Logistic Growth

TA

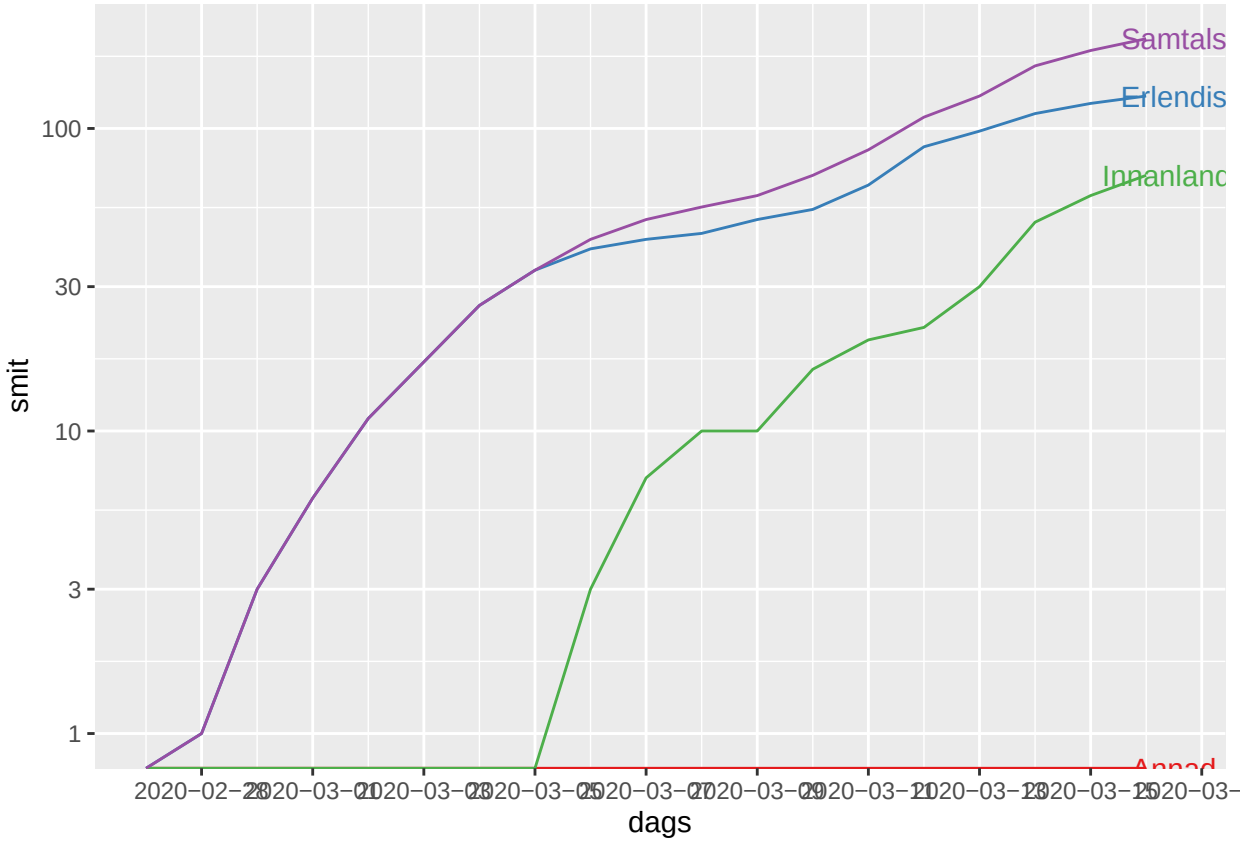
16/03/2020

```
library(nlme)
library(readxl)
library(tidyverse)
library(lubridate)
```

```
LandlaeknirSmit160320 <- read_excel("C:/Users/thor/OneDrive - Háskóli Íslands/Fyrirlestrar/COVID19/Landl
```

Smit á Íslandi

Greind smit á logra skala



Logistic model

The logistic model is the simplest model that shows an initial exponential growth followed a gradual slowing down and a saturation.

