

STAT 346 Final Project

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4/20/2020

```
library(data.table)
confirmedCasesUS = fread('https://raw.githubusercontent.com/CSSEGISandData/COVID-19/master/csse_covid_19_data/csse_covid_19_data/confirmedCasesUS.csv')
confirmedDeathsUS = fread('https://raw.githubusercontent.com/CSSEGISandData/COVID-19/master/csse_covid_19_data/csse_covid_19_data/confirmedDeathsUS.csv')
hospitalData = read.csv('data/Hospitals.csv', header = TRUE)
mobilityReport = fread('https://www.gstatic.com/covid19/mobility/Global_Mobility_Report.csv')

head(confirmedCasesUS)
```

##	UID	iso2	iso3	code3	FIPS	Admin2	Province_State	
## 1:	16	AS	ASM	16	60		American Samoa	
## 2:	316	GU	GUM	316	66		Guam	
## 3:	580	MP	MNP	580	69	Northern Mariana Islands		
## 4:	630	PR	PRI	630	72		Puerto Rico	
## 5:	850	VI	VIR	850	78		Virgin Islands	
## 6:	84001001	US	USA	840	1001	Autauga	Alabama	
##	Country_Region		Lat		Long_		Combined_Key	1/22/2020
## 1:		US	-14.27100		-170.13200		American Samoa, US	0
## 2:		US	13.44430		144.79370		Guam, US	0
## 3:		US	15.09790		145.67390		Northern Mariana Islands, US	0
## 4:		US	18.22080		-66.59010		Puerto Rico, US	0
## 5:		US	18.33580		-64.89630		Virgin Islands, US	0
## 6:		US	32.53953		-86.64408		Autauga, Alabama, US	0
##	1/23/2020	1/24/2020	1/25/2020	1/26/2020	1/27/2020	1/28/2020	1/29/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	0	0	0	0	0	0	0	
## 3:	0	0	0	0	0	0	0	
## 4:	0	0	0	0	0	0	0	
## 5:	0	0	0	0	0	0	0	
## 6:	0	0	0	0	0	0	0	
##	1/30/2020	1/31/2020	2/1/2020	2/2/2020	2/3/2020	2/4/2020	2/5/2020	2/6/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	0	0	0	0	0	0	0	0
## 3:	0	0	0	0	0	0	0	0
## 4:	0	0	0	0	0	0	0	0
## 5:	0	0	0	0	0	0	0	0
## 6:	0	0	0	0	0	0	0	0
##	2/7/2020	2/8/2020	2/9/2020	2/10/2020	2/11/2020	2/12/2020	2/13/2020	2/14/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	0	0	0	0	0	0	0	0
## 3:	0	0	0	0	0	0	0	0
## 4:	0	0	0	0	0	0	0	0

