

R Package Introduction - ggmap

Jan 3, 2020

Section 1

Get Started

Import Packages

```
library(ggmap)  
library(ggplot2)
```

Built-in Data Sets

• crime

time	date	hour	precinct	offense	beat	block	street	type	suffix	number	month	day	location	address	lon	lat	
82729	2010-01-01 14:00:00	1/1/2010	0	18A	murder	JSE30	9600-9659	marlin	ln	-	1	january	friday	apartment parking lot	9650 marline ln	-95.43739	29.67790
82730	2010-01-01 14:00:00	1/1/2010	0	13R	robbery	13D10	4700-4799	telephone	rd	-	1	january	friday	road / street / sidewalk	4750 telephone rd	-95.20888	29.69171
82731	2010-01-01 14:00:00	1/1/2010	0	20R	aggravated assault	14E20	5000-5099	wickhaven	ln	-	1	january	friday	residence / house	5050 wickhaven ln	-95.45588	29.59022
82732	2010-01-01 14:00:00	1/1/2010	0	20R	aggravated assault	2A30	1000-1099	ashland	st	-	1	january	friday	residence / house	1050 ashland st	-95.40334	29.79024
82733	2010-01-01 14:00:00	1/1/2010	0	20A	aggravated assault	14D20	8300-8399	canyon	ln	-	1	january	friday	apartment	8350 canyon	-95.37791	29.67603
82734	2010-01-01 14:00:00	1/1/2010	0	20R	burglary	18F60	9300-9399	rowan	ln	-	1	january	friday	residence / house	9350 rowan ln	-95.54830	29.70223
82735	2010-01-01 14:00:00	1/1/2010	0	20A	burglary	10H60	2500-2599	southmore	bvd	-	1	january	friday	apartment	2550 southmore bvd	-95.37940	29.71569
82736	2010-01-01 14:00:00	1/1/2010	0	20R	burglary	13H10	6300-6399	rupley	cir	-	1	january	friday	residence / house	2550 rupley cir	-95.31560	29.69007
82737	2010-01-01 14:00:00	1/1/2010	0	18A	burglary	2A10	1000-1099	ashley	ln	-	1	january	friday	residence / house	8200 ashley ln	-95.52000	29.71714
82738	2010-01-01 14:00:00	1/1/2010	0	20P	burglary	20G20	10700-10799	lakewood forest	dr	-	1	january	friday	multi-unit home (duplex, triples, etc)	10170 lakew forest dr	-95.56593	29.74780
82739	2010-01-01 14:00:00	1/1/2010	0	20R	burglary	JSE10	5700-5799	jason	ln	-	1	january	friday	residence / house	5750 jason	-95.49227	29.68389
82740	2010-01-01 14:00:00	1/1/2010	0	20R	burglary	JHH10	7000-7099	ave k	ln	-	1	january	friday	residence / house	7050 ave k	-95.29743	29.74156
82741	2010-01-01 14:00:00	1/1/2010	0	070	burglary	7C20	4400-4499	liberty	rd	-	1	january	friday	convenience store	4450 liberty rd	-95.32520	29.78724
82742	2010-01-01 14:00:00	1/1/2010	0	18A	auto theft	7C20	4600-4699	falls	st	-	1	january	friday	apartment parking lot	4650 falls st	-95.33067	29.80306
82743	2010-01-01 14:00:00	1/1/2010	0	13R	auto theft	24C40	24000-24099	lake houston	pkyw	E	1	january	friday	road / street / sidewalk	24050 lake houston pkyw	-95.11061	30.02089
82744	2010-01-01 14:00:00	1/1/2010	0	18N	auto theft	1A10	300-399	hamilton	st	-	1	january	friday	bar / night club parking lot	350 hamilton st	-95.35346	29.75704
82745	2010-01-01 14:00:00	1/1/2010	0	18M	theft	A50	1600-1699	west lp s	ser	E	1	january	friday	hotel / motel parking lot	1650 west lp s ser	-95.11413	31.41404
82746	2010-01-01 14:00:00	1/1/2010	0	18P	theft	41C10	1000-1099	shadow wood	dr	-	1	january	friday	commercial parking lot / garage	10850 shadow wood	-95.55900	29.80453
82747	2010-01-01 14:00:00	1/1/2010	0	18R	theft	14D55	16000-16999	cobre valley	dr	-	1	january	friday	commercial parking lot / garage	10850 cobre valley dr	-95.55804	29.80453
82748	2010-01-01 14:00:00	1/1/2010	0	01B	theft	1A10	1250-1299	ashley	ln	-	1	january	friday	bar / night club	1250 ashley ln	-95.35382	29.75352
82749	2010-01-01 14:00:00	1/1/2010	0	01B	theft	2A60	1000-1099	washington	ave	-	1	january	friday	bar / night club	1050 washington ave	-95.37823	29.76791
82750	2010-01-01 14:00:00	1/1/2010	0	01B	theft	3B40	5100-5199	yale	st	-	1	january	friday	bar / night club	5150 yale	-95.40283	29.84116
82751	2010-01-01 14:00:00	1/1/2010	0	250	theft	5F20	9100-9199	long point	rd	-	1	january	friday	other / unknown	9150 long point rd	-95.51726	29.79952
82752	2010-01-01 14:00:00	1/1/2010	0	20V	theft	2A30	2600-2699	lawrence	-	-	1	january	friday	vacant single occupancy residence (houses, townhouses, duplexes, etc)	2650 lawrence	-95.40813	29.81045
82753	2010-01-01 14:00:00	1/1/2010	0	20R	theft	3B40	900-999	36th	st	E	1	january	friday	residence / house	950 36th st	-95.38664	29.81949