(https://www.sciencedirect.com/science/article/pii/S2468042719300491)

```r
model_data <- d_smit %>%
    select(dags = Dagsetning, smit = Smit_Samtals) %>%
    mutate(dagar = as.numeric(dags - min(dags)))
```

Iceland

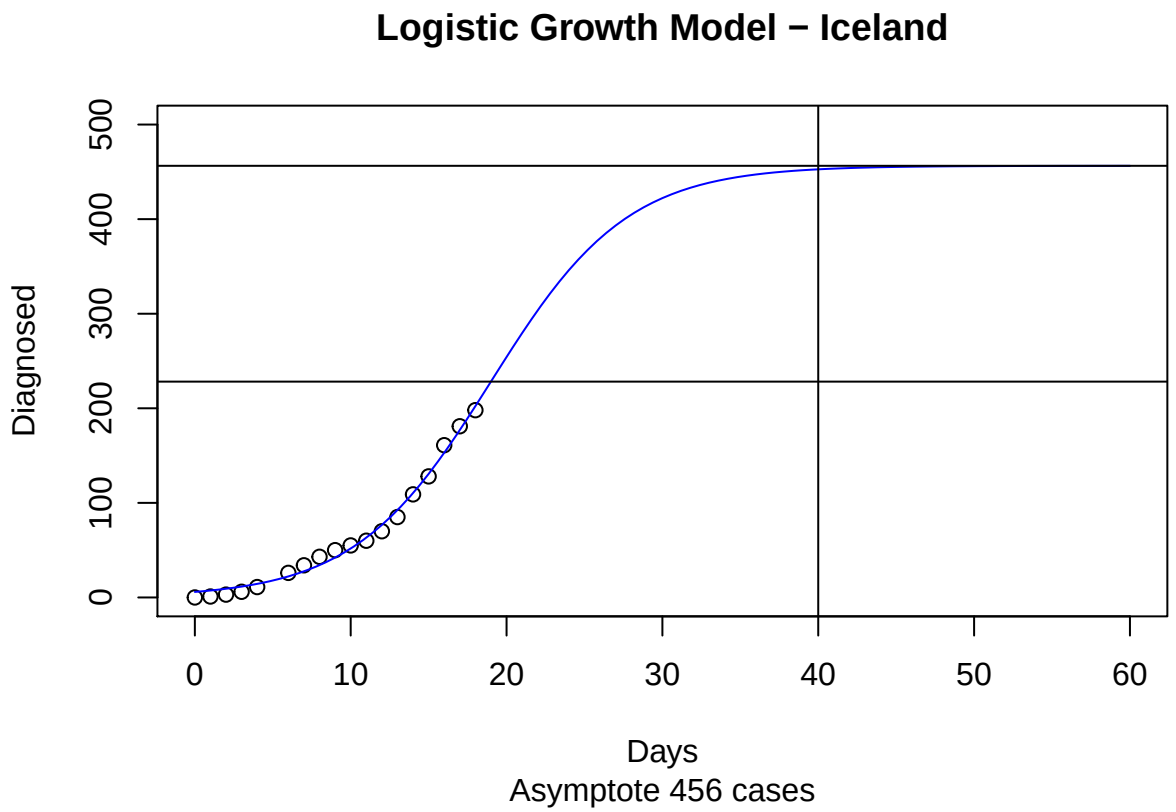
```r
ice.g <- nls(smit ~ SSlogis(dagar, phi1, phi2, phi3), data = model_data)
```

```r
alpha.ice <- coef(ice.g)  #extracting coefficients
alpha.ice
```

```
##       phi1       phi2       phi3
## 456.396407  18.997936   4.374632
```

```r
alpha <- alpha.ice

plot(smit ~ dagar, data = model_data, main = "Logistic Growth Model - Iceland",
     sub="Asymptote 456 cases",
    xlab = "Days", ylab = "Diagnosed", xlim = c(0, 60), ylim = c(0, 500))
curve(alpha[1]/(1 + exp(-(x - alpha[2])/alpha[3])), add = T, col = "blue")  # Fitted model
abline(v=c(40),h=c(alpha[1]/2,alpha[1]))
```



Mettun eftir ca 40 daga. Hægir á eftir 20 daga.

```r
ecd.data <- read.csv(file = "https://raw.githubusercontent.com/bgautijonsson/covid19/master/Data/ECDC_Da
```

