Trabajo final Data Science - Grupo 1

Brechas de ciberseguridad - Estados Unidos

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1 Objetivo

El objetivo de esta práctica es realizar un estudio de las brechas de ciberseguridad que se han dado en Estados Unidos entre los años 2000 y 2014.

Luego de presentar la estructura y los trabajos realizados en el dataset se procederá a responder las preguntas que se han planteado con el fin de obtener información para orientarnos a tomar decisiones.

1.1 Librerías utilizadas

Para poder elaborar este script hemos utilizado las siguientes librerias de R:

1. readr
2. dplyr
3. ggplot2
4. tidyverse
5. ggthemes
6. lubridate
7. lattice
8. survival
9. Formula
10. Hmisc
11. rmarkdown
12. knirt

1.2 Dataset

El dataset utilizado se llama “Cyber Security Breaches” y puede se encontrado dando click aquí

1.3 Preparación del dataset

Antes de comenzar a trabajar con el dataset ajustaremos los tipos de variables para poder obtener resultados correctos

```r
#La variable "State" la convertiremos a tipo factor
cyberb$State <- as.factor(cyberb$State)
#La variable "Type_of_Breach" la convertiremos a tipo factor
cyberb$Type_of_Breach <- as.factor(cyberb$Type_of_Breach)
#La variable "Location_of_Breached_Information" la convertiremos a tipo factor
cyberb$Location_of_Breached_Information <- as.factor(cyberb$Location_of_Breached_Information)
#La variable "Date_Posted_or_Updated" la convertiremos a tipo fecha
cyberb$Date_Posted_or_Updated <- as.Date(cyberb$Date_Posted_or_Updated,format="%d/%m/%Y")
#La variable "breach_start" la convertiremos a tipo fecha
cyberb$breach_start <- as.Date(cyberb$breach_start,format="%d/%m/%Y")
#La variable "breach_end" la convertiremos a tipo fecha
cyberb$breach_end <- as.Date(cyberb$breach_end,format="%d/%m/%Y")
```

1.4 Descripción de las variables del dataset

```
## cyberb
##
##  10  Variables      1055  Observations
## ---------------------------------------------------------------------------
## Name_of_Covered_Entity
##        n  missing distinct
##     1055        0      963
##
## lowest : 101 FAMILY MEDICAL GROUP
## highest: Yale University
## ---------------------------------------------------------------------------
## State
##        n  missing distinct
##     1055        0       52
##
## lowest : AK AL AR AZ CA, highest: VT WA WI WV WY
## ---------------------------------------------------------------------------
## Business_Associate_Involved
##        n  missing distinct
##      271      784      214
##
## lowest : Accretive Health                                      Accuprint
## highest: Xand Corporation                                      Xforia Web Services
## ---------------------------------------------------------------------------
## Individuals_Affected
##        n  missing distinct     Info     Mean      Gmd      .05      .10
##     1055        0      809        1    30262    55209      550      629
##      .25      .50      .75      .90      .95
##     1000     2300     6941    20446    55062
##
## lowest :     500     501     502     504     505
## highest: 1220000 1700000 1900000 4029530 4900000
## ---------------------------------------------------------------------------
## Type_of_Breach
##        n  missing distinct
##     1055        0       28
##
## lowest : Hacking/IT Incident                                   Hacking/IT Incident, Other
```

