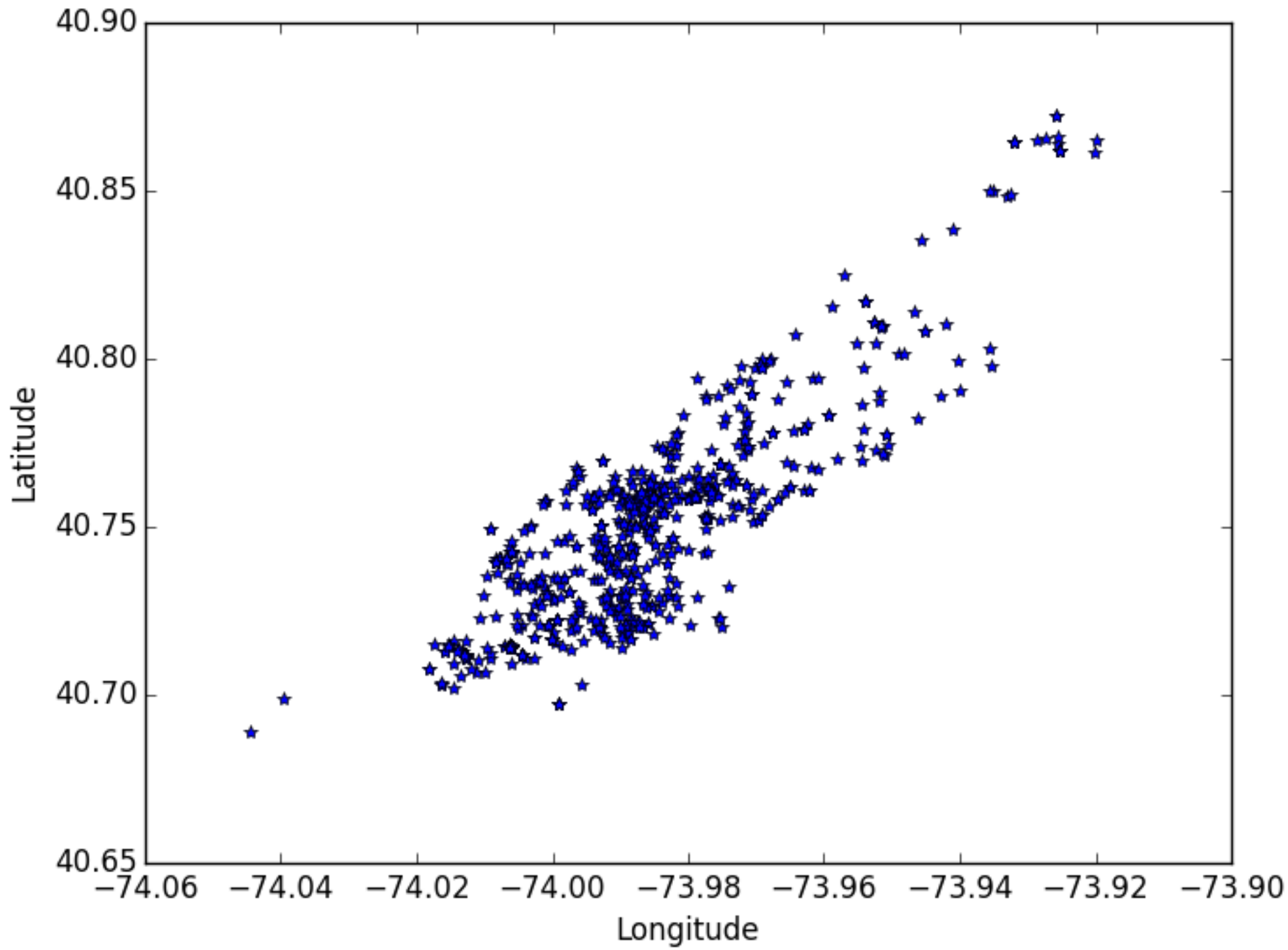
load_shapefile.py

Filter Tweets within a Shapefile

```
import sys
import shapefile
from shapely.geometry import shape, Point
import gzip

shp = shapefile.Reader("nybb_15c/nybb_wgs84.shp")

print "Found", shp.numRecords, "records:"

pos = 2 # Manhattan

count = 0
for record in shp.records():
    print count, "  ", record[1]
    count += 1

print >> sys.stderr, "Using", shp.records()[pos][1],"..."

manhattan = shape(shp.shapes()[pos])
fp = gzip.open("Manhattan.json.gz", "w")

for line in gzip.open("NYC.json.gz"):
    try:
        tweet = eval(line.strip())

        if "coordinates" in tweet and tweet["coordinates"] is not None:
            point = Point(tweet["coordinates"]["coordinates"])

            if manhattan.contains(point):
                print >> fp, line.strip()
    except:
        pass
```

