STAT 261, Lab 2

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HIV prevalence from WHO

- Estimated HIV prevalence was obtained from the `gapminder` website https://www.gapminder.org/data/
  - Estimated number of people living with HIV per 100 population of age group 15-49.
  - Original data source is the UNAIDS online database at http://www.aidsinfoonline.org
- A spreadsheet of the data, HIVprev.csv, is necessary for this lab.

We can read in these data as follows (we'll learn about reading in data later in STAT 260):

```
library(tidyverse) # you must have already installed the tidyverse package
```

```
## Warning: package 'tidyverse' was built under R version 4.0.2

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

## v ggplot2 3.3.2     v purrr   0.3.4
## v tibble  3.0.1     v dplyr   0.8.5
## v tidyr   1.1.2     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.5.0

## Warning: package 'ggplot2' was built under R version 4.0.2

## Warning: package 'tidyr' was built under R version 4.0.2

## Warning: package 'readr' was built under R version 4.0.2

## Warning: package 'forcats' was built under R version 4.0.2

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

```
hiv <- read.csv("HIVprev.csv",stringsAsFactors = FALSE)
hiv <- select(hiv,Country, year, prevalence)
```

Take a look at the top and bottom few lines of raw data.

```
head(hiv)
```

```
##   Country year prevalence
## 1 Algeria 1990       0.06
## 2 Algeria 1991       0.06
## 3 Algeria 1992       0.06
## 4 Algeria 1993       0.06
## 5 Algeria 1994       0.06
## 6 Algeria 1995       0.06
```

```
tail(hiv)
```

```
##       Country year prevalence
## 1601 Zimbabwe 1995       25.1
## 1602 Zimbabwe 1996       26.2
## 1603 Zimbabwe 1997       26.5
## 1604 Zimbabwe 1998       26.3
## 1605 Zimbabwe 1999       25.7
## 1606 Zimbabwe 2000       24.8
```