## 5:	0	0	0	0	0	0	0	0
## 6:	0	0	0	0	0	0	0	0
##	2/15/2020	2/16/2020	2/17/2020	2/18/2020	2/19/2020	2/20/2020	2/21/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	0	0	0	0	0	0	0	
## 3:	0	0	0	0	0	0	0	
## 4:	0	0	0	0	0	0	0	
## 5:	0	0	0	0	0	0	0	
## 6:	0	0	0	0	0	0	0	
##	2/22/2020	2/23/2020	2/24/2020	2/25/2020	2/26/2020	2/27/2020	2/28/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	0	0	0	0	0	0	0	
## 3:	0	0	0	0	0	0	0	
## 4:	0	0	0	0	0	0	0	
## 5:	0	0	0	0	0	0	0	
## 6:	0	0	0	0	0	0	0	
##	2/29/2020	3/1/2020	3/2/2020	3/3/2020	3/4/2020	3/5/2020	3/6/2020	3/7/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	0	0	0	0	0	0	0	0
## 3:	0	0	0	0	0	0	0	0
## 4:	0	0	0	0	0	0	0	0
## 5:	0	0	0	0	0	0	0	0
## 6:	0	0	0	0	0	0	0	0
##	3/8/2020	3/9/2020	3/10/2020	3/11/2020	3/12/2020	3/13/2020	3/14/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	0	0	0	0	0	0	0	
## 3:	0	0	0	0	0	0	0	
## 4:	0	0	0	0	0	0	0	
## 5:	0	0	0	0	0	0	0	
## 6:	0	0	0	0	0	0	0	
##	3/15/2020	3/16/2020	3/17/2020	3/18/2020	3/19/2020	3/20/2020	3/21/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	0	3	3	5	12	14	15	
## 3:	0	0	0	0	0	0	0	
## 4:	0	5	5	5	5	14	21	
## 5:	0	1	2	2	3	3	6	
## 6:	0	0	0	0	0	0	0	
##	3/22/2020	3/23/2020	3/24/2020	3/25/2020	3/26/2020	3/27/2020	3/28/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	27	29	32	37	45	51	55	
## 3:	0	0	0	0	0	0	0	
## 4:	23	31	39	51	64	79	100	
## 5:	6	7	17	17	17	19	22	
## 6:	0	0	1	4	6	6	6	
##	3/29/2020	3/30/2020	3/31/2020	4/1/2020	4/2/2020	4/3/2020	4/4/2020	4/5/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	56	58	69	77	82	84	93	112
## 3:	0	0	2	6	6	8	8	8
## 4:	127	174	239	286	316	316	452	475
## 5:	23	30	30	30	30	37	40	42
## 6:	6	6	7	8	10	12	12	12
##	4/6/2020	4/7/2020	4/8/2020	4/9/2020	4/10/2020	4/11/2020	4/12/2020	4/13/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	113	121	121	128	130	133	133	133

```
## 3:      8      8      11      11      11      11      11      11
## 4:     513     573     620     683     725     788     897     903
## 5:      43      43      45      45      50      51      51      51
## 6:      12      12      12      15      17      19      19      19
##    4/14/2020 4/15/2020 4/16/2020 4/17/2020 4/18/2020 4/19/2020 4/20/2020
## 1:         0         0         0         0         0         0         0
## 2:        133        135        135        136        136        136        136
## 3:         11         13         13         13         14         14         14
## 4:        923        974       1043       1068       1118       1213       1252
## 5:         51         51         51         51         53         53         53
## 6:         23         24         26         26         25         26         28
##    4/21/2020
## 1:         0
## 2:        136
## 3:         14
## 4:       1298
## 5:         53
## 6:         30
```

```
head(confirmedDeathsUS)
```

```
##      UID iso2 iso3 code3 FIPS  Admin2      Province_State
## 1:    16  AS  ASM   16   60              American Samoa
## 2:   316  GU  GUM   316   66                  Guam
## 3:   580  MP  MNP   580   69      Northern Mariana Islands
## 4:   630  PR  PRI   630   72          Puerto Rico
## 5:   850  VI  VIR   850   78      Virgin Islands
## 6: 84001001  US  USA   840 1001  Autauga      Alabama
##      Country_Region      Lat      Long_      Combined_Key Population
## 1:      US -14.27100 -170.13200      American Samoa, US      55641
## 2:      US  13.44430  144.79370      Guam, US      164229
## 3:      US  15.09790  145.67390 Northern Mariana Islands, US      55144
## 4:      US  18.22080 -66.59010      Puerto Rico, US      2933408
## 5:      US  18.33580 -64.89630      Virgin Islands, US      107268
## 6:      US  32.53953 -86.64408      Autauga, Alabama, US      55869
##    1/22/2020 1/23/2020 1/24/2020 1/25/2020 1/26/2020 1/27/2020 1/28/2020
## 1:         0         0         0         0         0         0         0
## 2:         0         0         0         0         0         0         0
## 3:         0         0         0         0         0         0         0
## 4:         0         0         0         0         0         0         0
## 5:         0         0         0         0         0         0         0
## 6:         0         0         0         0         0         0         0
##    1/29/2020 1/30/2020 1/31/2020 2/1/2020 2/2/2020 2/3/2020 2/4/2020 2/5/2020
## 1:         0         0         0         0         0         0         0         0
## 2:         0         0         0         0         0         0         0         0
## 3:         0         0         0         0         0         0         0         0
## 4:         0         0         0         0         0         0         0         0
## 5:         0         0         0         0         0         0         0         0
## 6:         0         0         0         0         0         0         0         0
##    2/6/2020 2/7/2020 2/8/2020 2/9/2020 2/10/2020 2/11/2020 2/12/2020 2/13/2020
## 1:         0         0         0         0         0         0         0         0
## 2:         0         0         0         0         0         0         0         0
## 3:         0         0         0         0         0         0         0         0
## 4:         0         0         0         0         0         0         0         0
```

