MIS530Module8

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## Data import and sample

library(ggplot2)

library(Hmisc)

library(cowplot)

library(WVPlots)  
set.seed(123)  
Data <- read.csv("influenza.csv")  
sample\_n(Data, 5)

## Season Region County CDC.Week Week.Ending.Date  
## 1 2017-2018 CENTRAL CORTLAND 11 3/17/18  
## 2 2018-2019 CAPITAL DISTRICT RENSSELAER 16 4/20/19  
## 3 2009-2010 METRO SULLIVAN 2 1/16/10  
## 4 2018-2019 METRO WESTCHESTER 52 12/29/18  
## 5 2013-2014 METRO WESTCHESTER 7 2/15/14  
## Disease Count County.Centroid FIPS  
## 1 INFLUENZA\_A 6 (42.5938237, -76.0762647) 36023  
## 2 INFLUENZA\_UNSPECIFIED 7 (42.7104206, -73.5138454) 36083  
## 3 INFLUENZA\_B 0 (41.7201763, -74.7646796) 36105  
## 4 INFLUENZA\_B 3 (41.1527698, -73.745912) 36119  
## 5 INFLUENZA\_B 11 (41.1527698, -73.745912) 36119

## Understanding the data

* **Season**: Date range of when data was being collected by the CDC
* **Region**: Region where data was collected
* **County**: County where data was collected
* **CDC.Week**: term for the CDC
* **Week.Ending.Date**: the conclusion of data being retrieved by the CDC
* **Disease**: identifies which influenza strand was diagnosed by the CDC *#predicted value*
* **Count**: how many of each influenza disease was diagnosed during a season, in a region and county
* **County.Centroid**: GPS location
* **FIPS**: Postal Code

describe(Data)

## Data   
##   
## 9 Variables 62658 Observations  
## --------------------------------------------------------------------------------  
## Season   
## n missing distinct   
## 62658 0 11   
##   
## lowest : 2009-2010 2010-2011 2011-2012 2012-2013 2013-2014  
## highest: 2015-2016 2016-2017 2017-2018 2018-2019 2019-2020  
##   
## Value 2009-2010 2010-2011 2011-2012 2012-2013 2013-2014 2014-2015  
## Frequency 6138 6138 6138 6138 6138 4068  
## Proportion 0.098 0.098 0.098 0.098 0.098 0.065  
##   
## Value 2015-2016 2016-2017 2017-2018 2018-2019 2019-2020  
## Frequency 6138 6138 6138 6138 3348  
## Proportion 0.098 0.098 0.098 0.098 0.053  
## --------------------------------------------------------------------------------  
## Region   
## n missing distinct   
## 62658 0 5   
##   
## lowest : CAPITAL DISTRICT CENTRAL METRO NYC WESTERN   
## highest: CAPITAL DISTRICT CENTRAL METRO NYC WESTERN   
##   
## Value CAPITAL DISTRICT CENTRAL METRO NYC  
## Frequency 16881 14034 9321 5235  
## Proportion 0.269 0.224 0.149 0.084  
##   
## Value WESTERN  
## Frequency 17187  
## Proportion 0.274  
## --------------------------------------------------------------------------------  
## County   
## n missing distinct   
## 62658 0 62   
##   
## lowest : ALBANY ALLEGANY BRONX BROOME CATTARAUGUS  
## highest: WASHINGTON WAYNE WESTCHESTER WYOMING YATES   
## --------------------------------------------------------------------------------  
## CDC.Week   
## n missing distinct Info Mean Gmd .05 .10   
## 62658 0 34 0.999 25.06 20.37 2 4   
## .25 .50 .75 .90 .95   
## 9 17 45 49 51   
##   
## lowest : 1 2 3 4 5, highest: 49 50 51 52 53  
## --------------------------------------------------------------------------------  
## Week.Ending.Date   
## n missing distinct   
## 62658 0 349   
##   
## lowest : 1/1/11 1/10/15 1/11/14 1/11/20 1/12/13  
## highest: 5/6/17 5/7/11 5/7/16 5/8/10 5/9/15   
## --------------------------------------------------------------------------------  
## Disease   
## n missing distinct   
## 62658 0 3   
##   
## Value INFLUENZA\_A INFLUENZA\_B INFLUENZA\_UNSPECIFIED  
## Frequency 20886 20886 20886  
## Proportion 0.333 0.333 0.333  
## --------------------------------------------------------------------------------  
## Count   
## n missing distinct Info Mean Gmd .05 .10   
## 62658 0 551 0.731 9.756 18.1 0 0   
## .25 .50 .75 .90 .95   
## 0 0 2 15 40   
##   
## lowest : 0 1 2 3 4, highest: 1279 1314 1383 1393 1409  
## --------------------------------------------------------------------------------  
## County.Centroid   
## n missing distinct   
## 62658 0 62   
##   
## lowest : (40.5795, -74.1502) (40.6782, -73.9442) (40.7282, -73.7949) (40.7506561, -73.582905) (40.7831, -73.9712)   
## highest: (44.0607, -75.9928) (44.1089711, -73.7775726) (44.4881125, -75.074311) (44.5943743, -74.3106698) (44.7527103, -73.7056478)  
## --------------------------------------------------------------------------------  
## FIPS   
## n missing distinct Info Mean Gmd .05 .10   
## 62658 0 62 1 36063 41.09 36007 36013   
## .25 .50 .75 .90 .95   
## 36033 36065 36095 36113 36119   
##   
## lowest : 36001 36003 36005 36007 36009, highest: 36115 36117 36119 36121 36123  
## --------------------------------------------------------------------------------