```
## highest: Unauthorized Access/Disclosure, Hacking/IT Incident        Unauthorized Access/Disclosure, H
## ---------------------------------------------------------------------------
## Location_of_Breached_Information
##        n  missing distinct
##     1055        0       41
##
## lowest : Desktop Computer                                                    Desktop Computer
## highest: Other Portable Electronic Device, Other                             Other Portable El
## ---------------------------------------------------------------------------
## Date_Posted_or_Updated
##          n    missing   distinct       Info       Mean        Gmd        .05
##       1055          0         43      0.719 2014-02-23      47.55 2014-01-23
##        .10        .25        .50        .75        .90        .95
## 2014-01-23 2014-01-23 2014-01-23 2014-03-24 2014-06-03 2014-06-19
##
## lowest : 2014-01-23 2014-01-24 2014-01-31 2014-02-11 2014-02-12
## highest: 2014-06-19 2014-06-20 2014-06-24 2014-06-27 2014-06-30
## ---------------------------------------------------------------------------
## Summary
##        n  missing distinct
##      142      913      141
##
## lowest :
##
## OCR opened an investigation of the covered entity (CE), Paul G. Klein DPM, after it reported an encry
##
##
##
##
##
## The covered entity (CE), Medco Health Solutions, mailed letters with incorrect addresses after a prog
##
##
##
##
## highest: Two unencrypted desktop computers containing the electronic protected health information (el
## ---------------------------------------------------------------------------
## breach_start
##          n    missing   distinct       Info       Mean        Gmd        .05
##       1055          0        732          1 2011-12-09      612.9 2009-10-31
##        .10        .25        .50        .75        .90        .95
## 2010-02-17 2010-11-08 2012-01-11 2013-03-07 2013-10-17 2014-01-09
##
## lowest : 1997-01-01 2002-05-06 2003-03-29 2004-04-21 2004-05-01
## highest: 2014-04-19 2014-05-13 2014-05-27 2014-05-30 2014-06-02
## ---------------------------------------------------------------------------
## breach_end
##          n    missing   distinct       Info       Mean        Gmd        .05
##        145        910        121          1 2012-10-28      279.6 2011-11-17
##        .10        .25        .50        .75        .90        .95
## 2011-12-19 2012-04-22 2012-10-29 2013-05-29 2013-08-15 2013-10-03
##
## lowest : 2007-06-14 2011-02-28 2011-08-05 2011-08-18 2011-09-20
## highest: 2013-10-15 2013-10-31 2013-11-06 2013-11-08 2013-11-30
```

```
## ------------------------------------------------------------------------
```

