

# Geo-mapping

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Assistant Professor

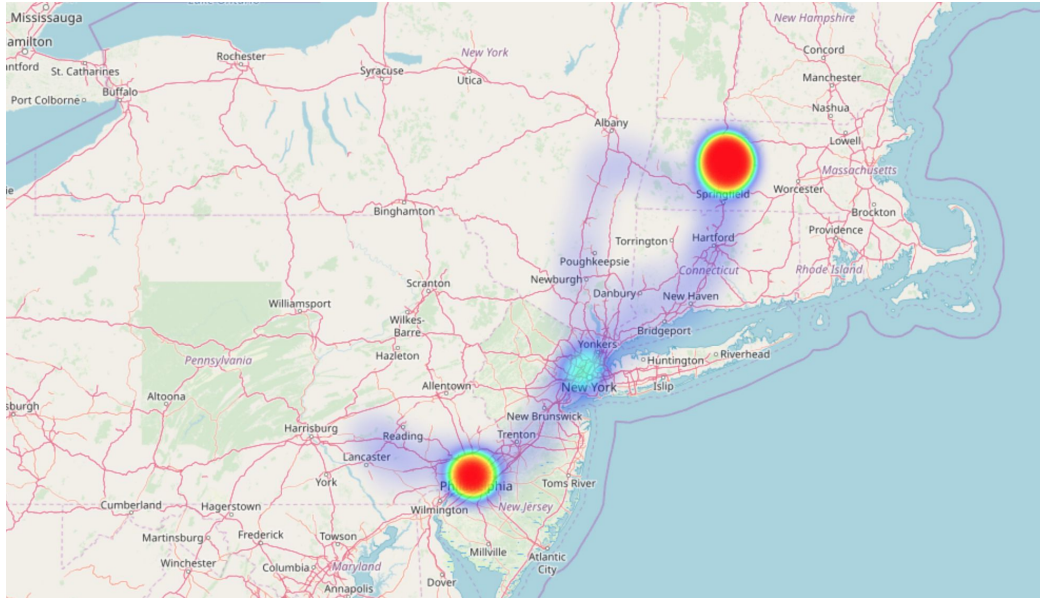
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[curiositybits.cc](http://curiositybits.cc)

# We are all being tracked

If you have a Google account (not your UMass-affiliated one), sign in Google Timeline (<https://www.google.com/maps/timeline?pb>), see every place Google logged your coordinates.



<https://www.maketecheasier.com/visualize-google-location-history/>

# If you don't want to be tracked by Google

Turn it off.

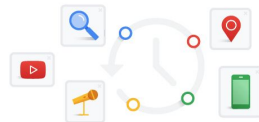
Google Account

Search Google Account

- Home
- Personal info
- Data & personalization**
- Security
- People & sharing
- Payments & subscriptions
- Help
- Send feedback

## Activity controls

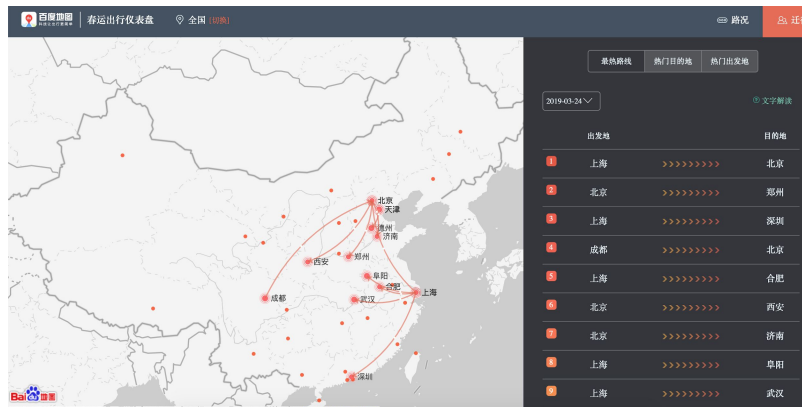
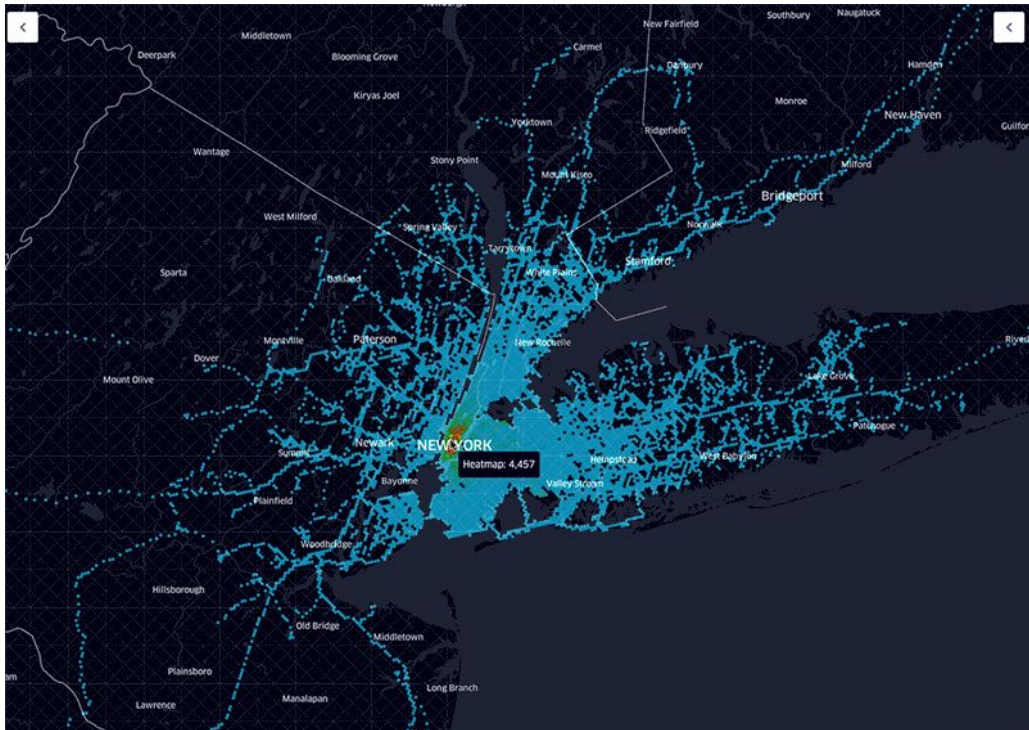
You can choose to save your activity for better personalization across Google. Turn on or pause these settings at any time.