## 5:	0	0	0	0	0	0	0	0
## 6:	0	0	0	0	0	0	0	0
##	2/14/2020	2/15/2020	2/16/2020	2/17/2020	2/18/2020	2/19/2020	2/20/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	0	0	0	0	0	0	0	
## 3:	0	0	0	0	0	0	0	
## 4:	0	0	0	0	0	0	0	
## 5:	0	0	0	0	0	0	0	
## 6:	0	0	0	0	0	0	0	
##	2/21/2020	2/22/2020	2/23/2020	2/24/2020	2/25/2020	2/26/2020	2/27/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	0	0	0	0	0	0	0	
## 3:	0	0	0	0	0	0	0	
## 4:	0	0	0	0	0	0	0	
## 5:	0	0	0	0	0	0	0	
## 6:	0	0	0	0	0	0	0	
##	2/28/2020	2/29/2020	3/1/2020	3/2/2020	3/3/2020	3/4/2020	3/5/2020	3/6/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	0	0	0	0	0	0	0	0
## 3:	0	0	0	0	0	0	0	0
## 4:	0	0	0	0	0	0	0	0
## 5:	0	0	0	0	0	0	0	0
## 6:	0	0	0	0	0	0	0	0
##	3/7/2020	3/8/2020	3/9/2020	3/10/2020	3/11/2020	3/12/2020	3/13/2020	3/14/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	0	0	0	0	0	0	0	0
## 3:	0	0	0	0	0	0	0	0
## 4:	0	0	0	0	0	0	0	0
## 5:	0	0	0	0	0	0	0	0
## 6:	0	0	0	0	0	0	0	0
##	3/15/2020	3/16/2020	3/17/2020	3/18/2020	3/19/2020	3/20/2020	3/21/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	0	0	0	0	0	0	0	
## 3:	0	0	0	0	0	0	0	
## 4:	0	0	0	0	0	0	0	1
## 5:	0	0	0	0	0	0	0	0
## 6:	0	0	0	0	0	0	0	0
##	3/22/2020	3/23/2020	3/24/2020	3/25/2020	3/26/2020	3/27/2020	3/28/2020	
## 1:	0	0	0	0	0	0	0	
## 2:	1	1	1	1	1	1	1	
## 3:	0	0	0	0	0	0	0	
## 4:	1	2	2	2	2	3	3	
## 5:	0	0	0	0	0	0	0	
## 6:	0	0	0	0	0	0	0	
##	3/29/2020	3/30/2020	3/31/2020	4/1/2020	4/2/2020	4/3/2020	4/4/2020	4/5/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	1	1	2	3	3	4	4	4
## 3:	0	0	0	1	1	1	1	1
## 4:	3	6	8	11	12	15	18	20
## 5:	0	0	0	0	0	0	0	1
## 6:	0	0	0	0	0	0	0	0
##	4/6/2020	4/7/2020	4/8/2020	4/9/2020	4/10/2020	4/11/2020	4/12/2020	4/13/2020
## 1:	0	0	0	0	0	0	0	0
## 2:	4	4	4	4	4	5	5	5

```
## 3:      1      2      2      2      2      2      2      2
## 4:     21     23     24     33     39     42     44     45
## 5:      1      1      1      1      1      1      1      1
## 6:      0      1      1      1      1      1      1      1
##    4/14/2020 4/15/2020 4/16/2020 4/17/2020 4/18/2020 4/19/2020 4/20/2020
## 1:      0      0      0      0      0      0      0
## 2:      5      5      5      5      5      5      5
## 3:      2      2      2      2      2      2      2
## 4:     45     51     56     58     60     62     63
## 5:      1      1      1      2      3      3      3
## 6:      1      1      1      2      2      2      1
##    4/21/2020
## 1:      0
## 2:      5
## 3:      2
## 4:     64
## 5:      3
## 6:      1
```

```
head(hospitalData)
```

```
##          X          Y OBJECTID      ID
## 1 -114.6175 34.83307    1001  7892363
## 2 -117.0571 32.77659    1002  1392120
## 3 -117.0442 32.77463    1003  1591942
## 4 -117.1446 32.75638    1004  23292104
## 5 -117.0823 32.68534    1005  34392050
## 6 -122.4259 37.77436    1006  25094116
##
##                                NAME                                ADDRESS
## 1                                COLORADO RIVER MEDICAL CENTER        1401 BAILEY AVENUE
## 2                                ALVARADO HOSPITAL MEDICAL CENTER        6655 ALVARADO ROAD
## 3                                ALVARADO PARKWAY INSTITUTE B.H.S.        7050 PARKWAY DRIVE
## 4                                KINDRED HOSPITAL - SAN DIEGO        1940 EL CAJON BOULEVARD
## 5                                PARADISE