filter_shapefile.py

Filter Tweets within a Shapefile

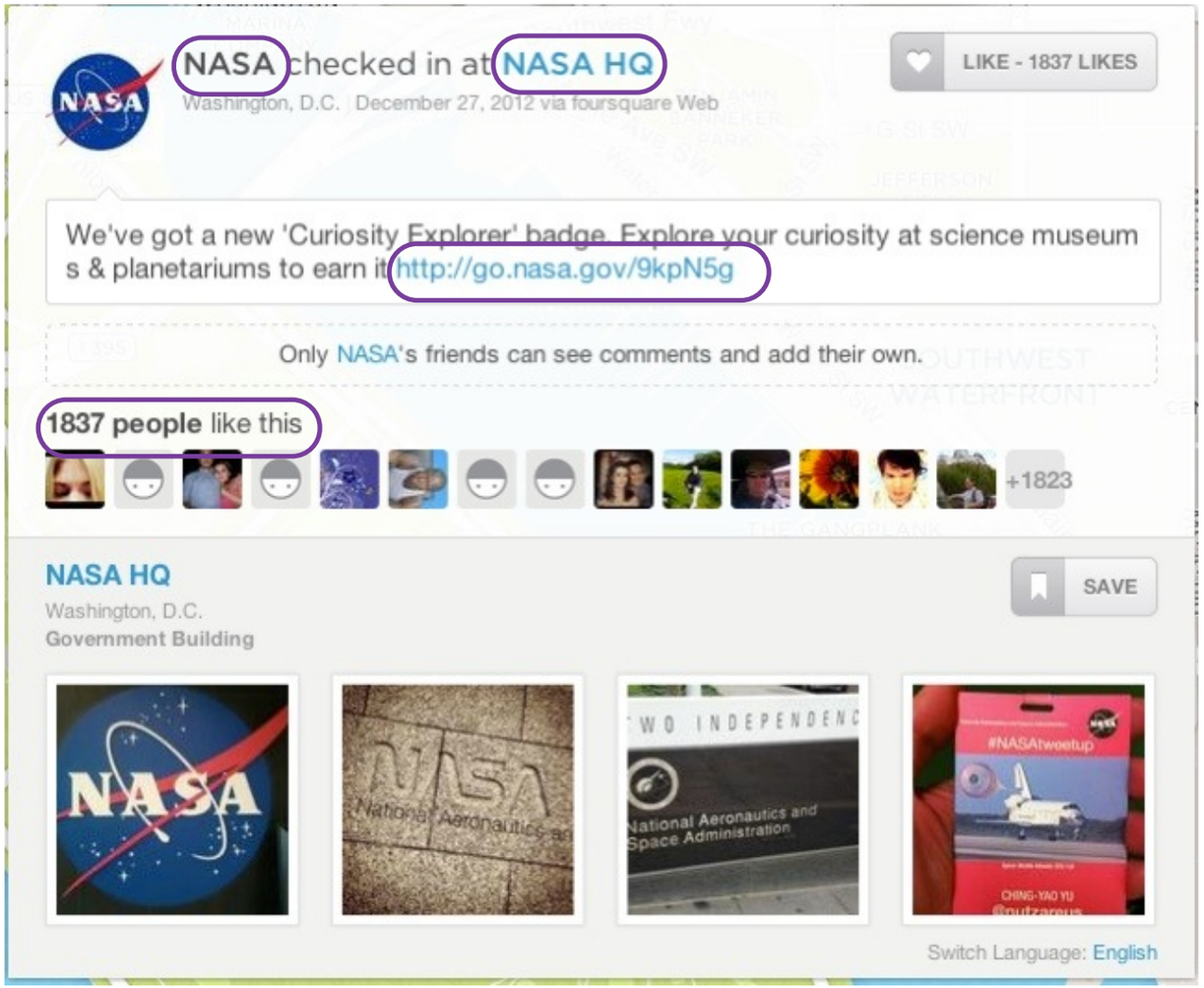


Foursquare

Foursquare


12:29
Four Square for Dummies
Sponso
FAQ
Videos
Twitter
Suppor
foursquare
I'm looking for...
About Foursquare
What is Foursquare?
Foursquare is a free app that helps you and your friends make the most of where you are. When you're out and about, use Foursquare to share and save the places you visit. And, when you're looking for inspiration for what to do next, we'll give you personalized recommendations and deals based on where you, your friends, and people with your tastes have been.
Whether you're setting off on a trip around the world, coordinating a night out with friends, or trying to pick out the best dish at your local restaurant, Foursquare is the perfect companion.
Fetched

Anatomy of a Checkin



Anatomy of a Checkin

```
[u'venue',
 u'like',
 u'photos',
 u'source',
 u'visibility',
 u'entities',
 u'shout',
 u'timeZoneOffset',
 u'type',
 u'id',
 u'createdAt',
 u'likes']
```

