Data from covidtracking.com

```
setwd("~/Documents/GitHub/covid_analysis")
library(EpiEstim)
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.0 --
```

```
## v ggplot2 3.3.0     v purrr   0.3.3
## v tibble  3.0.0     v dplyr   0.8.5
## v tidyr   1.0.2     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.5.0
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
states <- read.csv('daily.csv')
```

Choose the state of interest, get incidence (positive is cumulative)

```
statename = 'MA'
ST <- states %>% filter(state == statename) %>% arrange(date) %>% select(date,state,positive)
I <- diff(ST$positive)
ST$incidence <- c(ST$positive[1],I)
```

Estimates from https://www.ncbi.nlm.nih.gov/pubmed/32145466

```
mean_si = 3.96
std_si = 4.75

std_mean_si = (3.53-3.96)/(-1.96)
std_std_si = (4.46-4.75)/(-1.96)

min_mean_si = 2.46
max_mean_si = 5.46

min_std_si =  3.75
max_std_si = 5.75

n1 = 100
n2 = 100
```

Estimate R using EpiEstim package

```
res <- estimate_R(ST$incidence, method = "uncertain_si",
config = make_config(list(
mean_si = mean_si, std_mean_si = std_mean_si,
min_mean_si = min_mean_si, max_mean_si = max_mean_si,
std_si = std_si, std_std_si = std_std_si,
min_std_si = min_std_si, max_std_si = max_std_si,
n1 = n1, n2 = n2)))
```

```
## Default config will estimate R on weekly sliding windows.
##     To change this change the t_start and t_end arguments.
```

Change names for easier use with ggplot

```
RES <- res$R
names(RES)[names(RES)=='Mean(R)']<-'Mean'
```

```
names(RES)[names(RES)=='Quantile.0.05(R)']<-'LowQuantile'
names(RES)[names(RES)=='Quantile.0.95(R)']<-'HighQuantile'
```

R estimate with 95% quantiles (rightmost plot is today, each point is a day in time)

```
ggplot(data = RES, mapping = aes(t_start)) +
  geom_line(aes(y=Mean)) +
  geom_ribbon(aes(ymin=LowQuantile,ymax=HighQuantile),alpha=0.2) +
  xlab('days') + ylab('R0 Estimate') + ggtitle(statename)
```