```
summary(hiv)
```

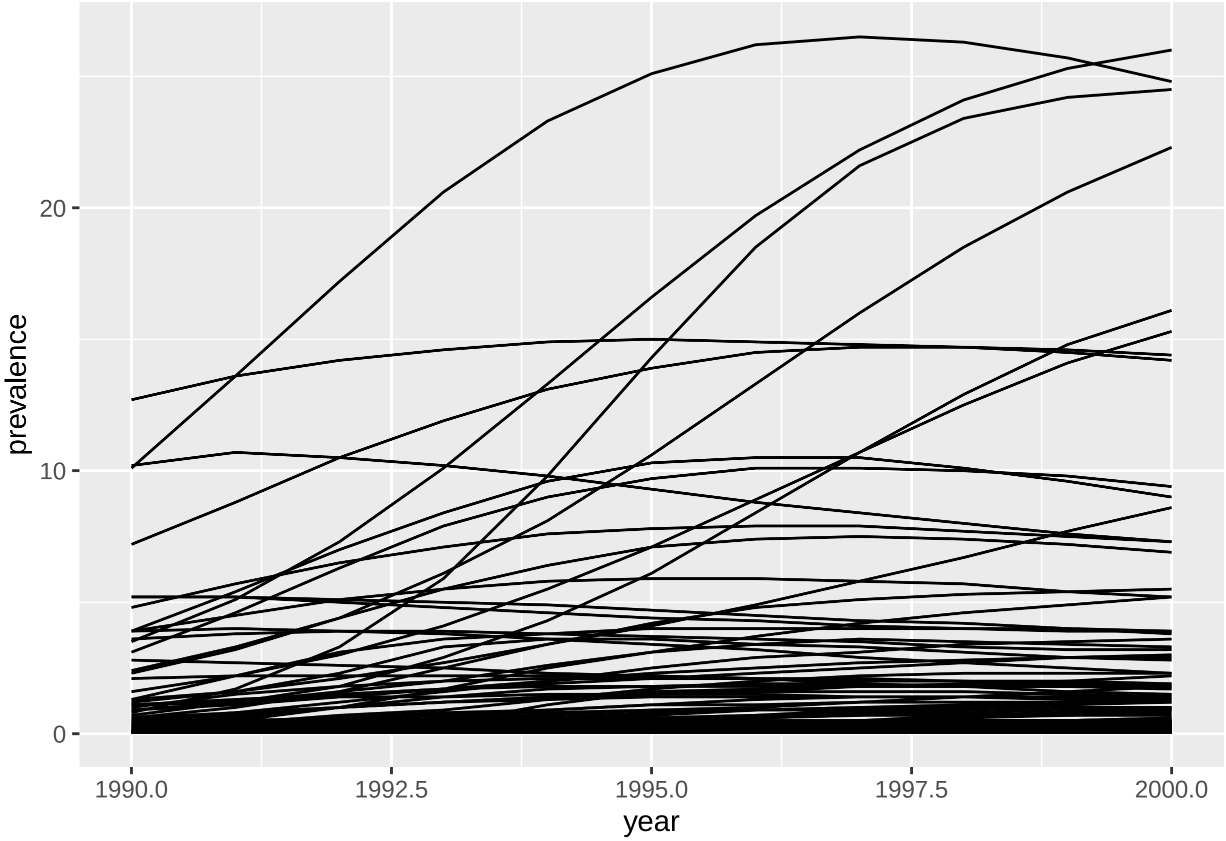
```
##    Country               year        prevalence
##  Length:1606        Min.   :1990   Min.   : 0.060
##  Class :character   1st Qu.:1992   1st Qu.: 0.060
##  Mode  :character   Median :1995   Median : 0.200
##                     Mean   :1995   Mean   : 1.575
##                     3rd Qu.:1998   3rd Qu.: 1.100
##                     Max.   :2000   Max.   :26.500
```

Exercises:

1. Plot time series of HIV prevalence by year for each country.

Solution:

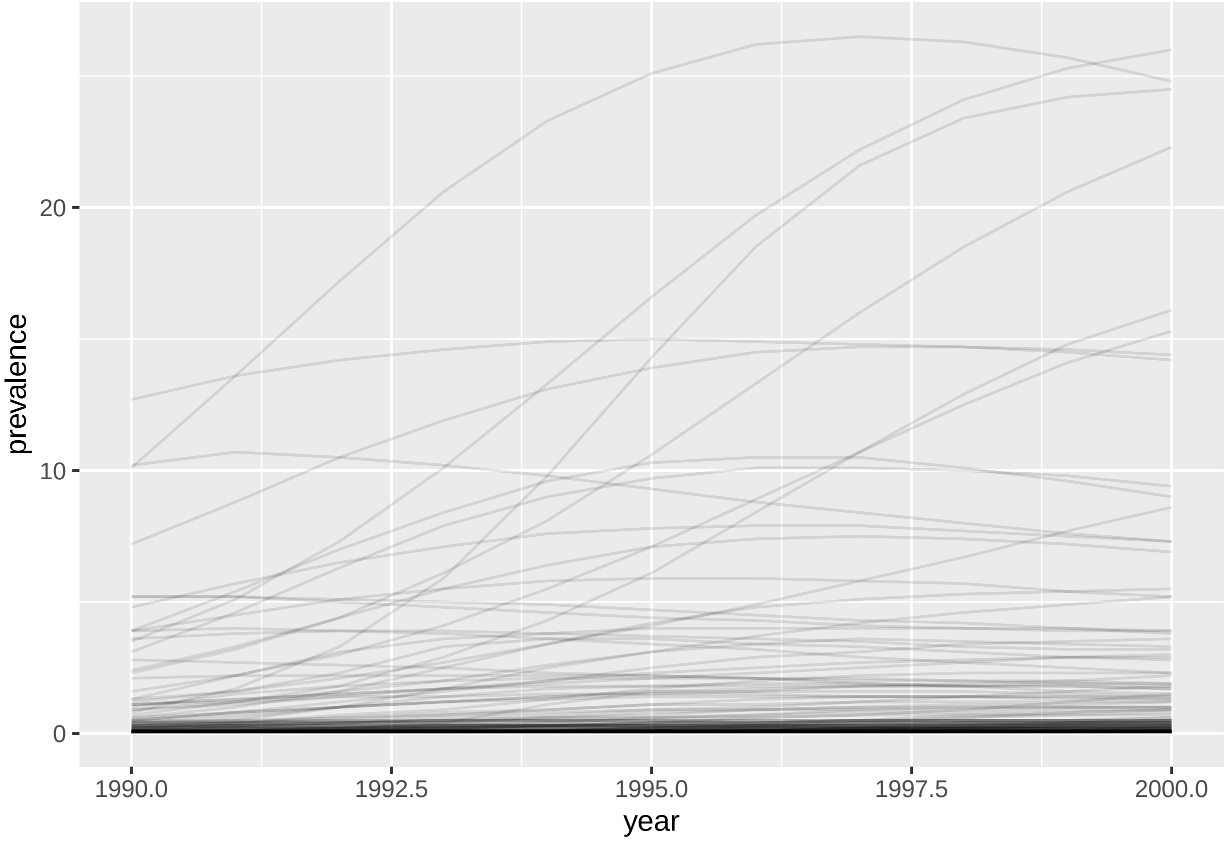
```
ggplot(hiv,aes(x=year,y=prevalence,group=Country)) + geom_line()
```



2. Redo the above plot but experiment with different `alpha` values. What problem does setting a small `alpha` overcome? What feature of the graph is hidden when we do not set `alpha`?

Solution:

```
ggplot(hiv,aes(x=year,y=prevalence,group=Country)) + geom_line(alpha=.1)
```



Due to many of the time series overlapping, we cannot observe that most coutries have an HIV prevalence of close to zero (i.e., there is overplotting). A small alpha value overcomes the overplotting and reveals the low HIV prevalence of most countries.

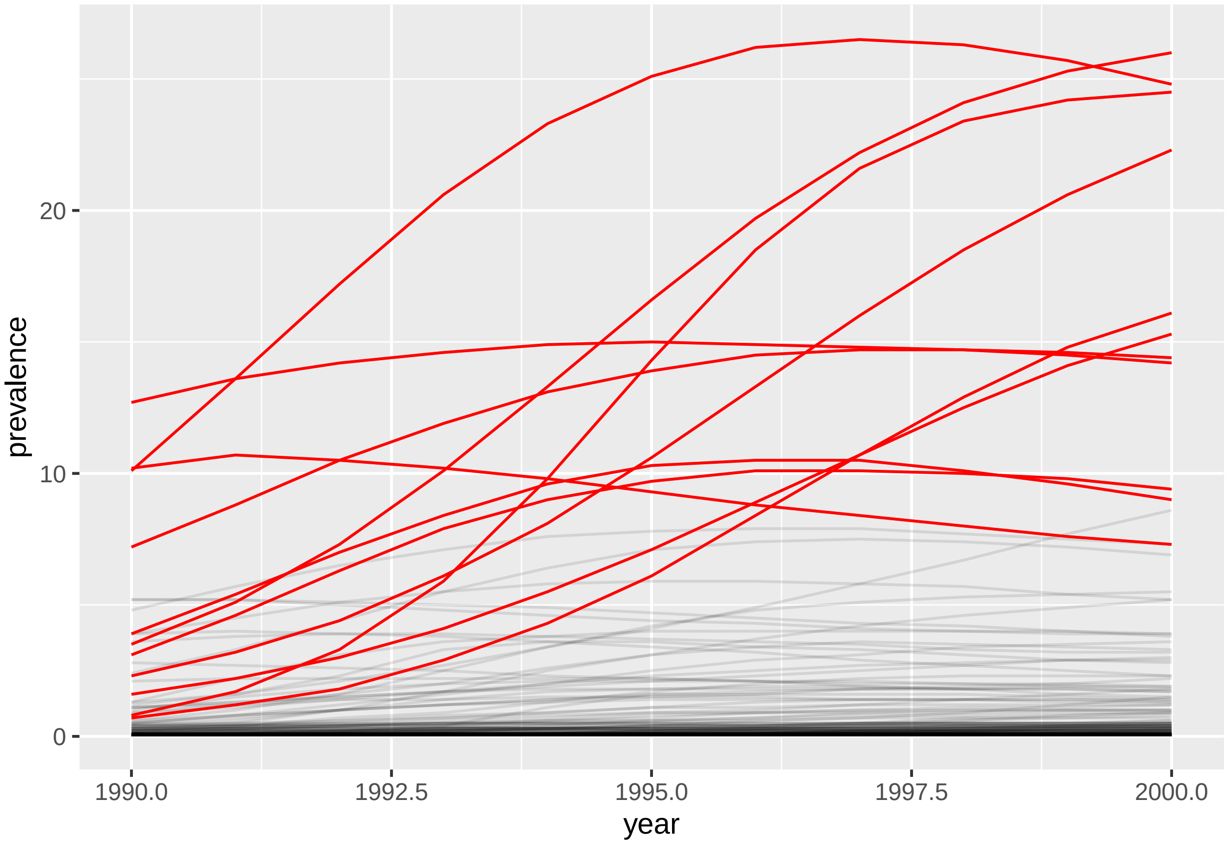
3. In the following code chunk we create a new dataset comprised of countries that had HIV prevalence greater than 10% in one or more of the years monitored (we will learn about this kind of "data wrangling" in future lectures of STAT 260).

```
cc <- c("Botswana","Central African Republic","Congo","Kenya","Lesotho","Malawi",
        "Namibia","South Africa","Swaziland","Uganda","Zambia","Zimbabwe")
hihiv <- filter(hiv,Country %in% cc)
```

Add red lines for the above countries to your time series plot.

Solution:

```
ggplot(hiv,aes(x=year,y=prevalence,group=Country)) + geom_line(alpha=.1) +
geom_line(data=hihiv,color="red")
```


prevalence
20
10
0
1990.0
1992.5
1995.0
1997.5
2000.0
year