Anatomy of a Checkin

```
[u'venue',
 u'like',
 u'photos',
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 u'visibility',
 u'entities',
 u'shout',
 u'timeZoneOffset',
 u'type',
 u'id',
 u'createdAt',
 u'likes']
```
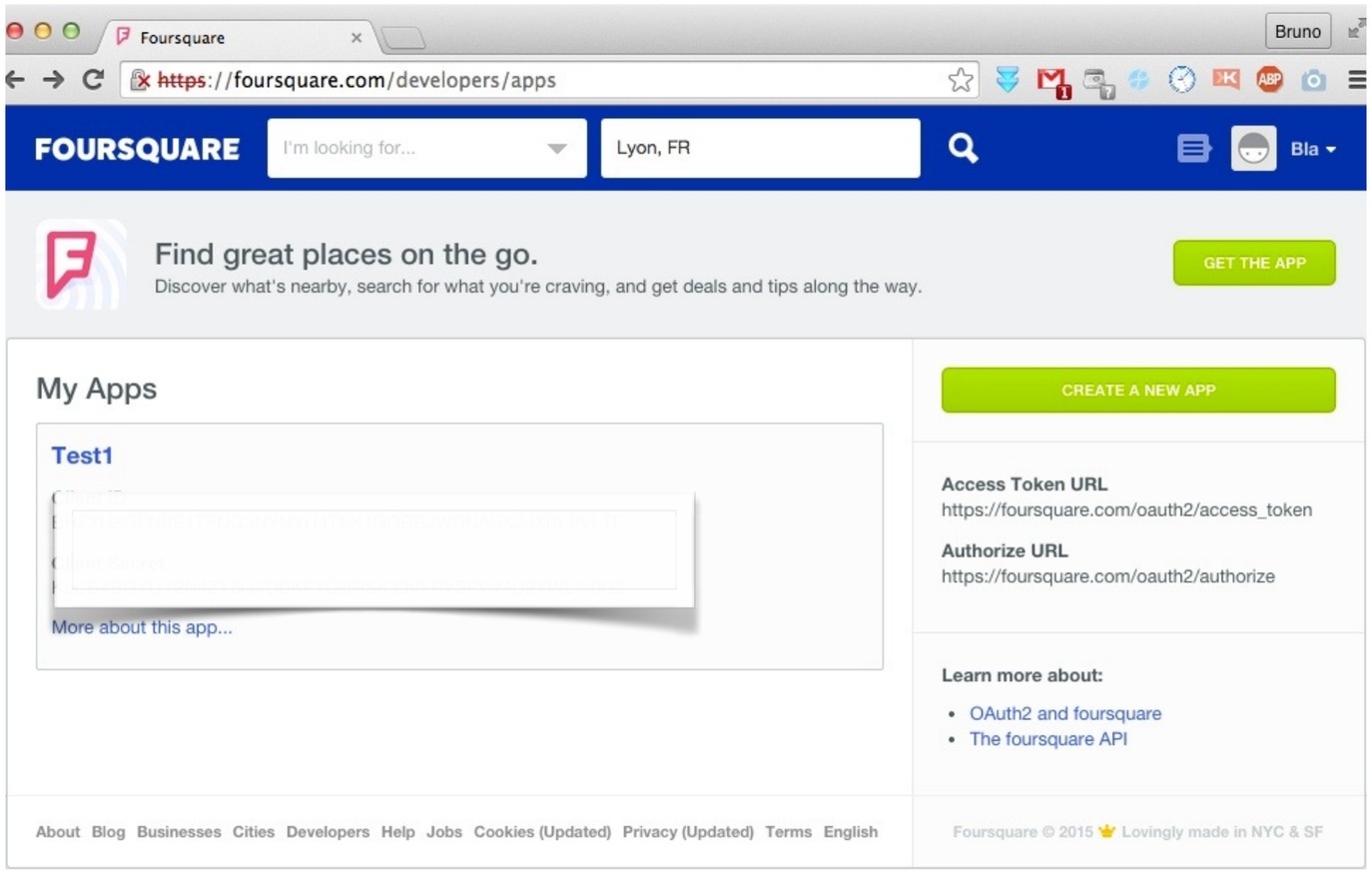
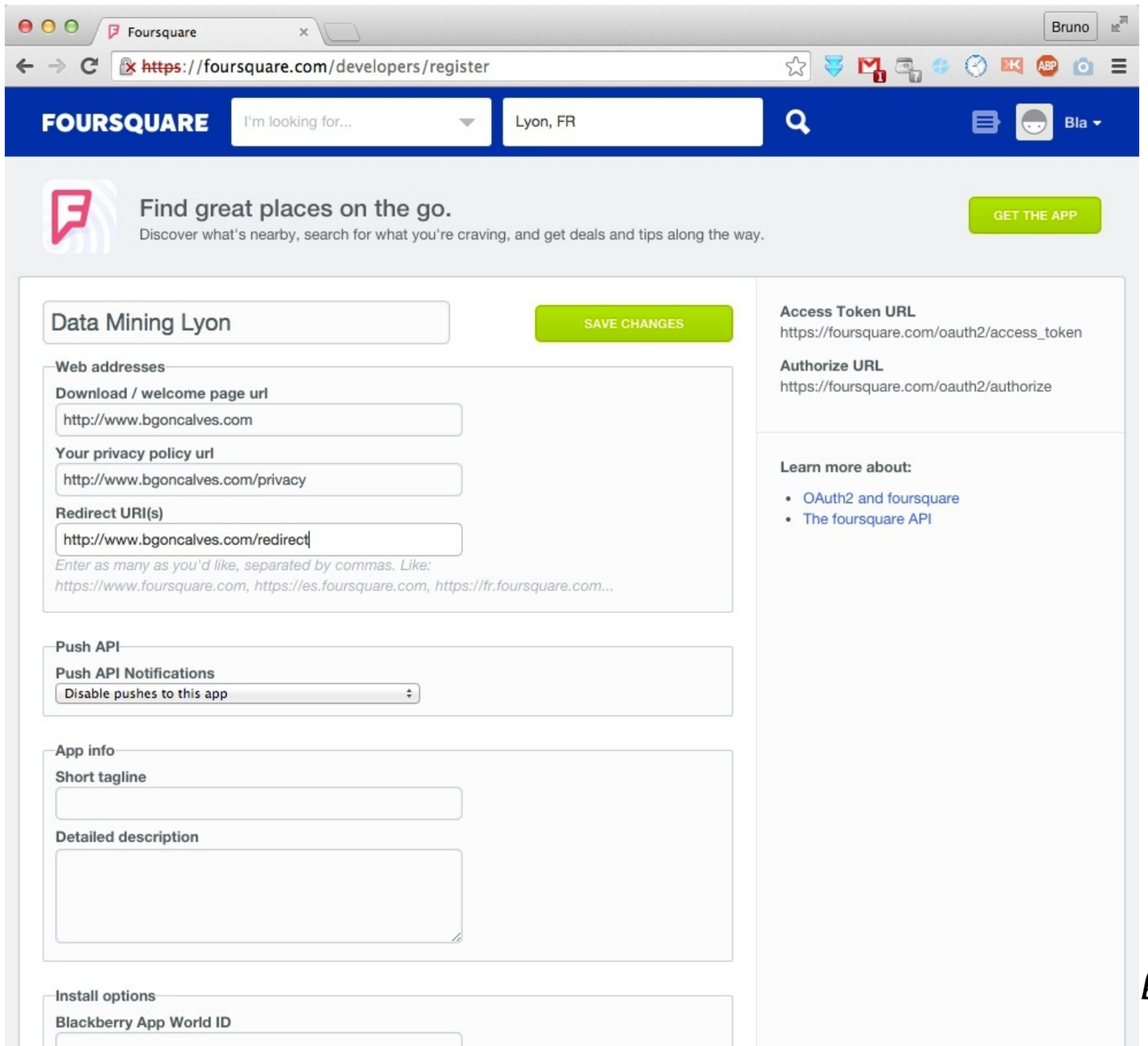

```
[u'verified',
 u'name',
 u'url',
 u'like',
 u'contact',
 u'location',
 u'stats',
 u'id',
 u'categories',
 u'likes']
[{u'indices': [112, 137],
  u'object': {u'url': u'http://go.nasa.gov/9kpN5g'},
  u'type': u'url'}]

u"We've got a new 'Curiosity Explorer' badge.
Explore your curiosity at science museums &
planetariums to earn it http://go.nasa.gov/9kpN5g"

{u'count': 1837,
 u'groups': [{u'count': 1837, u'items': [], u'type': u'others'}],
 u'summary': u'1837 likes'}
```