• wind

lon	lat	dir	dur	std	spd	delta_lat	delta_lon
-99.900	24.3	3.141593	0	0	0	0	-0.2
-99.856	24.3	3.141593	0	0	0	0	-0.2
-99.811	24.3	3.141593	0	0	0	0	-0.2
-99.767	24.3	3.141593	0	0	0	0	-0.2
-99.723	24.3	3.141593	0	0	0	0	-0.2
-99.679	24.3	3.141593	0	0	0	0	-0.2
-99.635	24.3	3.141593	0	0	0	0	-0.2

register_google

```
MY_API_KEY = "AIzaSyBBC7N-wLvVrB1Ka2JhC8BEaUU2CBH_PFk"  
register_google(key = MY_API_KEY)  
has_google_key()
```

```
## [1] TRUE
```

- Reference (click)

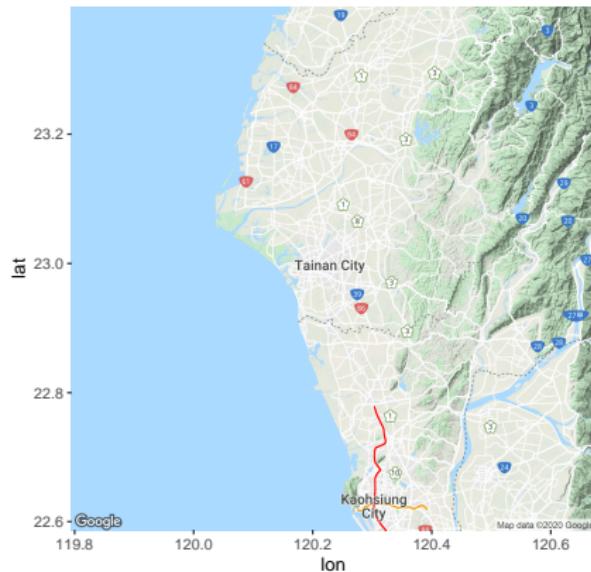
Section 2

Download Background Map

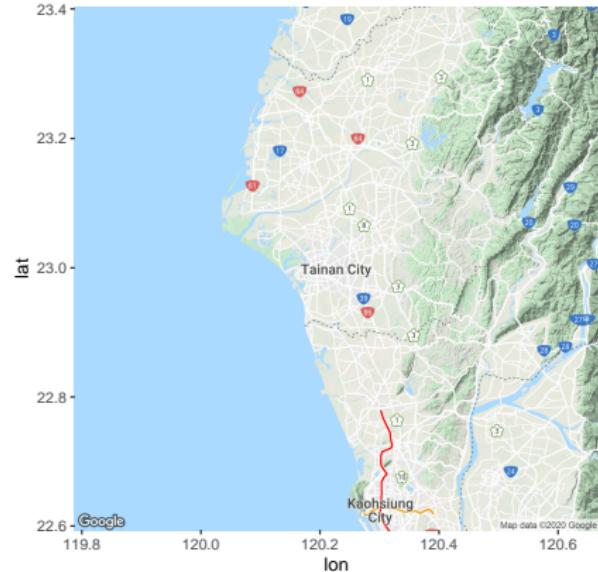
get_googlemap(1/5)