No missing values at this point in the dataset.

## Exploratory Data Analysis

## find the type of variable for each column  
str(Data)

## 'data.frame': 62658 obs. of 9 variables:  
## $ Season : Factor w/ 11 levels "2009-2010","2010-2011",..: 1 1 1 1 1 1 1 1 1 1 ...  
## $ Region : Factor w/ 5 levels "CAPITAL DISTRICT",..: 2 5 1 1 3 4 4 2 2 3 ...  
## $ County : Factor w/ 62 levels "ALBANY","ALLEGANY",..: 23 8 11 1 60 3 31 25 34 60 ...  
## $ CDC.Week : int 48 18 1 43 14 42 6 8 18 50 ...  
## $ Week.Ending.Date: Factor w/ 349 levels "1/1/11","1/10/15",..: 181 348 47 82 276 71 195 217 348 156 ...  
## $ Disease : Factor w/ 3 levels "INFLUENZA\_A",..: 1 1 2 1 1 3 2 1 1 2 ...  
## $ Count : int 3 0 0 86 1 0 0 0 0 0 ...  
## $ County.Centroid : Factor w/ 62 levels "(40.5795, -74.1502)",..: 58 16 20 28 8 6 5 57 43 8 ...  
## $ FIPS : int 36045 36015 36021 36001 36119 36005 36061 36049 36067 36119 ...

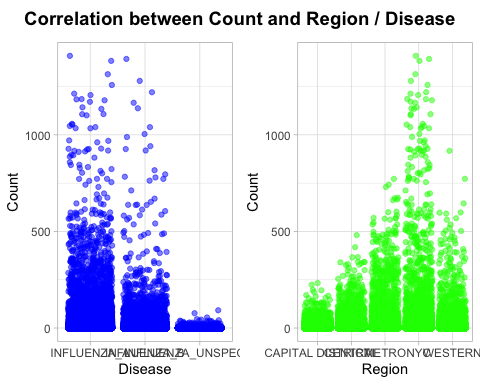
## show the first six rows for each column  
head(Data)

## Season Region County CDC.Week Week.Ending.Date  
## 1 2009-2010 CENTRAL JEFFERSON 48 12/5/09  
## 2 2009-2010 WESTERN CHEMUNG 18 5/8/10  
## 3 2009-2010 CAPITAL DISTRICT COLUMBIA 1 1/9/10  
## 4 2009-2010 CAPITAL DISTRICT ALBANY 43 10/31/09  
## 5 2009-2010 METRO WESTCHESTER 14 4/10/10  
## 6 2009-2010 NYC BRONX 42 10/24/09  
## Disease Count County.Centroid FIPS  
## 1 INFLUENZA\_A 3 (44.0607, -75.9928) 36045  
## 2 INFLUENZA\_A 0 (42.1552807, -76.7471788) 36015  
## 3 INFLUENZA\_B 0 (42.2477286, -73.6268046) 36021  
## 4 INFLUENZA\_A 86 (42.5882713, -73.9740136) 36001  
## 5 INFLUENZA\_A 1 (41.1527698, -73.745912) 36119  
## 6 INFLUENZA\_UNSPECIFIED 0 (40.8448, -73.8648) 36005