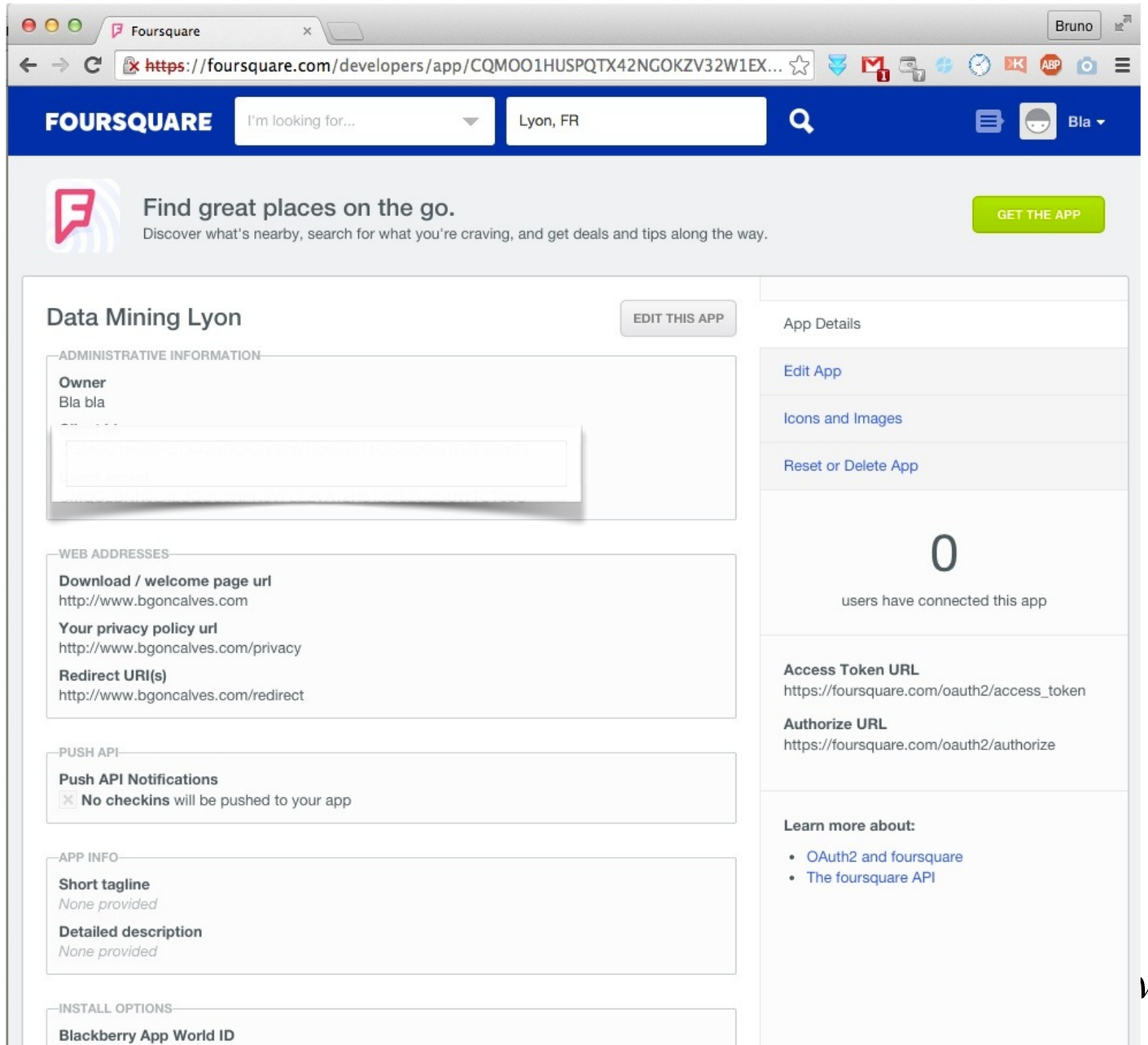
Registering An Application



Registering An Application



Registering An Application



Registering An Application

- We now have our client_id and client_secret that we can use to request an access token.

- First we request an auth_url, a URL where the "user" will be asked to login to foursquare and authorize our app