- center

use vector: c(lon = 120.233937, lat = 22.993013)

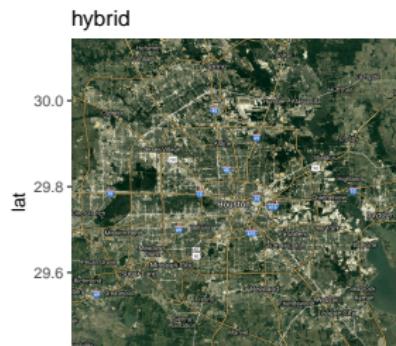
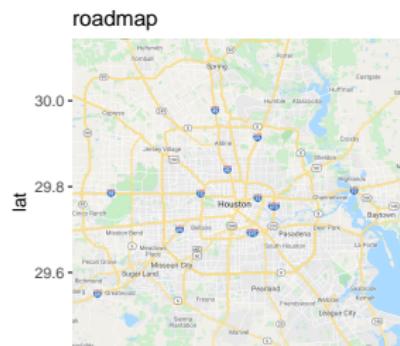
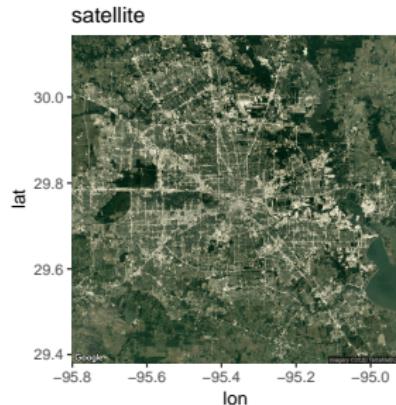
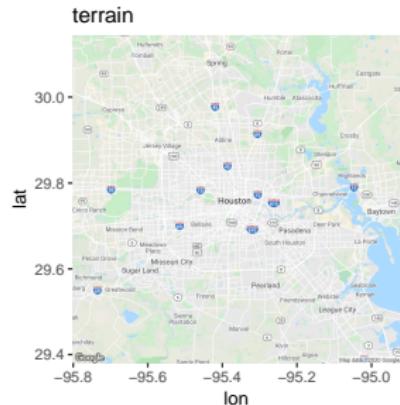


use place name: "Tainan"



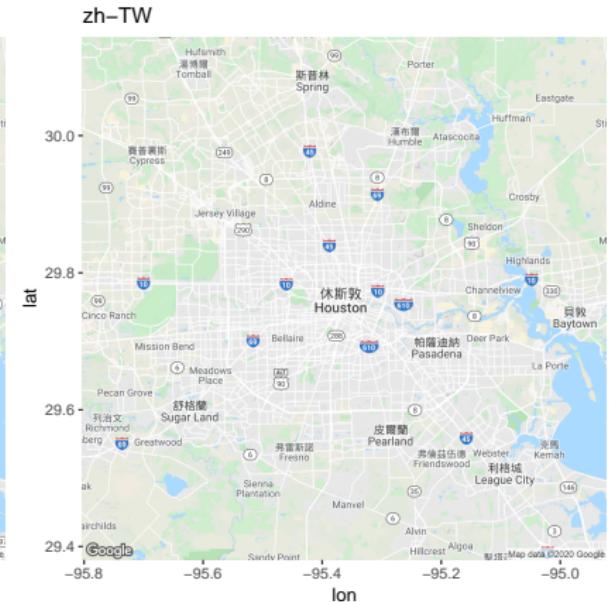
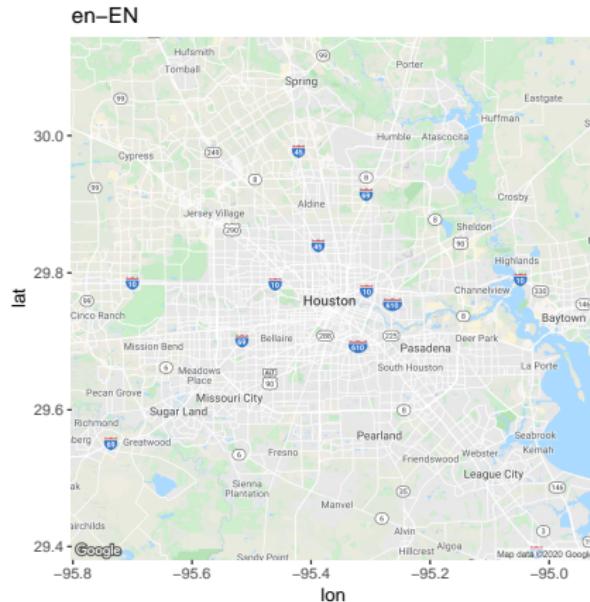
get_googlemap(2/5)