China

```
china <- ecd.data %>% filter(country == "China")
```

```
china.g <- nls(cum_cases ~ SSlogis(days, phi1, phi2, phi3), data = china)
coef(china.g)
```

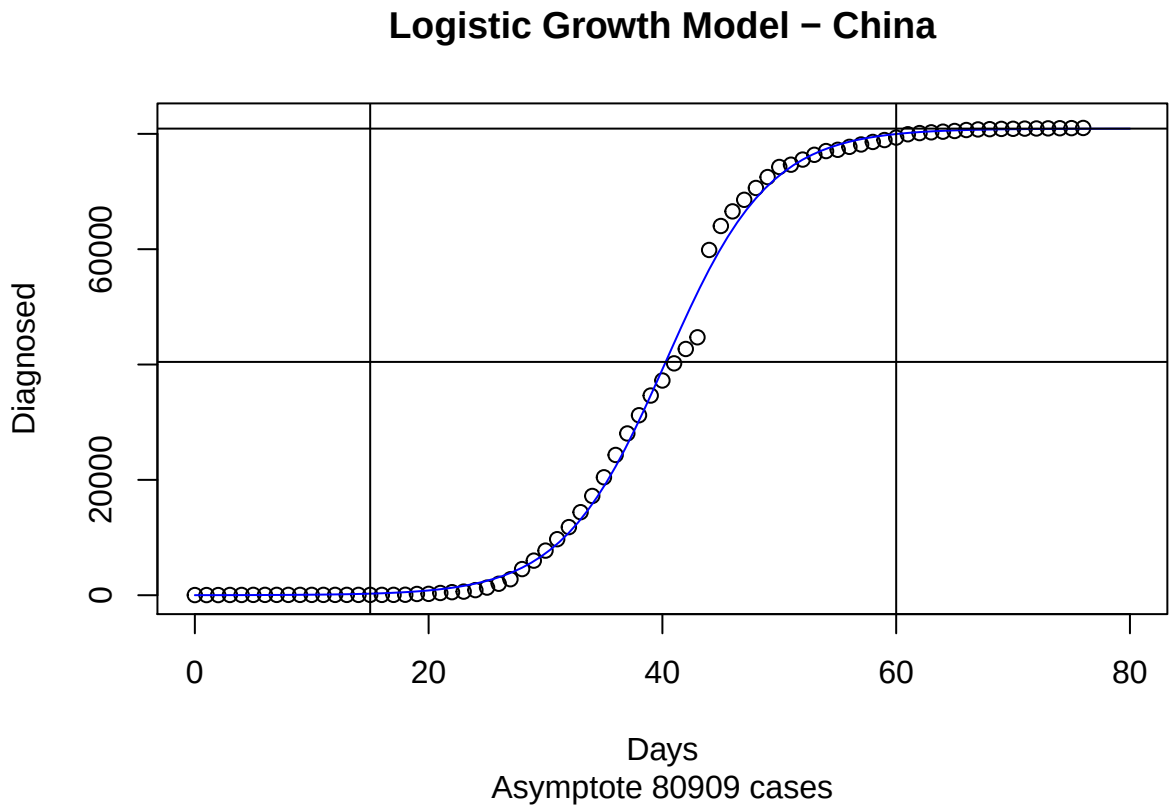
```
##         phi1         phi2         phi3
## 80909.557956    40.281161     4.435388
```

```
alpha <- coef(china.g)  #extracting coefficients

alpha
```

```
##         phi1         phi2         phi3
## 80909.557956    40.281161     4.435388
```

```
plot(cum_cases ~ days, data = china, main = "Logistic Growth Model - China",
     sub="Asymptote 80909 cases" ,
    xlab = "Days", ylab = "Diagnosed", xlim = c(0, 80), ylim = c(0, 82000))
curve(alpha[1]/(1 + exp(-(x - alpha[2])/alpha[3])), add = T, col = "blue")  # Fitted model
abline(v=c(15,60),h=c(alpha[1],alpha[1]/2))
```



Vöxturinn er mestur á 45 daga bili frá degi 15 til 60. Mettun eftir 60 daga, en fer almennilega í gang á degi 15. Hægir á á degi 40.