## summary of statistics for each column  
summary(Data)

## Season Region County CDC.Week   
## 2009-2010: 6138 CAPITAL DISTRICT:16881 BRONX : 1047 Min. : 1.00   
## 2010-2011: 6138 CENTRAL :14034 KINGS : 1047 1st Qu.: 9.00   
## 2011-2012: 6138 METRO : 9321 LIVINGSTON: 1047 Median :17.00   
## 2012-2013: 6138 NYC : 5235 MADISON : 1047 Mean :25.06   
## 2013-2014: 6138 WESTERN :17187 MONROE : 1047 3rd Qu.:45.00   
## 2015-2016: 6138 MONTGOMERY: 1047 Max. :53.00   
## (Other) :25830 (Other) :56376   
## Week.Ending.Date Disease Count   
## 1/1/11 : 186 INFLUENZA\_A :20886 Min. : 0.000   
## 1/11/14: 186 INFLUENZA\_B :20886 1st Qu.: 0.000   
## 1/11/20: 186 INFLUENZA\_UNSPECIFIED:20886 Median : 0.000   
## 1/12/13: 186 Mean : 9.756   
## 1/12/19: 186 3rd Qu.: 2.000   
## 1/13/18: 186 Max. :1409.000   
## (Other):61542   
## County.Centroid FIPS   
## (40.5795, -74.1502) : 1047 Min. :36001   
## (40.6782, -73.9442) : 1047 1st Qu.:36033   
## (40.7282, -73.7949) : 1047 Median :36065   
## (40.7506561, -73.582905): 1047 Mean :36063   
## (40.7831, -73.9712) : 1047 3rd Qu.:36095   
## (40.8448, -73.8648) : 1047 Max. :36123   
## (Other) :56376

##Correlations  
x <- ggplot(Data, aes(Disease, Count)) +  
 geom\_jitter(color = "blue", alpha = 0.5) +  
 theme\_light()  
y <- ggplot(Data, aes(Region, Count)) +  
 geom\_jitter(color = "green", alpha = 0.5) +  
 theme\_light()  
p <- plot\_grid(x, y)   
title <- ggdraw() + draw\_label("Correlation between Count and Region / Disease", fontface='bold')  
plot\_grid(title, p, ncol=1, rel\_heights=c(0.1, 1))



## Linear Regression Model/Preparation and splitting the data

set.seed(2)  
train.index <- sample(c(1:dim(Data)[1]), dim(Data)[1]\*0.6)   
train.df <- Data[train.index, ]  
valid.df <- Data[-train.index, ]

# use lm() to run a linear regression of Count on all predictors in the training set

Data.lm <- lm(Count ~ ., data = train.df)  
options(scipen = 999)  
summary(Data.lm)