- **maptyle**



get_googlemap(3/5)

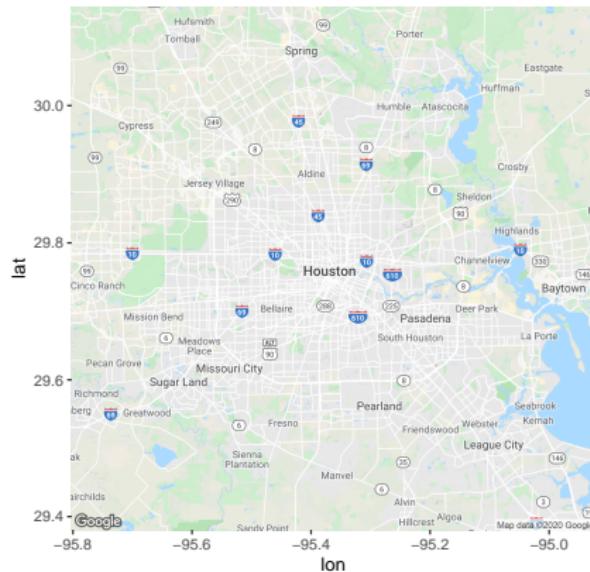
- language



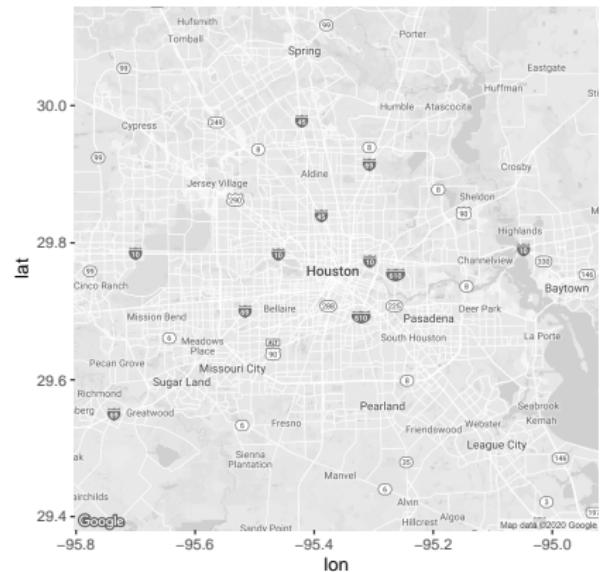
get_googlemap(4/5)

- color

color



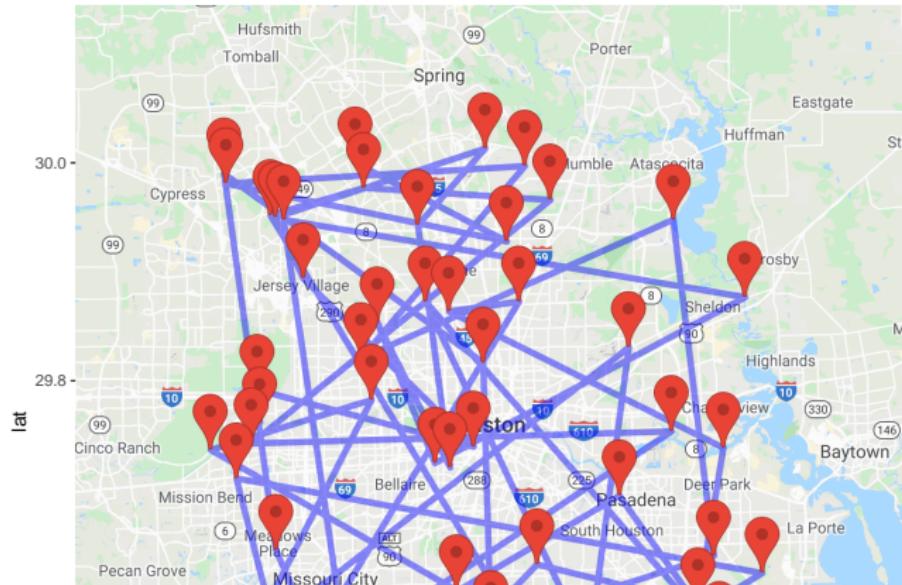
bw



get_ggmap(5/5)