1.5 Resumen del dataset

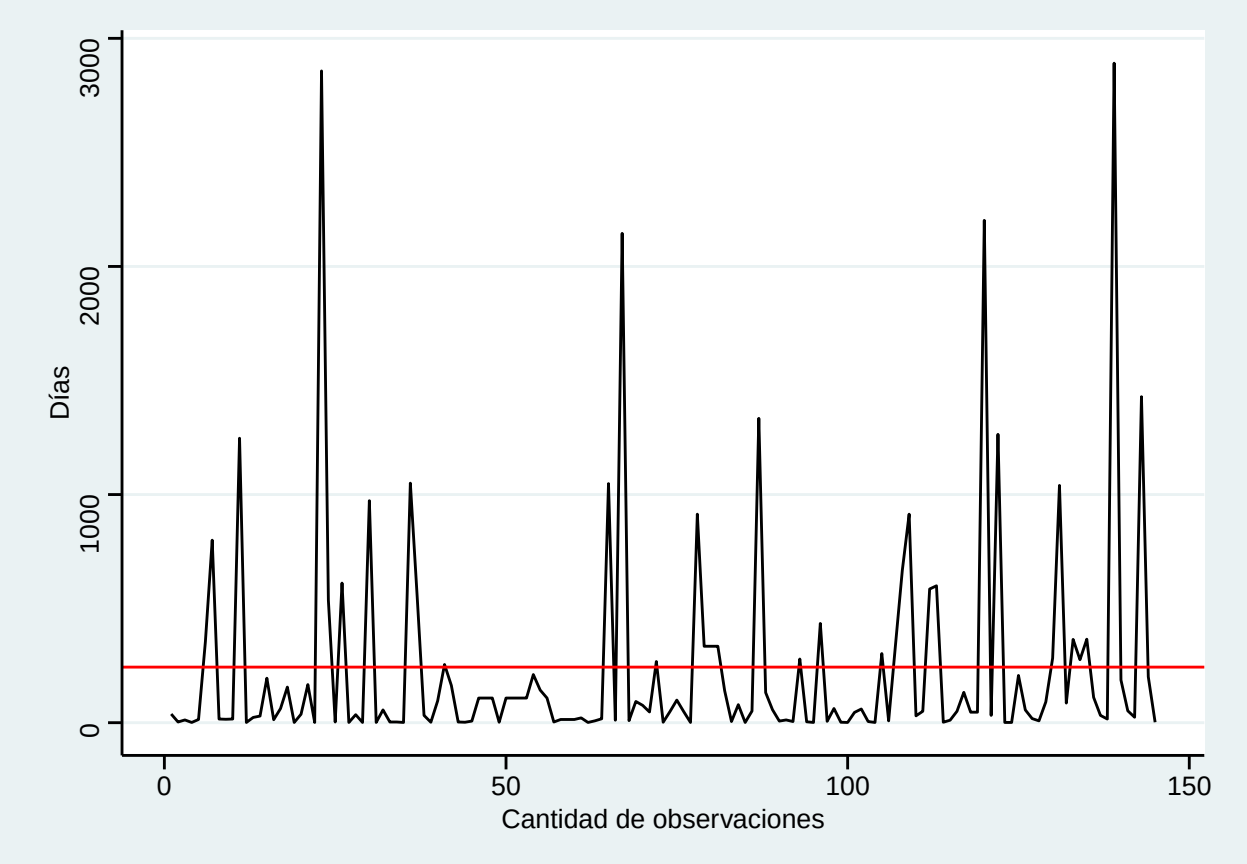
```
##  Name_of_Covered_Entity     State     Business_Associate_Involved
##  Length:1055            CA     :113   Length:1055
##  Class :character       TX     : 83   Class :character
##  Mode  :character       FL     : 66   Mode  :character
##                         NY     : 58
##                         IL     : 49
##                         IN     : 40
##                         (Other):646
##  Individuals_Affected                          Type_of_Breach
##  Min.   :    500      Theft                          :516
##  1st Qu.:   1000      Unauthorized Access/Disclosure:150
##  Median :   2300      Other                          : 91
##  Mean   :  30262      Loss                           : 85
##  3rd Qu.:   6941      Hacking/IT Incident            : 75
##  Max.   :4900000      Improper Disposal              : 38
##                       (Other)                        :100
##                  Location_of_Breached_Information Date_Posted_or_Updated
##  Paper                              :227          Min.   :2014-01-23
##  Laptop                             :217          1st Qu.:2014-01-23
##  Other                              :116          Median :2014-01-23
##  Desktop Computer                   :113          Mean   :2014-02-23
##  Network Server                     :107          3rd Qu.:2014-03-24
##  Other Portable Electronic Device: 60             Max.   :2014-06-30
##  (Other)                            :215
##    Summary           breach_start          breach_end
##  Length:1055        Min.   :1997-01-01   Min.   :2007-06-14
##  Class :character   1st Qu.:2010-11-08   1st Qu.:2012-04-22
##  Mode  :character   Median :2012-01-11   Median :2012-10-29
##                     Mean   :2011-12-09   Mean   :2012-10-28
##                     3rd Qu.:2013-03-07   3rd Qu.:2013-05-29
##                     Max.   :2014-06-02   Max.   :2013-11-30
##                                          NA's   :910
```

2 Preguntas

2.1 ¿Cuáles son los tipos de brechas que afectarona más personas?