Web & App Activity	On	>
Location History	On	>
Voice & Audio Activity	On	>
Device Information	On	>
YouTube Search History	Paused	>
YouTube Watch History	On	>

<https://myaccount.google.com/data-and-personalization?pli=1>

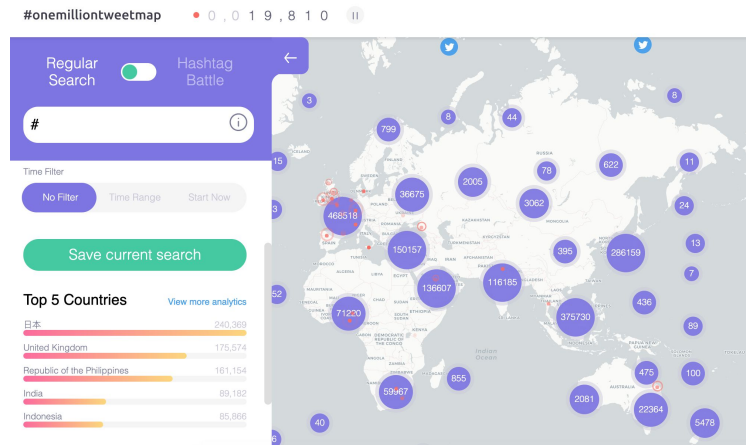
# Leveraging geo data for understanding movement of people