South Korea

```
sk <- ecd.data %>% filter(country == "South Korea")
```

```
sk.g <- nls(cum_cases ~ SSlogis(days, phi1, phi2, phi3), data = sk)
coef(sk.g)
```

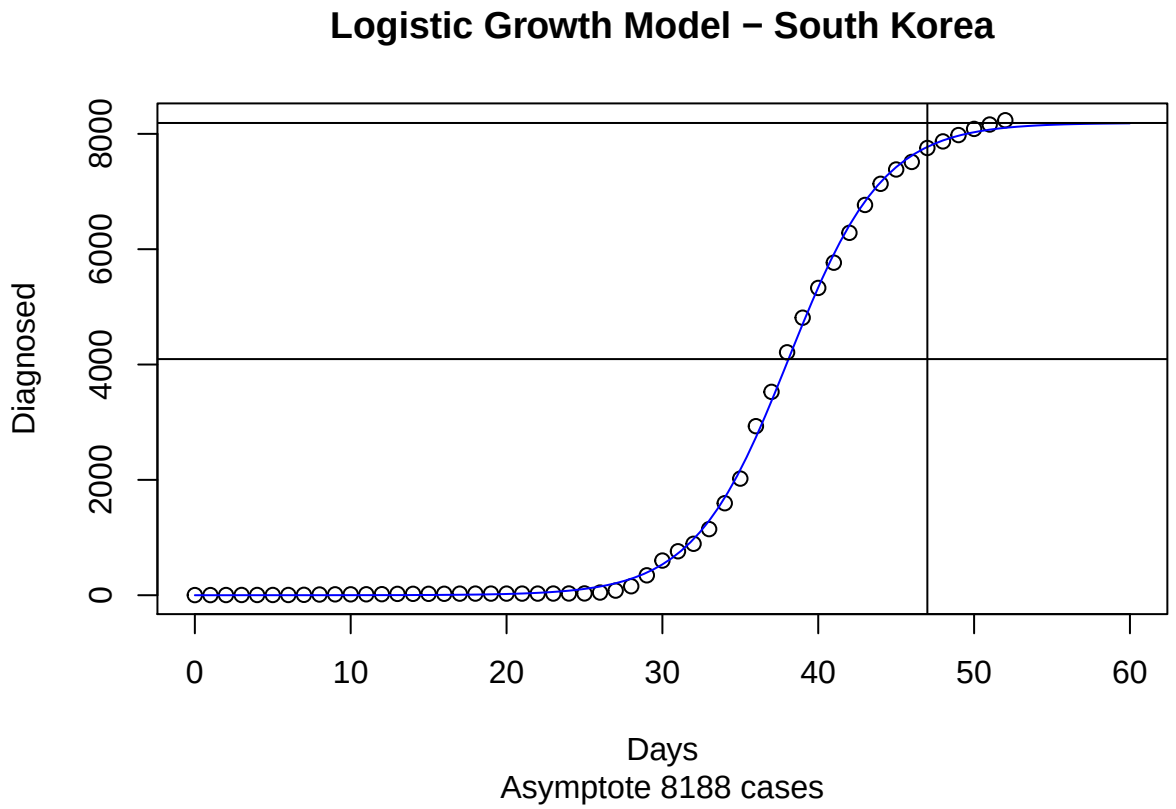
```
##        phi1        phi2        phi3
## 8188.548589   38.092453    3.039897
```

```
alpha <- coef(sk.g)  #extracting coefficients

alpha
```

```
##        phi1        phi2        phi3
## 8188.548589   38.092453    3.039897
```

```
plot(cum_cases ~ days, data = sk, main = "Logistic Growth Model - South Korea",
     sub="Asymptote 8188 cases" ,
    xlab = "Days", ylab = "Diagnosed", xlim = c(0, 60), ylim = c(0, 8200))
curve(alpha[1]/(1 + exp(-(x - alpha[2])/alpha[3])), add = T, col = "blue")  # Fitted model
abline(v=c(47),h=c(alpha[1],alpha[1]/2))
```



Hægir á degi 37. Mettun þegar nálgast fer 50 daga. Lítið að gerast í byrjun samt.