VALLEY HOSPITAL        2400 EAST FOURTH STREET
## 6 LAGUNA HONDA HOSPITAL AND REHABILITATION CENTER 375 LAGUNA HONDA BOULEVARD
##          CITY STATE   ZIP      ZIP4    TELEPHONE      TYPE
## 1    NEEDLES    CA 92363 NOT AVAILABLE NOT AVAILABLE GENERAL ACUTE CARE
## 2    SAN DIEGO  CA 92120 NOT AVAILABLE NOT AVAILABLE GENERAL ACUTE CARE
## 3    LA MESA    CA 91942 NOT AVAILABLE NOT AVAILABLE PSYCHIATRIC
## 4    SAN DIEGO  CA 92104 NOT AVAILABLE NOT AVAILABLE GENERAL ACUTE CARE
## 5 NATIONAL CITY CA 92050 NOT AVAILABLE NOT AVAILABLE GENERAL ACUTE CARE
## 6 SAN FRANCISCO CA 94116 NOT AVAILABLE NOT AVAILABLE GENERAL ACUTE CARE
## STATUS POPULATION      COUNTY COUNTYFIPS COUNTRY LATITUDE LONGITUDE
## 1 OPEN      25 SAN BERNARDINO    06071    USA 34.83307 -114.6175
## 2 OPEN      226 SAN DIEGO        06073    USA 32.77659 -117.0571
## 3 OPEN      66 SAN DIEGO        06073    USA 32.77463 -117.0442
## 4 OPEN      70 SAN DIEGO        06073    USA 32.75638 -117.1446
## 5 OPEN      227 SAN DIEGO        06073    USA 32.68534 -117.0823
## 6 OPEN      780 SAN FRANCISCO    06075    USA 37.77436 -122.4259
## NAICS_CODE      NAICS_DESC
## 1    622110    GENERAL MEDICAL AND SURGICAL HOSPITALS
## 2    622110    GENERAL MEDICAL AND SURGICAL HOSPITALS
## 3    622210    PSYCHIATRIC AND SUBSTANCE ABUSE HOSPITALS
## 4    622110    GENERAL MEDICAL AND SURGICAL HOSPITALS
```

```

## 5      622110      GENERAL MEDICAL AND SURGICAL HOSPITALS
## 6      622110      GENERAL MEDICAL AND SURGICAL HOSPITALS
##                               SOURCE                               SOURCEDATE
## 1 http://www.oshpd.ca.gov/HID/Facility-Listing.html 2018-08-08T00:00:00.000Z
## 2 http://www.oshpd.ca.gov/HID/Facility-Listing.html 2018-08-08T00:00:00.000Z
## 3 http://www.oshpd.ca.gov/HID/Facility-Listing.html 2018-08-08T00:00:00.000Z
## 4 http://www.oshpd.ca.gov/HID/Facility-Listing.html 2018-08-08T00:00:00.000Z
## 5 http://www.oshpd.ca.gov/HID/Facility-Listing.html 2018-08-08T00:00:00.000Z
## 6 http://www.oshpd.ca.gov/HID/Facility-Listing.html 2018-08-08T00:00:00.000Z
##      VAL_METHOD      VAL_DATE
## 1 IMAGERY/OTHER 2014-02-10T00:00:00.000Z
## 2 IMAGERY/OTHER 2014-02-10T00:00:00.000Z
## 3 IMAGERY/OTHER 2014-02-10T00:00:00.000Z
## 4 IMAGERY/OTHER 2014-02-10T00:00:00.000Z
## 5 IMAGERY/OTHER 2014-02-10T00:00:00.000Z
## 6 IMAGERY/OTHER 2014-02-10T00:00:00.000Z
##                               WEBSITE      STATE_ID      ALT_NAME
## 1 http://www.cityofneedles.com/Hospitals.asp NOT AVAILABLE NOT AVAILABLE
## 2      http://www.alvaradohospital.com NOT AVAILABLE NOT AVAILABLE
## 3      http://www.apibhs.com NOT AVAILABLE NOT AVAILABLE
## 4      http://www.kindredsandiego.com NOT AVAILABLE NOT AVAILABLE
## 5      http://www.paradisevalleyhospital.org NOT AVAILABLE NOT AVAILABLE
## 6      http://lagunahonda.org/ NOT AVAILABLE NOT AVAILABLE
##      ST_FIPS      OWNER TTL_STAFF BEDS      TRAUMA HELIPAD
## 1      6 GOVERNMENT - LOCAL      -999      25 NOT AVAILABLE      Y
## 2      6      PROPRIETARY      -999      226 NOT AVAILABLE      N
## 3      6      PROPRIETARY      -999      66 NOT AVAILABLE      N
## 4      6      PROPRIETARY      -999      70 NOT AVAILABLE      N
## 5      6      PROPRIETARY      -999      227 NOT AVAILABLE      N
## 6      6 GOVERNMENT - LOCAL      -999      780 NOT AVAILABLE      N