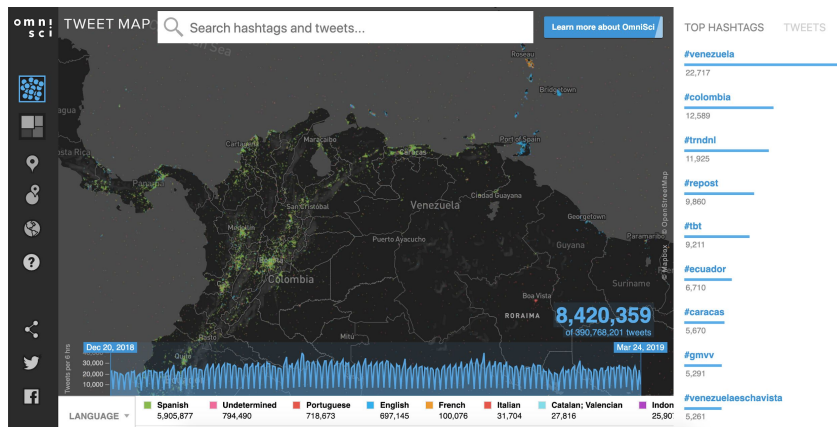
<http://qianxi.baidu.com/>

# Geo data on Twitter

Some easy visualization tools — these apps do not last forever



<https://onemilliontweetmap.com>



<https://www.omnisci.com/demos/tweetmap/>

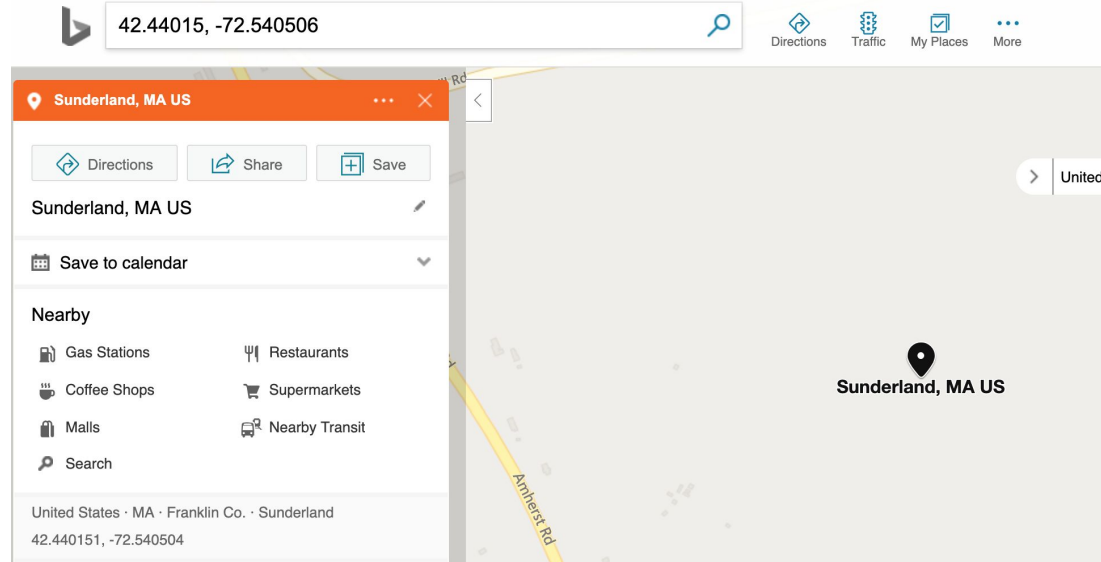
# Units in geographic data

## An unique identifier of a place

- Country
- State or province
- County, FIPS (Federal Information Processing Standards)
- City or metropolitan area
- Zip code

The most precise unit is:

Coordinates (latitude, longitude)





# Two types of *public* Twitter geo data

Assistant Prof. of Computational  
Communication Research. studies online  
public opinion and internet communities.

[CuriosityBits.org](https://CuriosityBits.org), bike trek, air travel

📍 Amherst, MA; Philadelphia, PA

🔗 [curiositybits.com](https://curiositybits.com)

📅 Joined December 2008

location on user bio



Geo-tagged tweets

# What can the geo data tell us?

There are very few geo-tagged tweets. But they reveal the precise location of a user at the moment of tweeting, but not necessarily where a user lives.

Twitter API returns geo-tagged tweets come with exact coordinates  
For the location info on user bio, we will need to convert whatever they enter to coordinates

Br [redacted]

@BradHarmon13

Postal worker

📍 Paducah ky

📅 Joined February 2018



**Paducah**  
**Kentucky**

37.075092, -88.648139





# Use Google Map API to convert addresses to coordinates


Rate-limited, up to 5,000 locations every month

**B**

@BradHarmon13

Postal worker

 Paducah ky

 Joined February 2018



**Paducah**

**Kentucky**

37.075092, -88.648139



# The scarcity of geo-tagged tweets

A convenient sample of 17,439 tweets sent to @realDonaldTrump created on 3/24/2019 at 5:30pm

**Only 493 are geo-tagged (<3%)**

Why so few geo-tagged tweets?

# Location data on user bio are *messy*

location
Thermal, Ca
United States
Long Island, NY
United States / South Pacific
Michigan, USA
HOME:Maine
Florida, USA
Summerlin South, NV
Georgia, USA
United States
RightHERE
Asheville, NC
TEXAS
Houston
Nashville, TN

location
Chatteris, England
Pennsylvania, USA
Washington, DC
chesapeake, ohio
United States
Cave Spring, VA
Paris
Litter box
North Pole, AK
SC
Extreme NE Georgia Mountains
United States
otto, new york
Free @GenFlynn

Dumbfuckistan aka Cali
Detroit, MI
United States
Washington DC
The South :)
Philadelphia, PA
United States
This is for you Dad
California, USA
United States
Paducah ky
The cornfield in Peaksville, Oh
Malvern, PA
United States