##   
## Call:  
## lm(formula = Count ~ ., data = train.df)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -125.34 -11.21 -1.76 9.45 1284.60   
##   
## Coefficients: (77 not defined because of singularities)  
## Estimate Std. Error t value  
## (Intercept) 8.051364 5.728958 1.405  
## Season2010-2011 1.658979 6.108166 0.272  
## Season2011-2012 1.827009 6.163333 0.296  
## Season2012-2013 2.416316 6.222603 0.388  
## Season2013-2014 5.540952 6.149626 0.901  
## Season2014-2015 -1.220522 6.916881 -0.176  
## Season2015-2016 6.777274 6.095924 1.112  
## Season2016-2017 2.413062 6.083033 0.397  
## Season2017-2018 5.461148 6.008995 0.909  
## Season2018-2019 2.885326 6.009085 0.480  
## Season2019-2020 87.957475 6.537714 13.454  
## RegionCENTRAL -2.959528 2.581493 -1.146  
## RegionMETRO 30.764423 2.595812 11.852  
## RegionNYC 1.745259 2.605830 0.670  
## RegionWESTERN -6.303186 2.590256 -2.433  
## CountyALLEGANY 0.605669 2.612722 0.232  
## CountyBRONX 53.747218 2.548540 21.089  
## CountyBROOME 4.506491 2.622143 1.719  
## CountyCATTARAUGUS 0.229427 2.618327 0.088  
## CountyCAYUGA -0.505396 2.601768 -0.194  
## CountyCHAUTAUQUA 4.072485 2.580192 1.578  
## CountyCHEMUNG 2.226359 2.600392 0.856  
## CountyCHENANGO -1.714154 2.579950 -0.664  
## CountyCLINTON -5.192617 2.633140 -1.972  
## CountyCOLUMBIA -6.180659 2.648691 -2.333  
## CountyCORTLAND -2.069575 2.573809 -0.804  
## CountyDELAWARE -6.487130 2.702488 -2.400  
## CountyDUTCHESS -31.565411 2.609574 -12.096  
## CountyERIE 21.378789 2.581369 8.282  
## CountyESSEX -6.318562 2.688247 -2.350  
## CountyFRANKLIN -5.055957 2.665453 -1.897  
## CountyFULTON -5.824401 2.676011 -2.177  
## CountyGENESEE 2.200403 2.609683 0.843  
## CountyGREENE -6.561830 2.668981 -2.459  
## CountyHAMILTON -6.847066 2.659492 -2.575  
## CountyHERKIMER -0.766888 2.573233 -0.298  
## CountyJEFFERSON 1.419520 2.589831 0.548  
## CountyKINGS 43.928294 2.591751 16.949  
## CountyLEWIS -2.802213 2.518450 -1.113  
## CountyLIVINGSTON 1.839171 2.551775 0.721  
## CountyMADISON -1.227186 2.525621 -0.486  
## CountyMONROE 33.201807 2.498219 13.290  
## CountyMONTGOMERY -4.988992 2.600990 -1.918  
## CountyNASSAU -1.232366 2.563377 -0.481  
## CountyNEW YORK 21.881175 2.568220 8.520  
## CountyNIAGARA 2.656421 2.535791 1.048  
## CountyONEIDA 14.045910 2.547172 5.514  
## CountyONONDAGA 13.324885 2.530450 5.266  
## CountyONTARIO 4.440289 2.529428 1.755  
## CountyORANGE -28.236125 2.519615 -11.207  
## CountyORLEANS 0.129361 2.533819 0.051  
## CountyOSWEGO 2.051856 2.548313 0.805  
## CountyOTSEGO -5.519642 2.617720 -2.109  
## CountyPUTNAM -34.616835 2.562151 -13.511  
## CountyQUEENS 53.976469 2.561599 21.071  
## CountyRENSSELAER -3.747218 2.620353 -1.430  
## CountyRICHMOND NA NA NA  
## CountyROCKLAND -31.237737 2.515476 -12.418  
## CountySARATOGA 0.810960 2.613021 0.310  
## CountySCHENECTADY -0.441015 2.577109 -0.171  
## CountySCHOHARIE -6.389091 2.595141 -2.462  
## CountySCHUYLER -0.195734 2.523852 -0.078  
## CountySENECA 0.684983 2.557804 0.268  
## CountyST LAWRENCE 1.506234 2.524085 0.597  
## CountySTEUBEN 2.607116 2.551337 1.022  
## CountySUFFOLK -0.666362 2.560583 -0.260  
## CountySULLIVAN -35.447591 2.575967 -13.761  
## CountyTIOGA -2.367896 2.514161 -0.942  
## CountyTOMPKINS NA NA NA  
## CountyULSTER -34.168201 2.522141 -13.547  
## CountyWARREN -5.923947 2.624349 -2.257  
## CountyWASHINGTON -6.017013 2.598496 -2.316  
## CountyWAYNE 4.554611 2.542262 1.792  
## CountyWESTCHESTER NA NA NA  
## CountyWYOMING 0.003674 2.535140 0.001  
## CountyYATES NA NA NA  
## CDC.Week 0.064677 0.176404 0.367  
## Week.Ending.Date1/10/15 19.977660 8.215652 2.432  
## Week.Ending.Date1/11/14 6.115960 6.739682 0.907  
## Week.Ending.Date1/11/20 -28.232734 5.959990 -4.737  
## Week.Ending.Date1/12/13 25.440003 6.732499 3.779  
## Week.Ending.Date1/12/19 20.630036 6.625150 3.114  
## Week.Ending.Date1/13/18 30.917805 6.560687 4.713  
## Week.Ending.Date1/14/12 -1.360877 6.739639 -0.202  
## Week.Ending.Date1/14/17 23.359429 6.776457 3.447  
## Week.Ending.Date1/15/11 7.001800 7.896675 0.887  
## Week.Ending.Date1/16/10 2.442512 6.598343 0.370  
## Week.Ending.Date1/16/16 -4.606992 6.704350 -0.687  
## Week.Ending.Date1/17/15 32.127093 8.076168 3.978  
## Week.Ending.Date1/18/14 11.322553 6.547441 1.729  
## Week.Ending.Date1/18/20 -27.296173 6.088614 -4.483  
## Week.Ending.Date1/19/13 23.043465 6.604259 