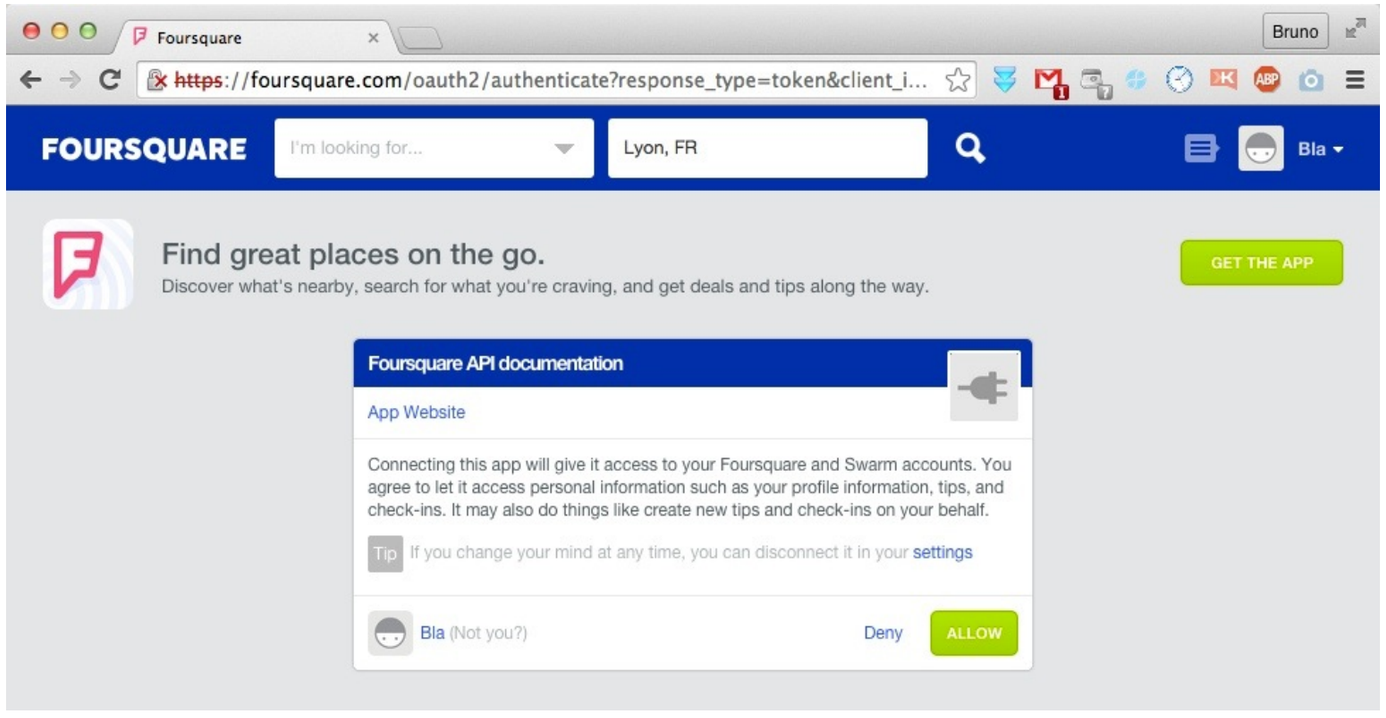
```
import foursquare

accounts = { "tutorial": {"client_id": "CLIENT_ID",
                          "client_secret": "CLIENT_SECRET",
                          "access_token": ""
                         }
           }

app = accounts["tutorial"]

client = foursquare.Foursquare(client_id = app["client_id"],
                               client_secret = app["client_secret"],
                               redirect_uri='http://www.bgoncalves.com/redirect')

auth_uri = client.oauth.auth_url()
print auth_uri
```

- In the remainder of this lecture, the accounts dict will live inside the foursquare_accounts.py file

auth_uri_foursquare.py

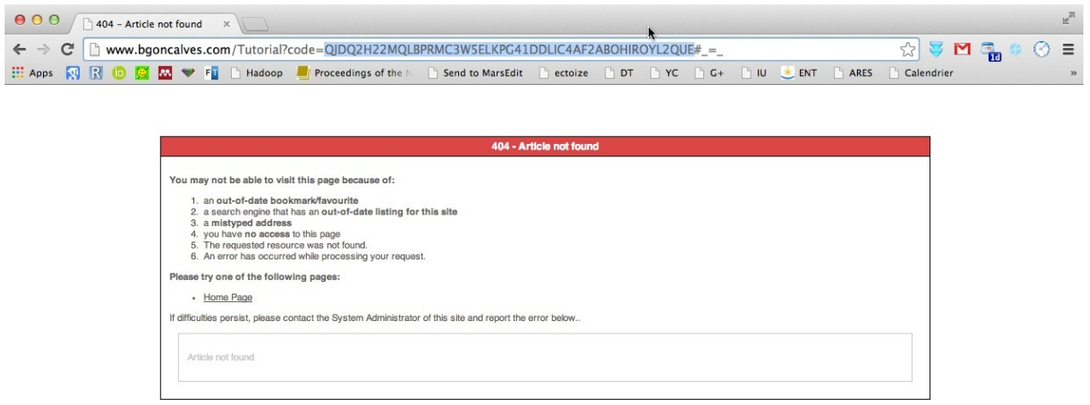
Registering An Application

- Now we must access our auth_uri in a browser, login and authorize the application



Registering An Application

- Afterwards we will be redirected automatically to out "redirect_uri" we used when registering the application



- Don't worry about the error. What we need is just the code portion of the url (the part between the "=" and the "#".

- This is the final piece of the puzzle.

Registering An Application

- with this code we can now request an auth_token which will allow us to authenticate with the Foursquare API

```
access_token = client.oauth.get_token('CODE')
```

- This will return the OAuth2 access_token that we can then use directly.