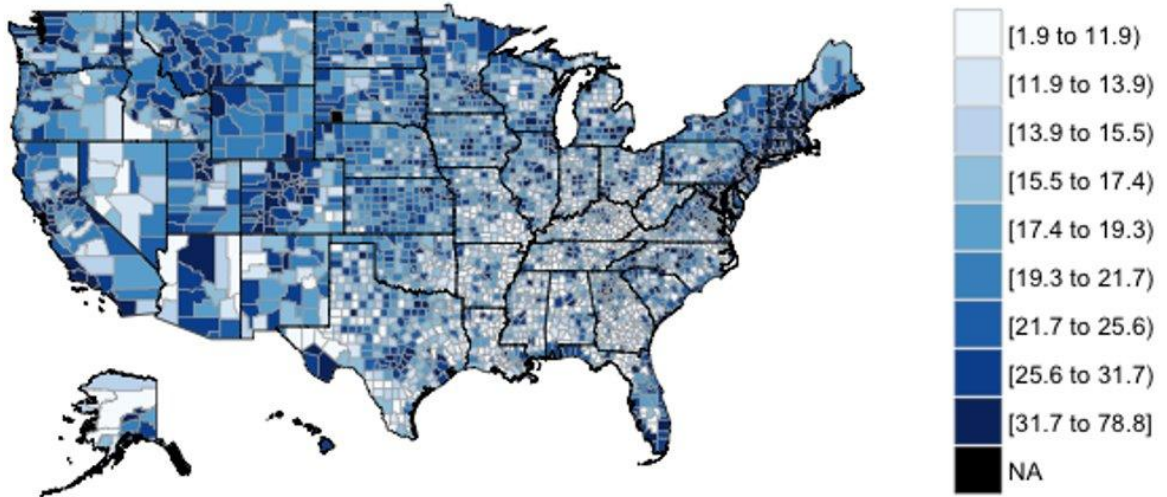
# Types of maps

## Choropleth

Areas are shaded or patterned in proportion to the numerical values

Areas: countries, states, counties, cities, zip codes, etc.

% of Population with Bachelor Degree or Higher by County

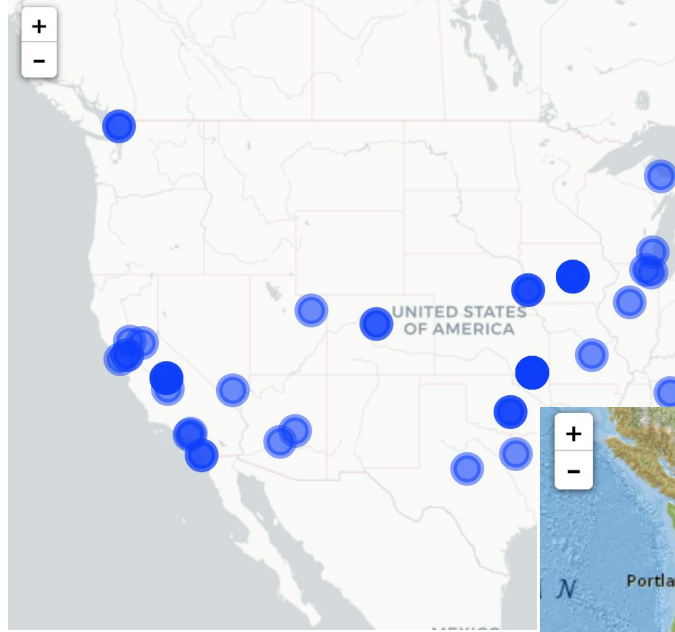


# Types of maps

## Markers map

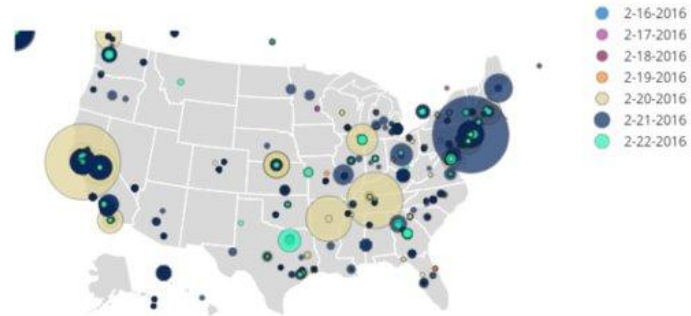
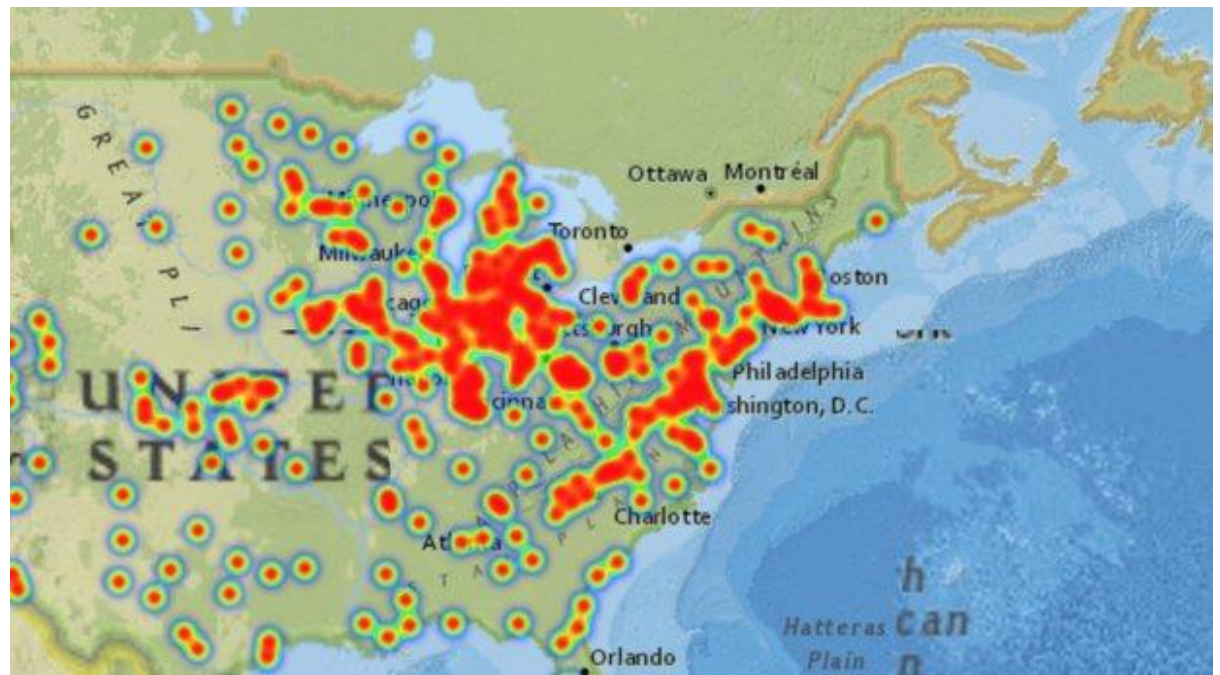
Putting markers on a map