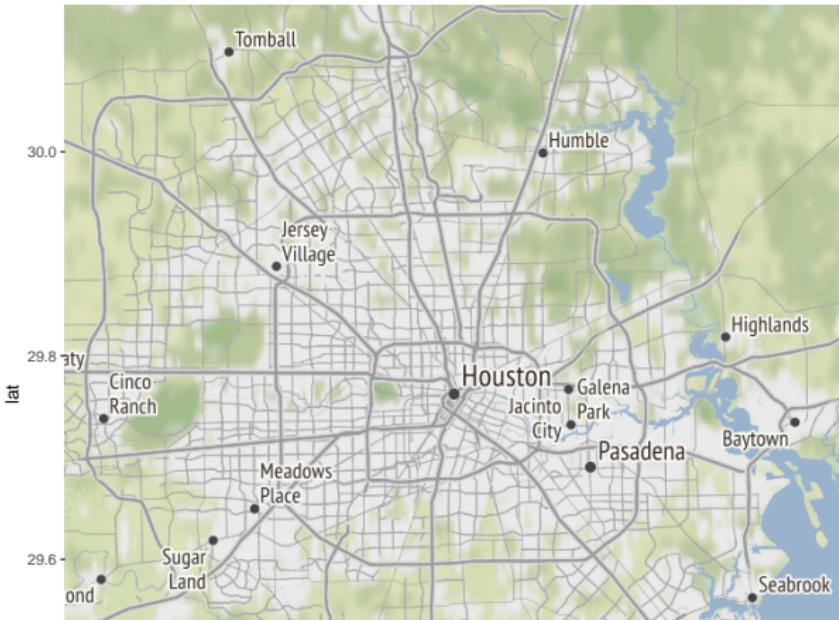
- markers / path

```
map <- get_ggmap(markers = df, path = df)
ggmap(map)
```



get_stamenmap

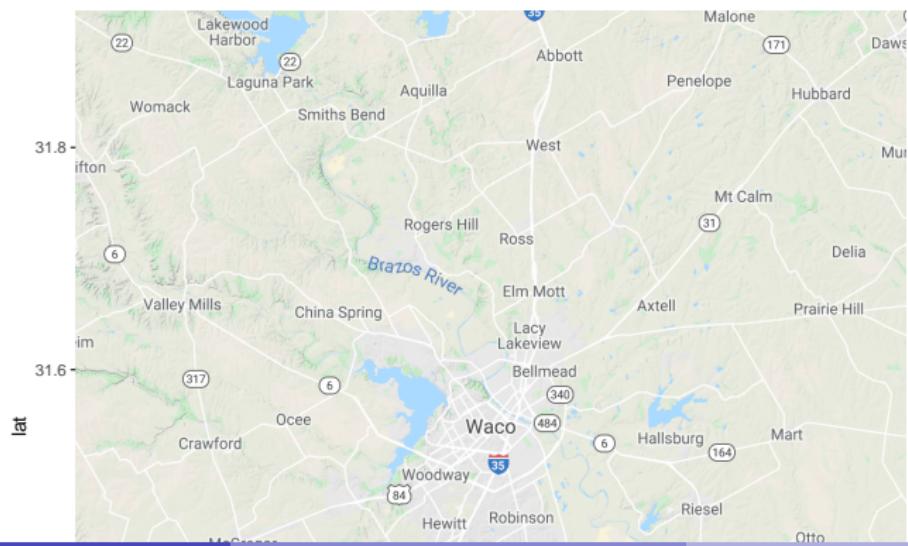
- bbox
- zoom
- maptype
- color



get_map

A smart wrapper that queries the Google Maps, Stamen Maps servers for a map.

```
map <- get_map(c(-97.14667, 31.5493))  
ggmap(map)
```