3.489  
## Week.Ending.Date1/19/19 36.005041 6.668379 5.399  
## Week.Ending.Date1/2/10 1.707738 8.532425 0.200  
## Week.Ending.Date1/2/16 -6.384946 8.693489 -0.734  
## Week.Ending.Date1/20/18 39.890288 6.594544 6.049  
## Week.Ending.Date1/21/12 0.273906 6.594331 0.042  
## Week.Ending.Date1/21/17 14.594495 6.555699 2.226  
## Week.Ending.Date1/22/11 6.417685 7.711533 0.832  
## Week.Ending.Date1/23/10 2.232258 6.670772 0.335  
## Week.Ending.Date1/23/16 -2.153533 6.672769 -0.323  
## Week.Ending.Date1/24/15 35.107760 7.792815 4.505  
## Week.Ending.Date1/25/14 14.030457 6.587075 2.130  
## Week.Ending.Date1/25/20 0.528810 5.988231 0.088  
## Week.Ending.Date1/26/13 13.289603 6.503990 2.043  
## Week.Ending.Date1/26/19 23.250313 6.442670 3.609  
## Week.Ending.Date1/27/18 53.814724 6.356209 8.466  
## Week.Ending.Date1/28/12 -0.975434 6.562072 -0.149  
## Week.Ending.Date1/28/17 27.546901 6.415133 4.294  
## Week.Ending.Date1/29/11 7.957457 7.530055 1.057  
## Week.Ending.Date1/3/15 33.367821 9.787345 3.409  
## Week.Ending.Date1/30/10 2.827129 6.723411 0.420  
## Week.Ending.Date1/30/16 -4.863801 6.663021 -0.730  
## Week.Ending.Date1/31/15 36.248668 7.754548 4.675  
## Week.Ending.Date1/4/14 6.703781 6.803307 0.985  
## Week.Ending.Date1/4/20 -39.338649 6.053406 -6.499  
## Week.Ending.Date1/5/13 24.969206 6.975549 3.580  
## Week.Ending.Date1/5/19 26.293609 6.591573 3.989  
## Week.Ending.Date1/6/18 18.965656 6.757511 2.807  
## Week.Ending.Date1/7/12 0.889618 6.881228 0.129  
## Week.Ending.Date1/7/17 16.795772 6.823042 2.462  
## Week.Ending.Date1/8/11 3.824590 7.954106 0.481  
## Week.Ending.Date1/9/10 3.115722 6.817370 0.457  
## Week.Ending.Date1/9/16 -4.762642 6.658607 -0.715  
## Week.Ending.Date10/10/09 1.307245 7.295267 0.179  
## Week.Ending.Date10/10/15 -7.975232 7.305935 -1.092  
## Week.Ending.Date10/11/14 -2.618213 8.562514 -0.306  
## Week.Ending.Date10/12/13 -8.049649 7.275852 -1.106  
## Week.Ending.Date10/12/19 -88.645067 8.810558 -10.061  
## Week.Ending.Date10/13/12 -3.696348 7.465760 -0.495  
## Week.Ending.Date10/13/18 -4.078606 7.114679 -0.573  
## Week.Ending.Date10/14/17 -6.449281 7.249828 -0.890  
## Week.Ending.Date10/15/11 -3.049187 7.343401 -0.415  
## Week.Ending.Date10/15/16 -1.560525 7.275965 -0.214  
## Week.Ending.Date10/16/10 -3.436247 5.265652 -0.653  
## Week.Ending.Date10/17/09 1.010288 7.427457 0.136  
## Week.Ending.Date10/17/15 -7.507144 7.335397 -1.023  
## Week.Ending.Date10/18/14 -3.618655 8.602628 -0.421  
## Week.Ending.Date10/19/13 -7.161114 7.556528 -0.948  
## Week.Ending.Date10/19/19 -88.485081 8.791576 -10.065  
## Week.Ending.Date10/20/12 -5.035440 7.502701 -0.671  
## Week.Ending.Date10/20/18 -4.263433 7.302747 -0.584  
## Week.Ending.Date10/21/17 -6.353721 7.291315 -0.871  
## Week.Ending.Date10/22/11 -3.391330 7.442390 -0.456  
## Week.Ending.Date10/22/16 -1.495980 7.308952 -0.205  
## Week.Ending.Date10/23/10 -1.918385 5.378270 -0.357  
## Week.Ending.Date10/24/09 9.509005 7.421429 1.281  
## Week.Ending.Date10/24/15 -6.547978 7.363098 -0.889  
## Week.Ending.Date10/25/14 -1.014484 8.502188 -0.119  
## Week.Ending.Date10/26/13 -6.799641 7.591651 -0.896  
## Week.Ending.Date10/26/19 -88.752295 9.130161 -9.721  
## Week.Ending.Date10/27/12 -3.714606 7.569941 -0.491  
## Week.Ending.Date10/27/18 -2.677249 7.362403 -0.364  
## Week.Ending.Date10/28/17 -7.017488 7.384227 -0.950  
## Week.Ending.Date10/29/11 -2.936477 7.555078 -0.389  
## Week.Ending.Date10/29/16 -3.892532 7.477880 -0.521  
## Week.Ending.Date10/30/10 -2.425757 5.375286 -0.451  
## Week.Ending.Date10/31/09 19.181829 7.589622 2.527  
## Week.Ending.Date10/31/15 -8.099322 7.354359 -1.101  
## Week.Ending.Date10/4/14 -4.062940 8.292909 -0.490  
## Week.Ending.Date10/5/13 -7.769473 7.179294 -1.082  
## Week.Ending.Date10/5/19 -88.849393 8.705272 -10.206  
## Week.Ending.Date10/6/12 -3.222338 7.230114 -0.446  
## Week.Ending.Date10/6/18 -2.900263 7.104367 -0.408  
## Week.Ending.Date10/7/17 -6.553523 7.128520 -0.919  
## Week.Ending.Date10/8/11 -4.289066 7.284080 -0.589  
## Week.Ending.Date10/8/16 -3.896370 7.280285 -0.535  
## Week.Ending.Date10/9/10 -0.167095 5.392701 -0.031  
## Week.Ending.Date11/1/14 -3.044885 8.870753 -0.343  
## Week.Ending.Date11/10/12 -3.432212 7.710906 -0.445  
## Week.Ending.Date11/10/18 -1.378665 7.621602 -0.181  
## Week.Ending.Date11/11/17 -4.978970 7.501771 -0.664  
## Week.Ending.Date11/12/11 -2.044346 7.812756 -0.262  
## Week.Ending.Date11/12/16 -3.438835 7.669094 -0.448  
## Week.Ending.Date11/13/10 -1.873093 5.406599 -0.346  
## Week.Ending.Date11/14/09 23.830850 7.755667 3.073  
## Week.Ending.Date11/14/15 -9.808264 7.712603 -1.272  
## Week.Ending.Date11/15/14 -4.437837 8.991975 -0.494  
## Week.Ending.Date11/16/13 -6.017408 7.832015 -0.768  
## Week.Ending.Date11/17/12 -3.608412 7.859246 -0.459  
## Week.Ending.Date11/17/18 -4.023370 7.766789 -0.518  
## Week.Ending.Date11/17/19 -87.958308 9.422066 -9.335  
## Week.Ending.Date11/18/17 -7.362962 7.722522 -0.953  
## Week.Ending.Date11/19/11 -1.819887 7.728476 -0.235  
## Week.Ending.Date11/19/16 -3.875168 7.719854 -0.502  
## Week.Ending.Date11/2/13 -7.450741 7.708045 -0.967  
## Week.Ending.Date11/2/19 -88.551623 9.162532 -9.665  
## Week.Ending.Date11/20/10 -1.552437 5.506952 -0.282  
## Week.Ending.Date11/21/09 12.971170 7.786884 1.666  
## Week.Ending.Date11/21/15 -9.191839 7.729685 -1.189  
## Week.Ending.Date11/22/14 -1.001922 8.921405 -0.112  
## Week.Ending.Date11/23/13 -7.438744 7.885583 -0.943  
## Week.Ending.Date11/23/19 -84.538427 9.592858 -8.813  
## Week.Ending.Date11/24/12 -2.871678 8.011868 -0.358  
## Week.Ending.Date11/24/18 -3.314156 7.795925 -0.425  
## Week.Ending.Date11/25/17 -5.070518 7.826598 -0.648  
## Week.Ending.Date11/26/11 -4.629814 7.935620 -0.583  
## Week.Ending.Date11/26/16 -2.135484 7.872928 -0.271  
## Week.Ending.Date11/27/10 -1.199491 5.688161 -0.211  
## Week.Ending.Date11/28/09 4.801036 7.966878 0.603  
## Week.Ending.Date11/28/15 -9.679643 7.789671 -1.243  
## Week.Ending.Date11/29/14 -3.625522 9.075561 -0.399  
## Week.Ending.Date11/3/12 -4.109041 7.674479 -0.535  
## Week.Ending.Date11/3/18 -2.813881 7.428795 -0.379  
## Week.Ending.Date11/30/13 -6.057987 8.039375 -0.754  
## Week.Ending.Date11/30/19 -82.944326 9.670407 -8.577  
## Week.Ending.Date11/4/17 -7.791221 7.409611 -1.052  
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## Week.Ending.Date11/5/16 -4.710051 7.642742 -0.616  
## Week.Ending.Date11/6/10 -2.961698 5.409239 -0.548  
## Week.Ending.Date11/7/09 17.135668 7.681796 2.231  
## Week.Ending.Date11/7/15 -9.508641 7.549902 -1.259  
## Week.Ending.Date11/8/14 -0.527605 8.815367 -0.060  
## Week.Ending.Date11/9/13 -7.956547 7.711746 -1.032  
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## Week.Ending.Date12/1/12 1.416278 8.115554 0.175  
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## County.Centroid(40.8448, -73.8648) NA NA NA  
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## County.Centroid(41.4024096, -74.3062522) NA NA NA  
## County.Centroid(41.4351, -73.7949) NA NA NA  
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## Season2013-2014 0.367582   
## Season2014-2015 0.859937   
## Season2015-2016 0.266244   
## Season2016-2017 0.691600   
## Season2017-2018 0.363446   
## Season2018-2019 0.631116   
## Season2019-2020 < 0.0000000000000002 \*\*\*  
## RegionCENTRAL 0.251620   
## RegionMETRO < 0.0000000000000002 \*\*\*  
## RegionNYC 0.503020   
## RegionWESTERN 0.014962 \*   
## CountyALLEGANY 0.816683   
## CountyBRONX < 0.0000000000000002 \*\*\*  
## CountyBROOME 0.085690 .   
## CountyCATTARAUGUS 0.930177   
## CountyCAYUGA 0.845981   
## CountyCHAUTAUQUA 0.114490   
## CountyCHEMUNG 0.391913   
## CountyCHENANGO 0.506430   
## CountyCLINTON 0.048614 \*   
## CountyCOLUMBIA 0.019628 \*   
## CountyCORTLAND 0.421350   
## CountyDELAWARE 0.016381 \*   
## CountyDUTCHESS < 0.0000000000000002 \*\*\*  
## CountyERIE < 0.0000000000000002 \*\*\*  
## CountyESSEX 0.018756 \*   
## CountyFRANKLIN 0.057856 .   
## CountyFULTON 0.029522 \*   
## CountyGENESEE 0.399140   
## CountyGREENE 0.013954 \*   
## CountyHAMILTON 0.010040 \*   
## CountyHERKIMER 0.765686   
## CountyJEFFERSON 0.583618   
## CountyKINGS < 0.0000000000000002 \*\*\*  
## CountyLEWIS 0.265856   
## CountyLIVINGSTON 0.471073   
## CountyMADISON 0.627045   
## CountyMONROE < 0.0000000000000002 \*\*\*  
## CountyMONTGOMERY 0.055104 .   
## CountyNASSAU 0.630691   
## CountyNEW YORK < 0.0000000000000002 \*\*\*  
## CountyNIAGARA 0.294843   
## CountyONEIDA 0.000000035246424331 \*\*\*  
## CountyONONDAGA 0.000000140342066298 \*\*\*  
## CountyONTARIO 0.079190 .   