Markers: pin, circle, dot, etc



# Types of maps

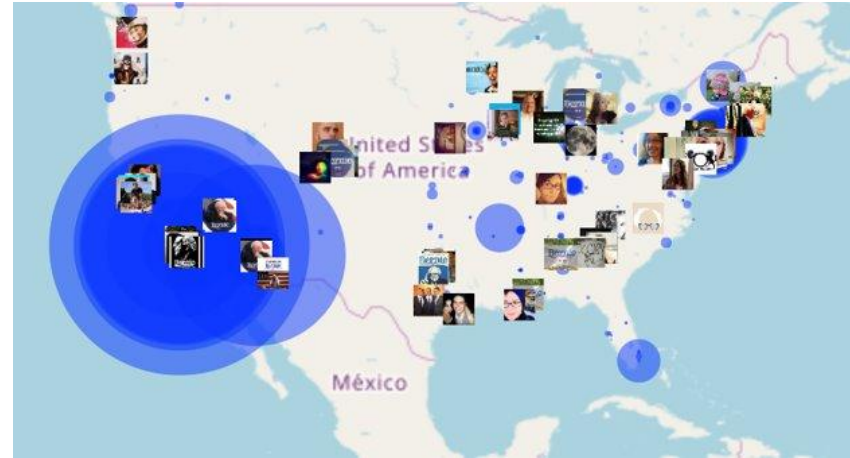
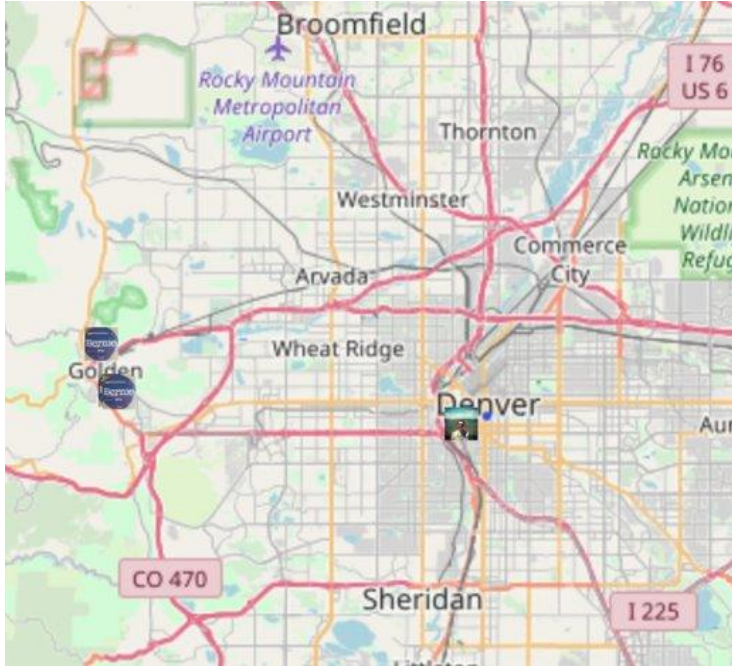
## Heatmap