```

```
head(mobilityReport)
```

```

##      country_region_code      country_region sub_region_1 sub_region_2
## 1:      AE United Arab Emirates
## 2:      AE United Arab Emirates
## 3:      AE United Arab Emirates
## 4:      AE United Arab Emirates
## 5:      AE United Arab Emirates
## 6:      AE United Arab Emirates
##      date retail_and_recreation_percent_change_from_baseline
## 1: 2020-02-15      0
## 2: 2020-02-16      1
## 3: 2020-02-17     -1
## 4: 2020-02-18     -2
## 5: 2020-02-19     -2
## 6: 2020-02-20     -2
##      grocery_and_pharmacy_percent_change_from_baseline
## 1:      4
## 2:      4
## 3:      1
## 4:      1
## 5:      0
## 6:      1

```

```

## parks_percent_change_from_baseline
## 1: 5
## 2: 4
## 3: 5
## 4: 5
## 5: 4
## 6: 6
## transit_stations_percent_change_from_baseline
## 1: 0
## 2: 1
## 3: 1
## 4: 0
## 5: -1
## 6: 1
## workplaces_percent_change_from_baseline
## 1: 2
## 2: 2
## 3: 2
## 4: 2
## 5: 2
## 6: 1
## residential_percent_change_from_baseline
## 1: 1
## 2: 1
## 3: 1
## 4: 1
## 5: 1
## 6: 1

```

mobilityReport

```

## country_region_code country_region sub_region_1 sub_region_2
## 1: AE United Arab Emirates
## 2: AE United Arab Emirates
## 3: AE United Arab Emirates
## 4: AE United Arab Emirates
## 5: AE United Arab Emirates
## ---
## 224143: ZW Zimbabwe
## 224144: ZW Zimbabwe
## 224145: ZW Zimbabwe
## 224146: ZW Zimbabwe
## 224147: ZW Zimbabwe
## date retail_and_recreation_percent_change_from_baseline
## 1: 2020-02-15 0
## 2: 2020-02-16 1
## 3: 2020-02-17 -1
## 4: 2020-02-18 -2
## 5: 2020-02-19 -2
## ---
## 224143: 2020-04-07 -64
## 224144: 2020-04-08 -62
## 224145: 2020-04-09 -60
## 224146: 2020-04-10 -70

```

```

## 224147: 2020-04-11
##      grocery_and_pharmacy_percent_change_from_baseline
##      1: 4
##      2: 4
##      3: 1
##      4: 1
##      5: 0
##      ---
## 224143: -52
## 224144: -51
## 224145: -47
## 224146: -57
## 224147: -56
##      parks_percent_change_from_baseline
##      1: 5
##      2: 4
##      3: 5
##      4: 5
##      5: 4
##      ---
## 224143: -49
## 224144: -51
## 224145: -47
## 224146: -53
## 224147: -48
##      transit_stations_percent_change_from_baseline
##      1: 0
##      2: 1
##      3: 1
##      4: 0
##      5: -1
##      ---
## 224143: -78
## 224144: -78
## 224145: -77
## 224146: -82
## 224147: -81
##      workplaces_percent_change_from_baseline
##      1: 2
##      2: 2
##      3: 2
##      4: 2
##      5: 2
##      ---
## 224143: -67
## 224144: -66
## 224145: -66
## 224146: -78
## 224147: -58
##      residential_percent_change_from_baseline
##      1: 1
##      2: 1
##      3: 1
##      4: 1

```


##	5:	1
##	---	
##	224143:	42
##	224144:	41
##	224145:	41
##	224146:	48
##	224147:	36