Section 3

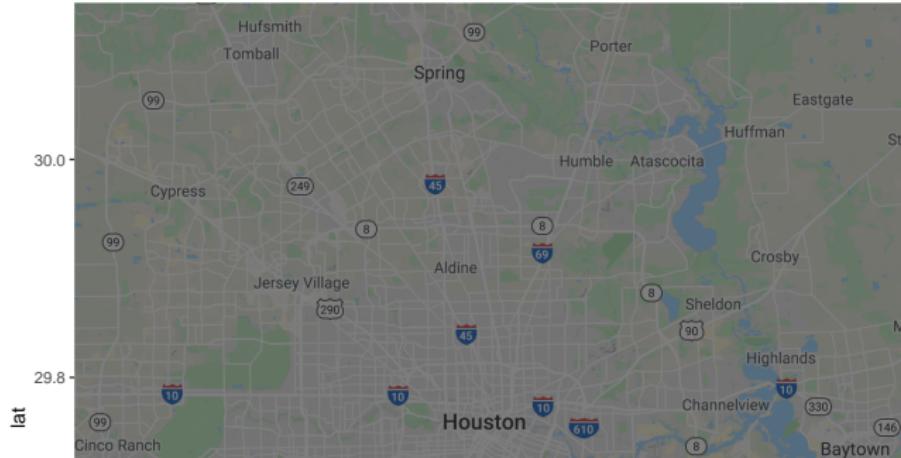
Plot Your Map

ggmap

Plots the raster object produced by get_map.

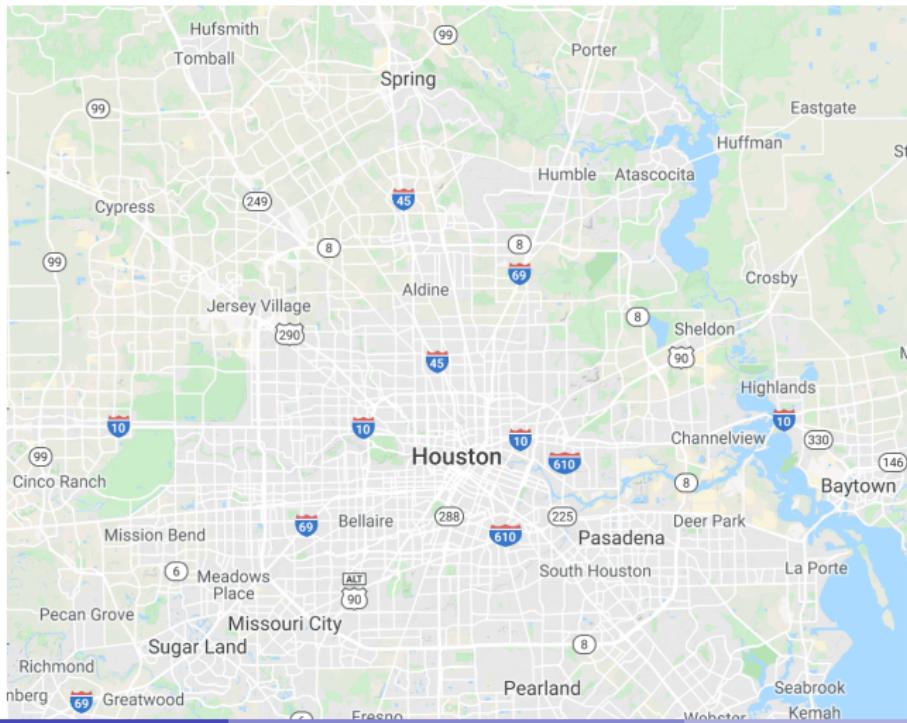
- darken
- extent

```
map <- get_map()  
ggmap(map, darken = .5)
```



qmap()

qmap()

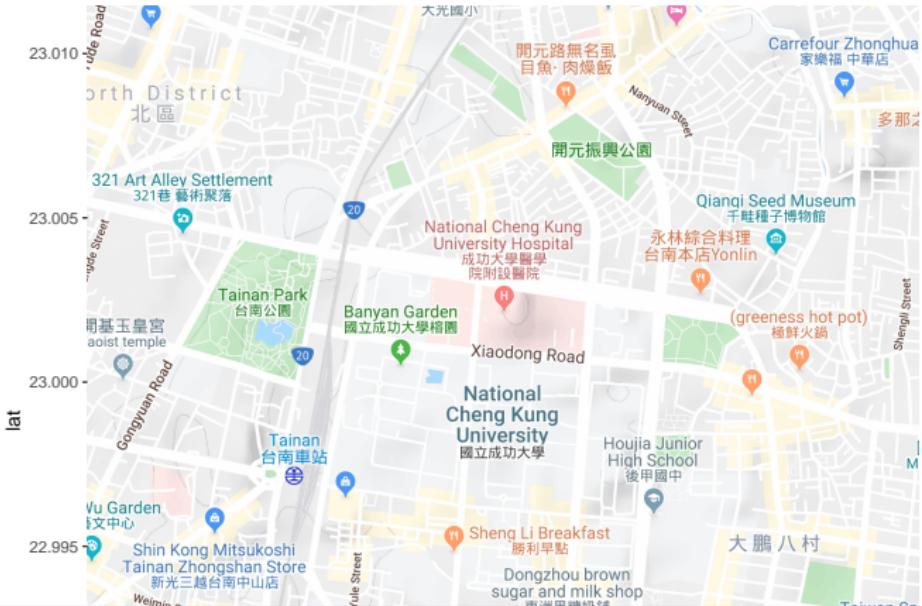


Section 4

Bounding Box

bb2bbox(1/3)

```
# grab a center/zoom map and compute its bounding box  
map <- get_map("National Cheng Kung University", zoom = 15)  
ggmap(map)
```