# Terminology

Pop-up

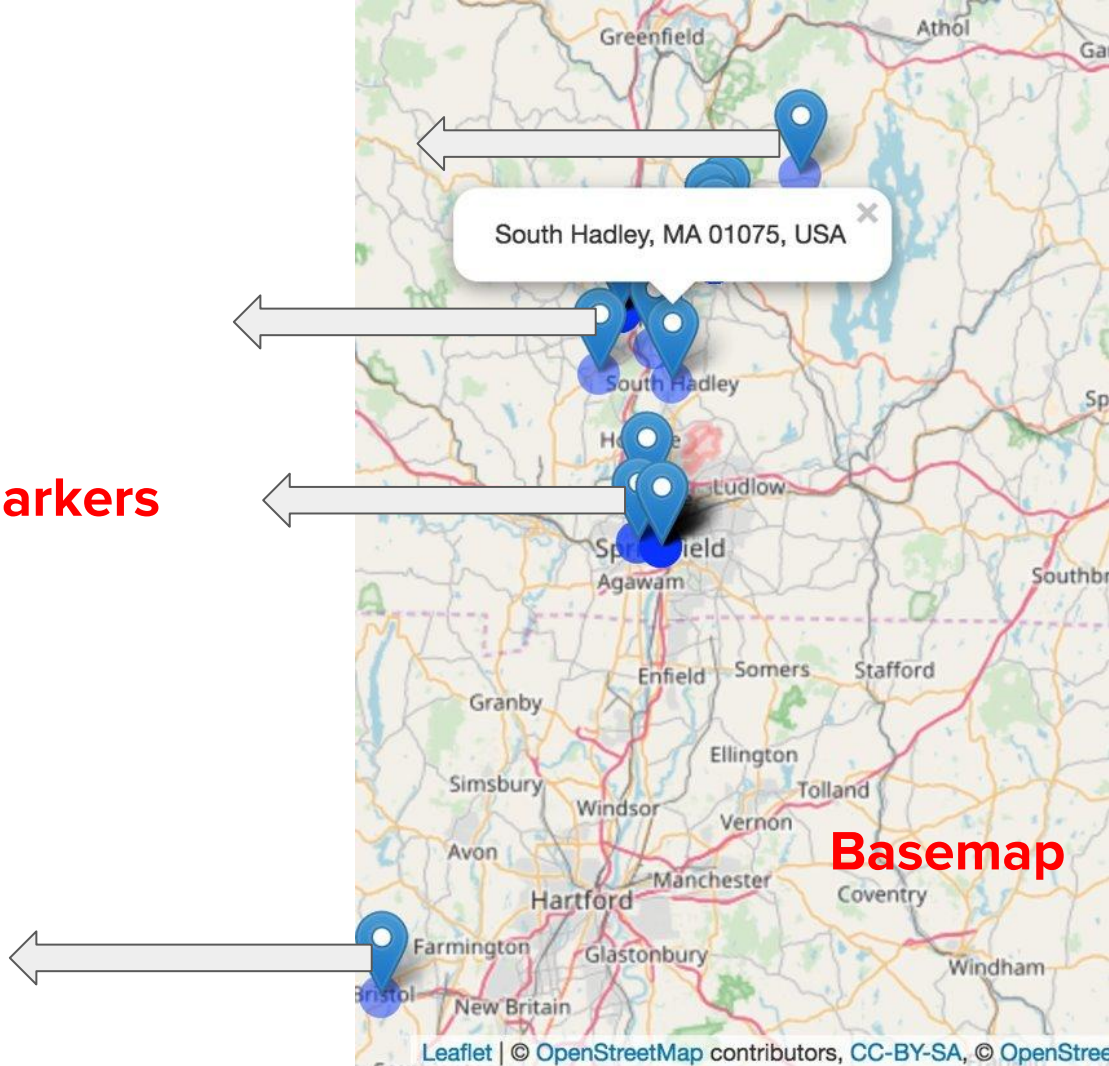




# Terminology

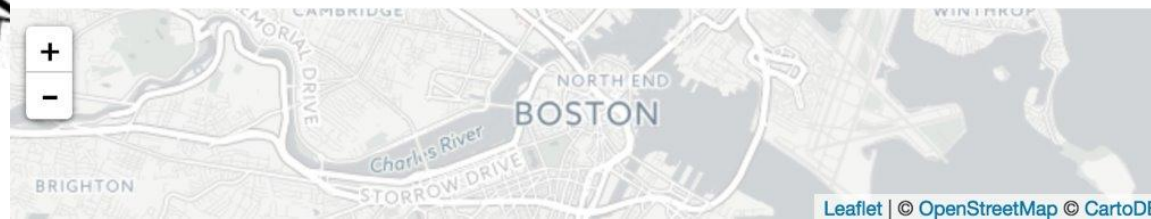
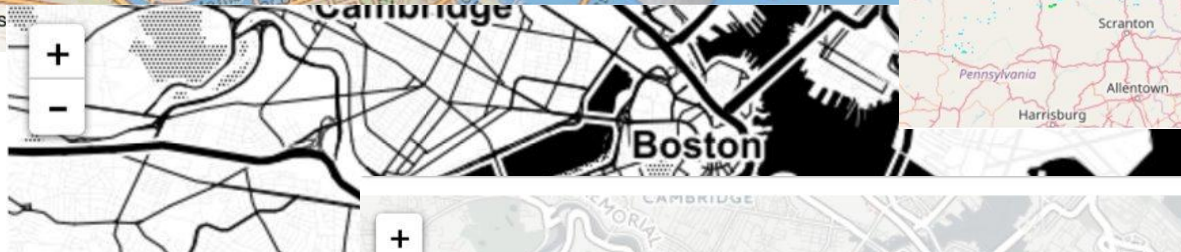
## Basemap and markers