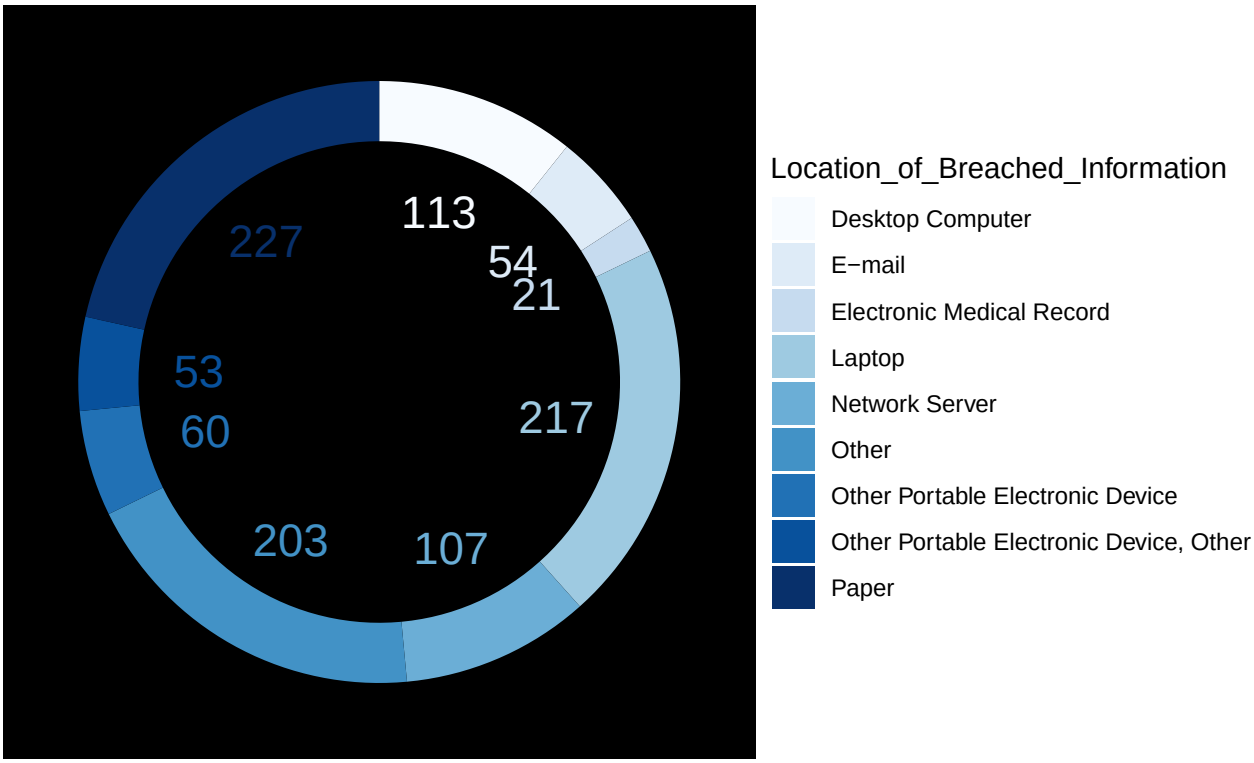
2.2 ¿Cual es el tiempo promedio para superar la brecha?

```
#Se crea un nuevo dataframe en el cual almacenamos los días que duran las brechas
a2 <- data.frame(day=na.omit(cyberb$breach_end - cyberb$breach_start))
#luego calculamos el promedio
media <- as.numeric(mean(a2$day))
```



2.3 ¿Qué tipo de almacenamiento de la información tuvo mas vulnerabilidades?

```
#Creamos un nuevo dataframe en el cual esten agrupados los datos de la columna
#"Location_of_Breached_Information" y sume la cantidad de repeticiones que tiene
#dicho valor
a3 <- cyberb %>%
    group_by(Location_of_Breached_Information) %>%
    summarise(count = n())
#Todo aquellos valores que sean menores a 20 seran ingresados en el grupo
#"Other"  para disminuir la cantidad de observaciones de la columna de a3
#"Location_of_Breached_Information"
a3[a3$Location_of_Breached_Information=="Other", "count"] <-
  a3[a3$Location_of_Breached_Information=="Other", "count"]+sum(a3[a3$count<20,
                                                                  "count"])
#Asignamos a a3 el dataframe cuyas observaciones sean mayores o iguales a 20
#en la columna "count"
a3 <- a3[a3$count>=20, ]
```