Authenticating with the API

```
import foursquare
from foursquare_accounts import accounts

app = accounts["tutorial"]

client = foursquare.Foursquare(client_id = app["client_id"],
                               client_secret = app["client_secret"])

client.set_access_token(app["access_token"])

user_id = 3751987
friends = client.users.friends(user_id)
```

- Much simpler and intuitive
- Less prone to mistakes
- Automatically takes care of all the dirty details

auth_foursquare.py

Objects

- Two main types of objects:
    - Users
    - Venues
- Multiple possible actions (by Users on Venues)
    - Checkin
    - Like
    - Tip

API Limitations

- Users have privacy concerns with respect to publicly sharing their location.
    - "Stalker apps"
    - "Please Rob Me"
- Privacy is a big concern for Foursquare
- API structure reflects this
    - "Easy" to get information on users and on venues. Connecting users to venues much harder to obtain.

Venues

- Venues correspond to physical locations
- Are perhaps the most important object in the Foursquare universe
- API is particularly generous, allowing for 5000 requests per hour.
- .venues(venue_id)
  Returns a venue object
- .venues.similar(venue_id)
  Returns a list of similar venues (abbreviated)
- .venues.search({“query”:query, “near”:location})
  Searches for places matching the query (“pizza”, “Eiffel Tower”, etc) near location (“Paris”, etc).

```
[u'city',
 u'cc',
 u'country',
 u'state',
 u'address',
 u'lat',
 u'lng']

[u'count',
 u'groups',
 u'summary']
```

```
[u'rating',
 u'reasons',
 u'likes',
 u'mayor',
 u'createdAt',
 u'verified',
 u'id',
 u'shortUrl',
 u'pageUpdates',
 u'location',
 u'tips',
 u'listed',
 u'canonicalUrl',
 u'tags',
 u'photos',
 u'attributes',
 u'stats',
 u'dislike',
 u'hereNow',
 u'categories',
 u'name',
 u'like',
 u'phrases',
 u'specials',
 u'contact',
 u'popular',
 u'timeZone']
```

Similar Venues

https://developer.foursquare.com/overview/venues.html

```
import foursquare
from foursquare_accounts import accounts

app = accounts["tutorial"]

client = foursquare.Foursquare(client_id = app["client_id"],
                               client_secret = app["client_secret"])

client.set_access_token(app["access_token"])

venue_id = "43695300f964a5208c291fe3"
venue = client.venues(venue_id)
similar = client.venues.similar(venue_id)

print "Similar venues to", venue["venue"]["name"],"(",venue["venue"]["hereNow"]["summary"],")"
print
for venue in similar["similarVenues"]["items"]:
    print venue["name"]
```


venues_foursquare.py

Tips

https://developer.foursquare.com/docs/venues/tips

- Users can leave tips in venues at any time (without checking in)

- (Reduced) Tips for a venue can be accessed using .venues.tips(venue_id)

- Limited to a maximum of 500 per call, defined with the "count" parameter. Get further tips with "offset" parameter (same as for friends).

- Full Tip objets can be obtained with .tips(tip_id)

- Contain (Reduced) User object and are public, providing an easy way to connect users with venues.

Tips

```python
import foursquare
from foursquare_accounts import accounts

app = accounts["tutorial"]

client = foursquare.Foursquare(client_id = app["client_id"],
                               client_secret = app["client_secret"])

client.set_access_token(app["access_token"])

venue_id = "43695300f964a5208c291fe3"

tips = client.venues.tips(venue_id)
tips_list = tips["tips"]["items"]
tip_count = tips["tips"]["count"]

while len(tips_list) < tip_count:
    tips = client.venues.tips(venue_id, {"offset": len(tips_list)})
    tips_list += tips["tips"]["items"]

print len(tips_list), tip_count

for tip in tips_list:
    print tip[“user”]["id"], tip["text"]
```


tips_foursquare.py

Checkins

https://developer.foursquare.com/docs/checkins/checkins.html

- Checkins are the *Raison d'être* of Foursquare.
- They connect Users with Venues providing valuable temporal and demographic information.
- .checkins(checkin_id) Returns the Checkin object
- .users.checkins(user_id) Returns the list of ***Public*** checkins for User user_id or all checkins if user_id is friends of the user using the application.

```python
import foursquare
from foursquare_accounts import accounts

app = accounts["tutorial"]

client = foursquare.Foursquare(client_id = app["client_id"],
                               client_secret = app["client_secret"])

client.set_access_token(app["access_token"])

checkin_id = "5089b44319a9974111a6c882"

checkin = client.checkins(checkin_id)
user_name = checkin["checkin"]["user"]["firstName"]

print checkin_id, "was made by", user_name
```

checkins_foursquare.py

Checkins

https://developer.foursquare.com/docs/checkins/checkins.html

- Users have the option of sharing their checkins through Twitter and Facebook, making them publicly accessible
- The status text is shared along with the URL of the web version of the checkin.
- To allow Twitter and Facebook friends to access the checkin, a special "**access_token**", called a **signature**, is added to the checkin URL.
- Each signature is valid for just a single checkin and it allows anyone to access the respective checkin