**Markers**



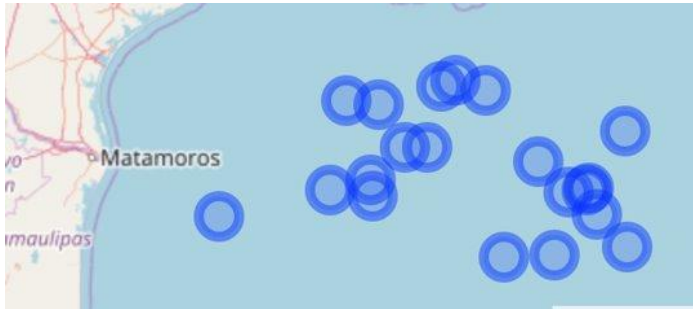
# Terminology

Different types of  
basemap available in R





# Terminology


Different types of  
markers available in R




# How to set up a Google Map API

 Google Cloud Platform 

New Project


 You have 20 projects remaining in your quota. Request an increase or delete projects. [Learn more](#)  
[MANAGE QUOTAS](#)

Project name \*

My COMM497DB Project Demo 

Project ID: my-comm497db-project-demo. It cannot be changed later. [EDIT](#)

Location \*

 No organization [BROWSE](#)

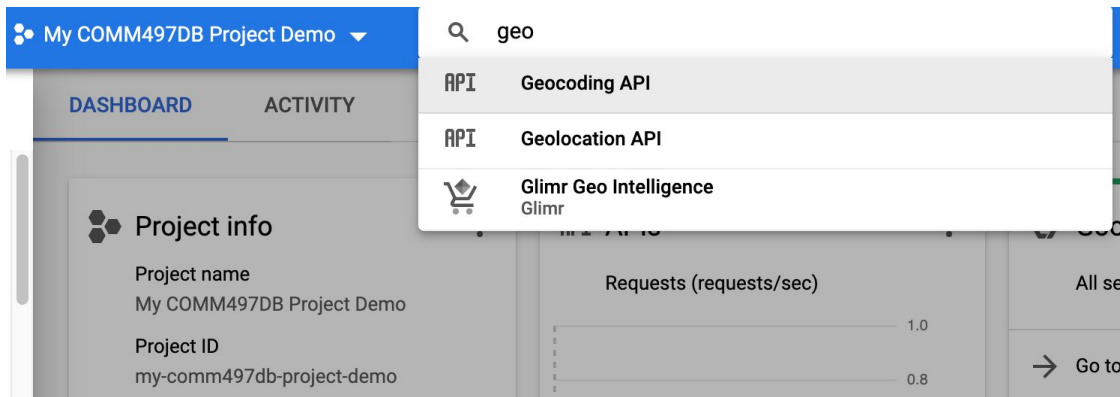
Parent organization or folder

CREATE

CANCEL

Create a project at  
<https://console.cloud.google.com>

# How to set up a Google Map API



Enable **Geocoding API** and **Geolocation API**



## Geocoding API

Google

Convert between addresses and geographic coordinates.

ENABLE



## Geolocation API


Google


Location data from cell towers and WiFi nodes.


ENABLE


# How to set up a Google Map API


Go to **Geocoding API**

Google Maps

Overview

APIs

Metrics

Support

APIs

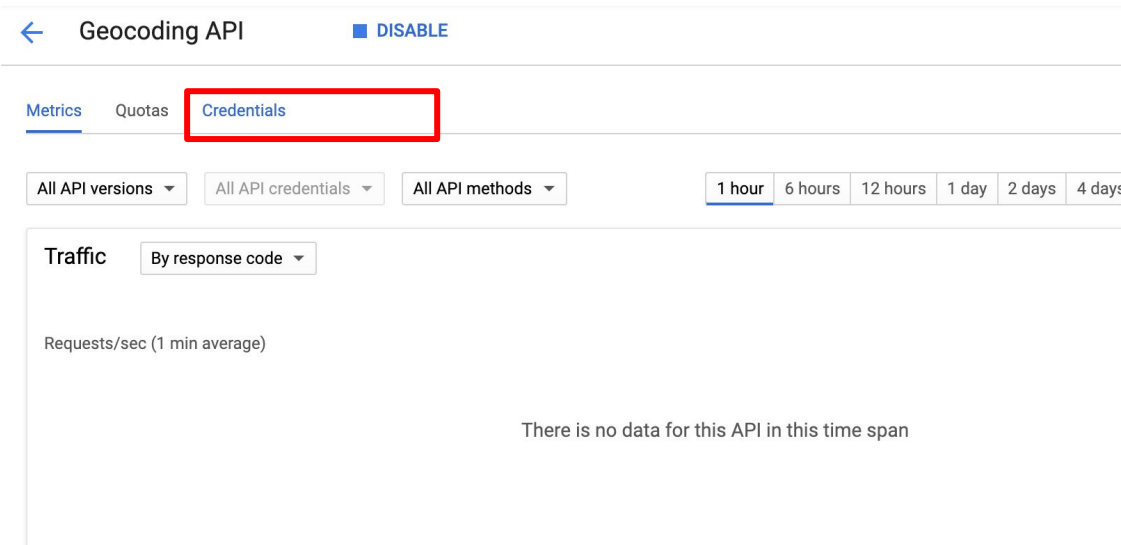
Enabled APIs

Select an API to view details. Figures are for the last 30 days.