bb2bbox(2/3)

```
(bb <- attr(map, "bb"))
```

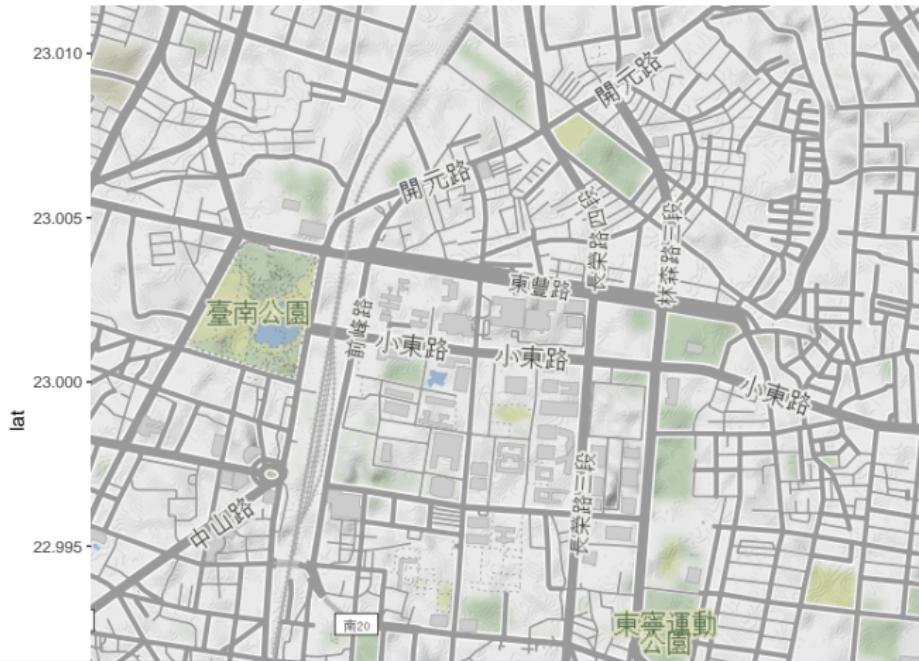
```
## # A tibble: 1 x 4
##   ll.lat ll.lon ur.lat ur.lon
##     <dbl>   <dbl>   <dbl>   <dbl>
## 1    23.0    120.    23.0    120.
```

```
(bbox <- bb2bbox(bb))
```

```
##       left     bottom      right       top
## 120.20580 22.98618 120.23327 23.01146
```

bb2bbox(3/3)

```
# use the bounding box to get a stamen map  
ggmap(get_stamenmap(bbox, zoom = 15))
```



make_bbox

```
make_bbox(lon, lat, data = crime, f = .10)
```

```
##           left      bottom       right        top
## -100.26148 26.52414 -91.19034 38.31988
```

Section 5

Conversion Between Geocode and Address

geocode

```
(gc <- geocode("the white house"))
```

```
## # A tibble: 1 x 2
##       lon     lat
##   <dbl> <dbl>
## 1 -77.0  38.9
```

revgeocode

```
revgeocode(as.numeric(gc))
```

```
## [1] "1600 Pennsylvania Ave NW, Washington, DC 20500, USA"
```

Section 6

Route and Trek

route

```
from <- "houston, texas"
to <- "waco, texas"
route_df <- route(from, to, structure = "route")
```