## CountyORANGE < 0.0000000000000002 \*\*\*  
## CountyORLEANS 0.959283   
## CountyOSWEGO 0.420720   
## CountyOTSEGO 0.034989 \*   
## CountyPUTNAM < 0.0000000000000002 \*\*\*  
## CountyQUEENS < 0.0000000000000002 \*\*\*  
## CountyRENSSELAER 0.152713   
## CountyRICHMOND NA   
## CountyROCKLAND < 0.0000000000000002 \*\*\*  
## CountySARATOGA 0.756294   
## CountySCHENECTADY 0.864124   
## CountySCHOHARIE 0.013823 \*   
## CountySCHUYLER 0.938184   
## CountySENECA 0.788854   
## CountyST LAWRENCE 0.550681   
## CountySTEUBEN 0.306852   
## CountySUFFOLK 0.794681   
## CountySULLIVAN < 0.0000000000000002 \*\*\*  
## CountyTIOGA 0.346289   
## CountyTOMPKINS NA   
## CountyULSTER < 0.0000000000000002 \*\*\*  
## CountyWARREN 0.023995 \*   
## CountyWASHINGTON 0.020587 \*   
## CountyWAYNE 0.073212 .   
## CountyWESTCHESTER NA   
## CountyWYOMING 0.998844   
## CountyYATES NA   
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## Week.Ending.Date1/6/18 0.005009 \*\*   
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## Week.Ending.Date1/9/10 0.647654   
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## Week.Ending.Date10/8/16 0.592518   
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## Week.Ending.Date11/12/16 0.653866   
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## Week.Ending.Date11/15/14 0.621639   
## Week.Ending.Date11/16/13 0.442308   
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## Week.Ending.Date5/5/12 NA   
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## County.Centroid(40.7831, -73.9712) NA   
## County.Centroid(40.8448, -73.8648) NA   
## County.Centroid(40.943554, -72.6922184) NA   
## County.Centroid(41.1527698, -73.745912) NA   
## County.Centroid(41.1547851, -74.0247721) NA   
## County.Centroid(41.4024096, -74.3062522) NA   
## County.Centroid(41.4351, -73.7949) NA   
## County.Centroid(41.7201763, -74.7646796) NA   
## County.Centroid(41.7550085, -73.7399512) NA   
## County.Centroid(41.9472321, -74.265447) NA   
## County.Centroid(42.1256, -76.3637) NA   
## County.Centroid(42.1552807, -76.7471788) NA   
## County.Centroid(42.1619773, -75.830291) NA   
## County.Centroid(42.1939865, -74.966728) NA   
## County.Centroid(42.2448527, -78.6810055) NA   
## County.Centroid(42.2477286, -73.6268046) NA   
## County.Centroid(42.2478938, -78.0261758) NA   
## County.Centroid(42.2667252, -77.3855253) NA   
## County.Centroid(42.2869511, -74.1494949) NA   
## County.Centroid(42.3042159, -79.4075949) NA   
## County.Centroid(42.419776, -76.9386038) NA   
## County.Centroid(42.4532811, -76.4737116) NA   
## County.Centroid(42.489732, -75.6049051) NA   
## County.Centroid(42.5882713, -73.9740136) NA   
## County.Centroid(42.591294, -74.4381718) NA   
## County.Centroid(42.5938237, -76.0762647) NA   
## County.Centroid(42.6297762, -75.028841) NA   
## County.Centroid(42.6431, -77.1485) NA   
## County.Centroid(42.7013627, -78.2285667) NA   
## County.Centroid(42.7104206, -73.5138454) NA   
## County.Centroid(42.7274845, -77.7697795) NA   
## County.Centroid(42.752759, -78.7781922) NA   
## County.Centroid(42.7652, -76.8721) NA   
## County.Centroid(42.8175421, -74.0435834) NA   
## County.Centroid(42.8566949, -77.3032768) NA   
## County.Centroid(42.9008912, -74.4353575) NA   
## County.Centroid(42.9100255, -75.6635749) NA   
## County.Centroid(43.0009096, -78.1927784) NA   
## County.Centroid(43.0065299, -76.1961167) NA   
## County.Centroid(43.0085456, -76.5745866) NA   
## County.Centroid(43.1061353, -73.8553872) NA   
## County.Centroid(43.1156093, -74.4236782) NA   
## County.Centroid(43.1631, -74.8741) NA   
## County.Centroid(43.174966, -77.639663) NA   
## County.Centroid(43.202, -77.0104) NA   
## County.Centroid(43.203001, -78.71083) NA   
## County.Centroid(43.209007, -78.254897) NA   
## County.Centroid(43.2427273, -75.4342824) NA   
## County.Centroid(43.3123766, -73.4394282) NA   
## County.Centroid(43.4614428, -76.209258) NA   
## County.Centroid(43.5551053, -73.8381388) NA   
## County.Centroid(43.6578786, -74.5024556) NA   
## County.Centroid(43.7863965, -75.4426165) NA   
## County.Centroid(44.0607, -75.9928) NA   
## County.Centroid(44.1089711, -73.7775726) NA   
## County.Centroid(44.4881125, -75.074311) NA   
## County.Centroid(44.5943743, -74.3106698) NA   
## County.Centroid(44.7527103, -73.7056478) NA   
## FIPS NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 45.07 on 37182 degrees of freedom  
## Multiple R-squared: 0.2123, Adjusted R-squared: 0.2036   
## F-statistic: 24.39 on 411 and 37182 DF, p-value: < 0.00000000000000022