Checkins

https://developer.foursquare.com/docs/checkins/checkins.html

- Signed checkin urls are of the form:

https://foursquare.com/<user>/checkin/<checkin_id>?s=<signature>&ref=tw

- For example:

https://foursquare.com/tyayayayaa/checkin/5304b652498e734439d8711f?
s=ScMqmpSLg1buhGXQicDJS4A_FVY&ref=tw

- corresponds to user tyayayayaa performing checkin 5304b652498e734439d8711f and has signature ScMqmpSLg1buhGXQicDJS4A_FVY

- .checkins(checkin_id, {“signature”: signature}) can be used to query the API using the signature key to access a private checkin

Obtain signatures from Twitter!!!!

URL parsing

```
import urllib2
import posixpath
import foursquare
from foursquare_accounts import accounts

app = accounts["tutorial"]

client = foursquare.Foursquare(client_id = app["client_id"],
                               client_secret = app["client_secret"])

client.set_access_token(app["access_token"])

url = "https://foursquare.com/tyayayayaa/checkin/
5304b652498e734439d8711f?s=ScMqmpSLg1buhGXQicDJS4A_FVY&ref=tw"

parsed_url = urllib2.urlparse.urlparse(url)
checkin_id = posixpath.basename(parsed_url.path)
query = urllib2.urlparse.parse_qs(parsed_url.query)
screen_name = parsed_url.path.split('/')[1]

signature = query["s"][0]
source = query["ref"]

checkin = client.checkins(checkin_id, {"signature": signature})
```


url_parse.py

requests

http://requests.readthedocs.org/en/latest/

- .get(url) open the given url for reading (like .urlopen()) and returns a Response
- .get(url, auth=(“user”, “pass”)) open the given url and authenticate with username=“user” and password=“pass” (Basic Authentication)
- Response.status_code is a field that contains the calls status code
- Response.headers is a dict containing all the returned headers
- Response.text is a field that contains the content of the returned page
- Response.url contains the final url after all redirections
- Response.json() parses a JSON response (throws a JSONDecodeError exception if response is not valid JSON). Check “content-type” header field.

requests

http://requests.readthedocs.org/en/latest/

```
import requests
import sys

url = "http://httpbin.org/basic-auth/user/passwd"

request = requests.get(url, auth=("user", "passwd"))

if request.status_code != 200:
    print >> sys.stderr, "Error found", request.get_code()

content_type = request.headers["content-type"]

response = request.json()

if response["authenticated"]:
    print "Authentication Successful"
```

- .get(url, headers=headers) open the url for reading but pass "headers" contents to server when establishing a connection
  - Useful to override default values of headers or add custom values to help server decide how to handle our request
  - Most commonly used to spoof the user-agent

basic_auth.py

requests

http://requests.readthedocs.org/en/latest/

```
import requests
from BeautifulSoup import BeautifulSoup

url = "http://whatsmyuseragent.com/"

headers = {"User-agent" : "Mozilla/5.0 (Windows NT 6.1; Win64; x64; rv:25.0) Gecko/20100101 Firefox/25.0"}

request_default = requests.get(url)
request_spoofed = requests.get(url, headers=headers)

soup_default = BeautifulSoup(request_default.text)
soup_spoofed = BeautifulSoup(request_spoofed.text)

print "Default:", soup_default.h2.text
print "Spoofed:", soup_spoofed.h2.text
```

- Some servers use the User-agent string to decide how to format the output
  - Correctly handle specific versions of web browsers
  - Provide lighter/simplified versions to users on their mobiles
  - Refusing access to automated tools, etc

spoof.py

Venue HTML Parsing

http://www.crummy.com/software/BeautifulSoup/

```
from BeautifulSoup import BeautifulSoup
import urllib2
import requests
import posixpath

url = "http://4sq.com/18aGENW"

headers = {"User-agent": "Mozilla/5.0 (Windows NT 6.1; Win64; x64; rv:25.0) Gecko/20100101 Firefox/
25.0"}

request = requests.get(url, headers=headers)

final_url = request.url
parsed = urllib2.urlparse.urlparse(final_url)
query = parsed.query
signature = urllib2.urlparse.parse_qs(query)["s"][0]

checkin_id = posixpath.basename(parsed.path)
user = posixpath.dirname(parsed.path).split('/')[1]

soup = BeautifulSoup(request.text)

venue_push = soup.div(attrs={"class": "venue push"})[0]
screen_name = venue_push.h1.strong.text

venue = venue_push.a["href"]

print "Checkin %s is for User \"%s\" with Name \"%s\" checking in at %s"\
    % (checkin_id, user, screen_name, posixpath.basename(venue))
```