API ↑	Requests	Errors
Geocoding API	0	0
Geolocation API	0	0



# How to set up a Google Map API



The screenshot shows the Google Cloud console interface for the Geocoding API. At the top, there is a back arrow, the text 'Geocoding API', and a 'DISABLE' button. Below this is a navigation bar with three tabs: 'Metrics', 'Quotas', and 'Credentials'. The 'Credentials' tab is highlighted with a red rectangular box. Underneath the tabs, there are three dropdown menus: 'All API versions', 'All API credentials', and 'All API methods'. To the right of these are six time range buttons: '1 hour', '6 hours', '12 hours', '1 day', '2 days', and '4 days'. The '1 hour' button is selected. Below these elements is a 'Traffic' section with a 'By response code' dropdown. The main content area shows 'Requests/sec (1 min average)' and a message stating 'There is no data for this API in this time span'.

← Geocoding API ■ DISABLE

[Metrics](#) [Quotas](#) [Credentials](#)

All API versions ▾ All API credentials ▾ All API methods ▾

[1 hour](#) 6 hours 12 hours 1 day 2 days 4 days

Traffic By response code ▾

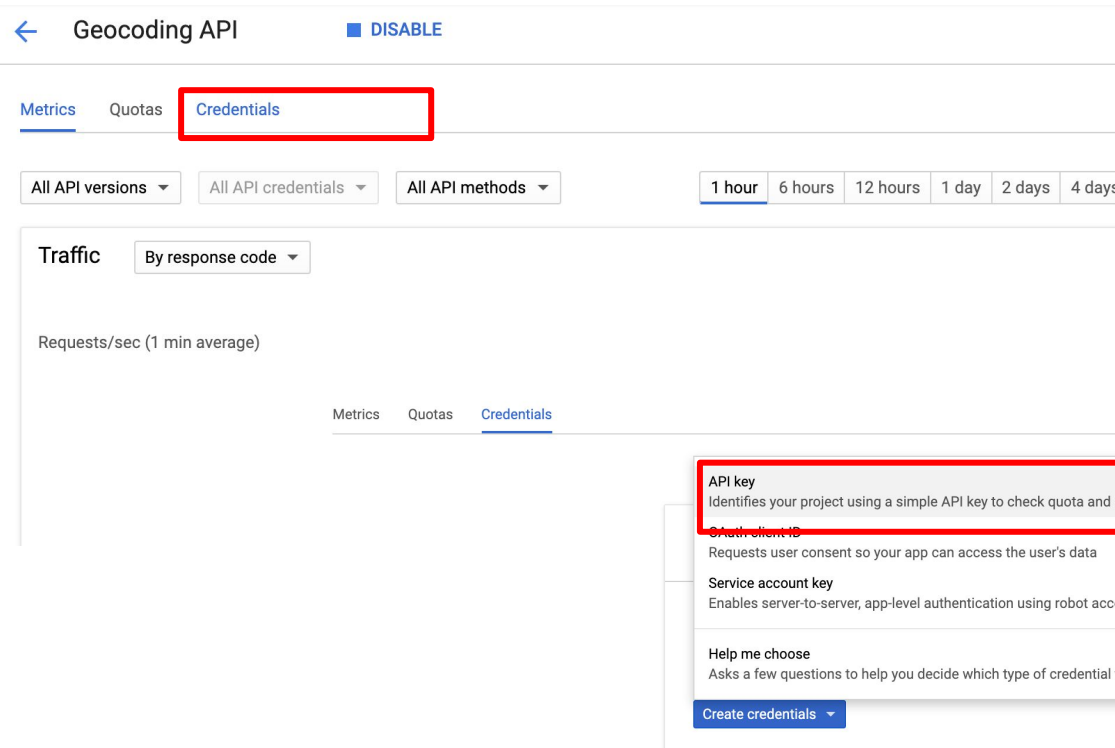
Requests/sec (1 min average)

There is no data for this API in this time span

Click **Credentials**



# How to set up a Google Map API



← Geocoding API ■ DISABLE

[Metrics](#) [Quotas](#) [Credentials](#)

All API versions ▾ All API credentials ▾ All API methods ▾

1 hour 6 hours 12 hours 1 day 2 days 4 days

Traffic By response code ▾

Requests/sec (1 min average)

[Metrics](#) [Quotas](#) [Credentials](#)

**API key**  
Identifies your project using a simple API key to check quota and access resources

**OAuth client ID**  
Requests user consent so your app can access the user's data

**Service account key**  
Enables server-to-server, app-level authentication using robot accounts

**Help me choose**  
Asks a few questions to help you decide which type of credential to use

Create credentials ▾

Click **Credentials**  
and Create **API Key**