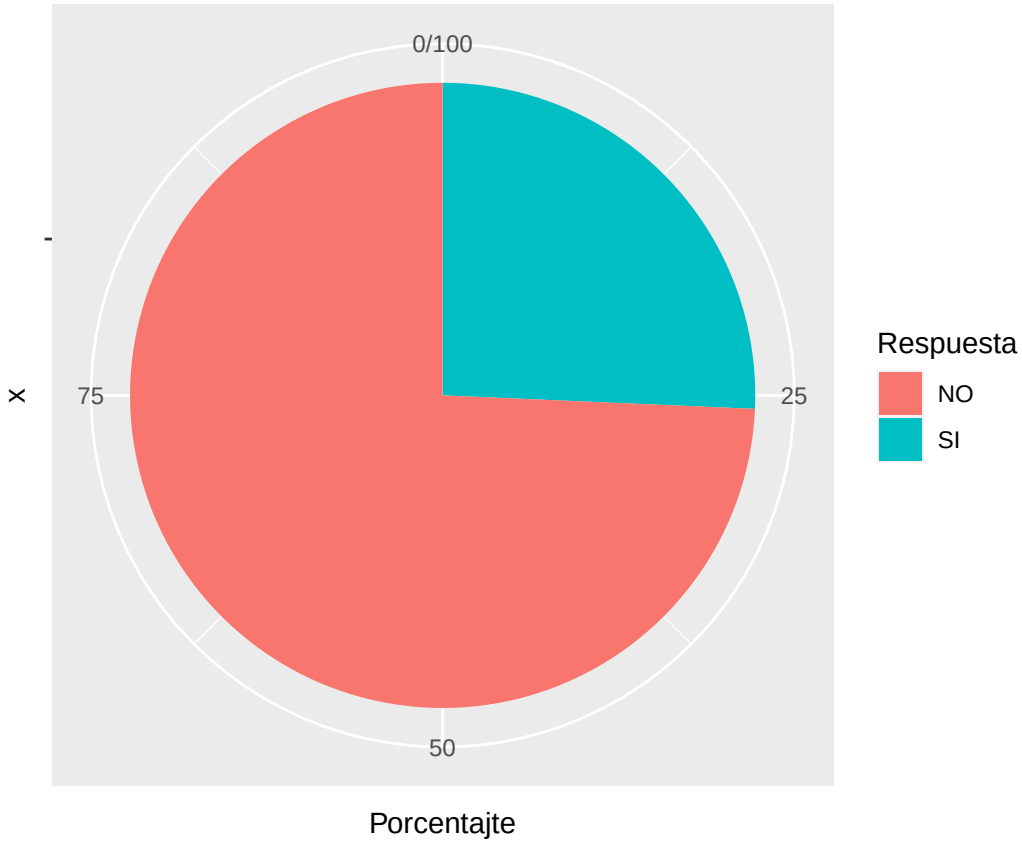


2.4 ¿Cuáles son los Estados más atacados?

2.5 ¿Cuántas empresas afectaron a terceros tras un ciberataque?

```
si <- (sum(!is.na(cyberb$Business_Associate_Involved))*100)/length(cyberb$Business_Associate_Involved)
no <- (sum(is.na(cyberb$Business_Associate_Involved))*100)/length(cyberb$Business_Associate_Involved)

a5 <- data.frame(
  Respuesta=c("SI","NO"),
  Porcentajte=c(si,no)
)
```



2.6 Las 10 empresas que tuvieron la mayor cantidad de afectados

```
a6 <- (data.frame (ID = paste("E",c(1:length(cyberb$Name_of_Covered_Entity)), sep = ""),
                   Entidad = cyberb$Name_of_Covered_Entity,
                   Individuos_afectados = trunc((cyberb$Individuals_Affected)/1000))) %>%
  arrange(desc(Individuos_afectados)) %>%
  slice(1:10)
```