# Execute scatter plot for Disease and Count with y-intercept

plot(Data$Disease, Data$Count)  
Data.lm2 <- lm(Data$Count ~ Data$Count)

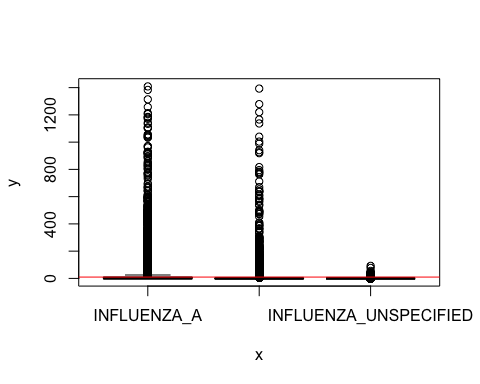
## Warning in model.matrix.default(mt, mf, contrasts): the response appeared on the  
## right-hand side and was dropped

## Warning in model.matrix.default(mt, mf, contrasts): problem with term 1 in  
## model.matrix: no columns are assigned

Data.lm2

##   
## Call:  
## lm(formula = Data$Count ~ Data$Count)  
##   
## Coefficients:  
## (Intercept)   
## 9.756

abline(Data.lm2, col="red")



# Execute scatter plot for Region and Count with y-intercept

plot(Data$Region, Data$Count)  
Data.lm2 <- lm(Data$Count ~ Data$Region)  
Data.lm2

##   
## Call:  
## lm(formula = Data$Count ~ Data$Region)  
##   
## Coefficients:  
## (Intercept) Data$RegionCENTRAL Data$RegionMETRO Data$RegionNYC   
## 2.624 3.760 13.855 40.085   
## Data$RegionWESTERN   
## 3.205

abline(Data.lm2, col="red")

## Warning in abline(Data.lm2, col = "red"): only using the first two of 5  
## regression coefficients