route	m	km	miles	seconds	minutes	hours	lon	lat
A	43	0.043	0.0267202	12	0.2000000	0.0033333	-95.36981	29.76043
A	79	0.079	0.0490906	16	0.2666667	0.0044444	-95.36957	29.76075
A	1684	1.684	1.0464376	87	1.4500000	0.0241667	-95.37006	29.76114
A	196	0.196	0.1217944	8	0.1333333	0.0022222	-95.36586	29.77243
A	7885	7.885	4.8997390	292	4.8666667	0.0811111	-95.36706	29.77382
A	507	0.507	0.3150498	21	0.3500000	0.0058333	-95.44553	29.77921
A	1279	1.279	0.7947706	53	0.8833333	0.0147222	-95.45067	29.77971
A	2044	2.044	1.2701416	75	1.2500000	0.0208333	-95.45150	29.79092
A	223	0.223	0.1385722	8	0.1333333	0.0022222	-95.45523	29.80740
A	69847	69.847	43.4029258	2301	38.3500000	0.6391667	-95.45683	29.80885
A	77804	77.804	48.3474056	2478	41.3000000	0.6883333	-96.06931	30.11378
A	9532	9.532	5.9231848	301	5.0166667	0.0836111	-96.36433	30.70177
A	20845	20.845	12.9530830	726	12.1000000	0.2016667	-96.44656	30.74192
A	2073	0.2073	0.1360000	106	0.1333333	0.0022222	-95.50171	29.87678

trek

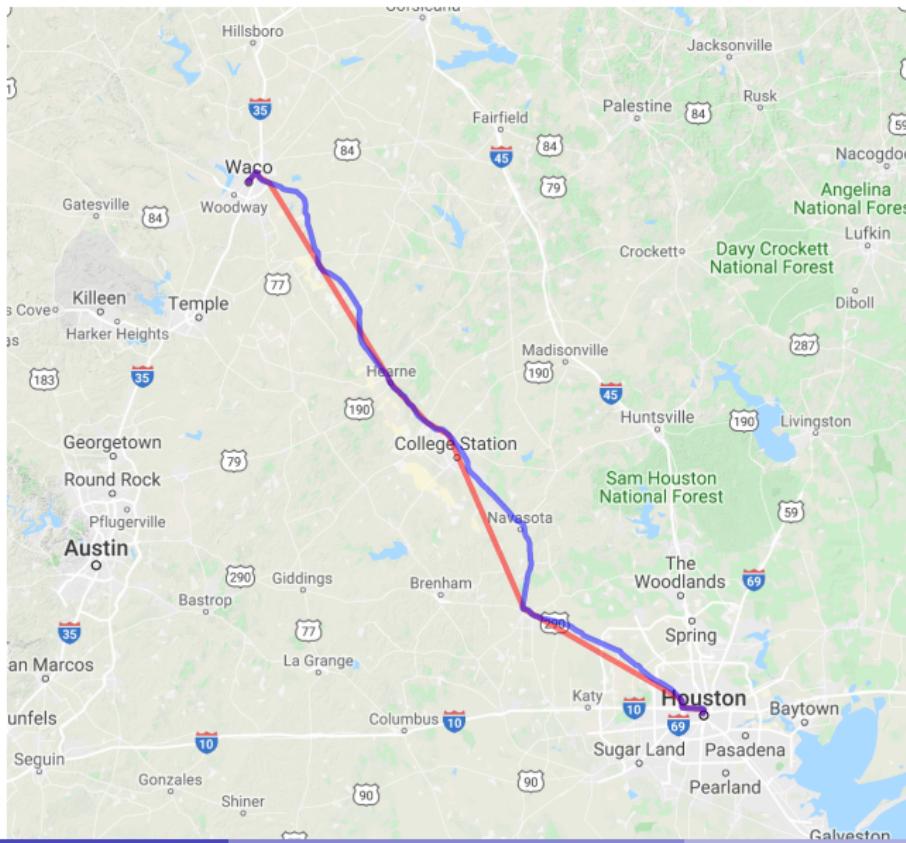
```
trek_df <- trek(from, to, structure = "route")
```

lat	lon	route
29.76043	-95.36981	A
29.76087	-95.36960	A
29.76118	-95.37026	A
29.76130	-95.37132	A
29.76159	-95.37187	A
29.76325	-95.37012	A
29.76517	-95.36722	A
29.77003	-95.36508	A
29.77195	-95.36557	A
29.77402	-95.36715	A
29.77704	-95.36935	A
29.77841	-95.37262	A
29.77921	-95.37651	A

compare route/trek(1/2)

```
qmap("college station, texas", zoom = 8) +
  geom_path(
    aes(x = lon, y = lat), colour = "red",
    size = 1.5, alpha = .5,
    data = route_df, lineend = "round"
  ) +
  geom_path(
    aes(x = lon, y = lat), colour = "blue",
    size = 1.5, alpha = .5,
    data = trek_df, lineend = "round"
  )
```

compare route/trek(2/2)



Section 7

Hands On!

Data

- Data Source (click)