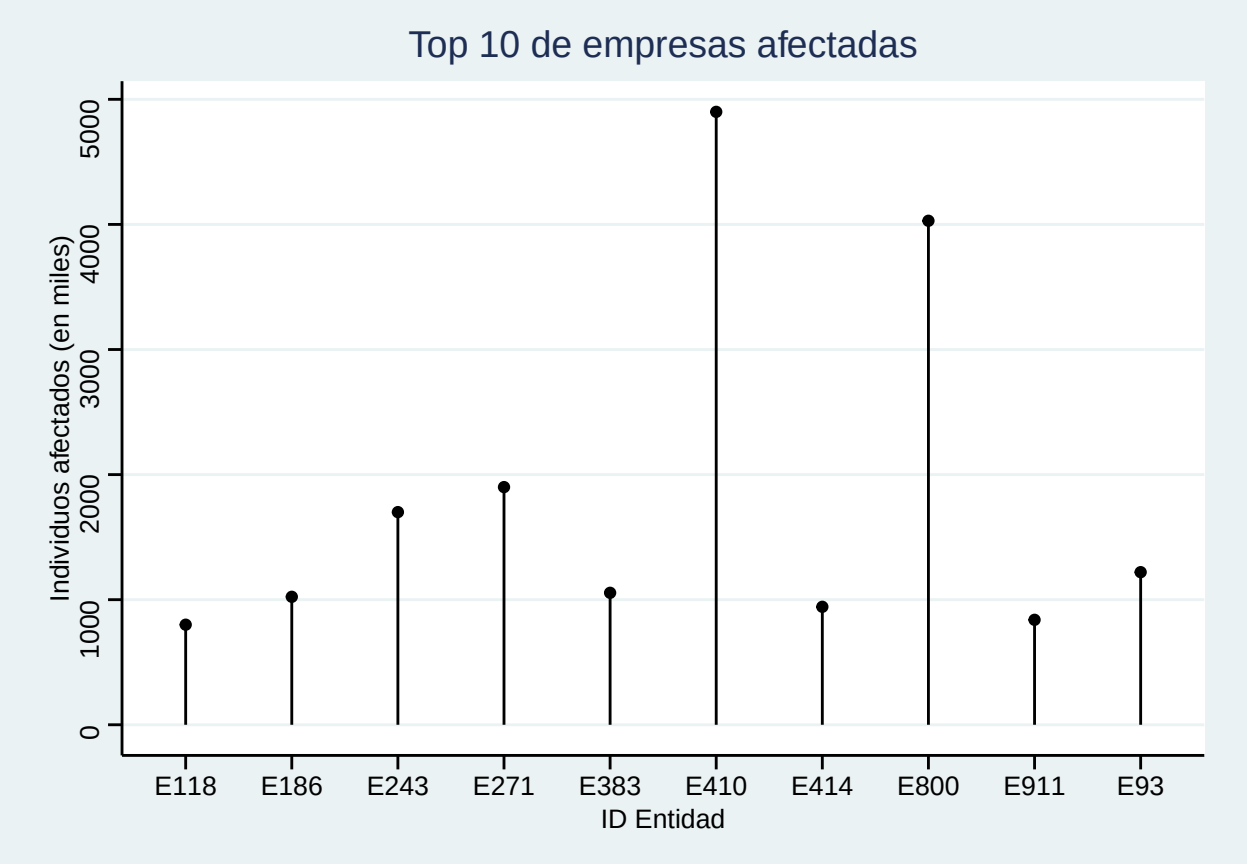


Table 1: Top 5 empresas afectadas

ID	Entidad	Individuos_afectados
E410	TRICARE Management Activity (TMA)	4900
E800	Advocate Health and Hospitals Corporation, d/b/a Advocate Medical Group	4029
E271	Health Net, Inc.	1900
E243	New York City Health & Hospitals Corporation's North Bronx Healthcare Network	1700
E93	AvMed, Inc.	1220
E383	The Nemours Foundation	1055
E186	BlueCross BlueShield of Tennessee, Inc.	1023
E414	Sutter Medical Foundation	943
E911	Horizon Healthcare Services, Inc., doing business as Horizon Blue Cross Blue Shield of New Jersey, and its affiliates	839
E118	South Shore Hospital	800