Data-607 Final Project

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Date : 12/10/2018

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- Data File

Context

Below example demonstrate what it takes from Data Scientist to analyze a given data and derive a meaningful information from the data. Data scientist frequently work with ambiguous data and are tasked to infer meaningful information from data. Let's take example of The Global Terrorism Database (GTD).

This is an open-source database including information on terrorist attacks around the world from 1970 through 2017

The GTD includes systematic data on domestic as well as international terrorist incidents that have occurred during this time period and now includes more than 180,000 attacks. The database is maintained by researchers at the National Consortium for the Study of Terrorism and Responses to Terrorism (START), headquartered at the University of Maryland. More Information

Let's see how a Data Scientist will approach this data set and what kind of insights can be obtained

1] Library Initialization

```
library(ggplot2) # Data visualization
library(readr) # CSV file I/O, e.g. the read_csv function
library(tidyverse)
```

```
## Loading tidyverse: tibble
## Loading tidyverse: tidyr
## Loading tidyverse: purrr
## Loading tidyverse: dplyr
```

```
## Conflicts with tidy packages ----------------------------------------------
```

```
## filter(): dplyr, stats
## lag():    dplyr, stats
```

```
library(RCurl)
```

```
## Loading required package: bitops
```

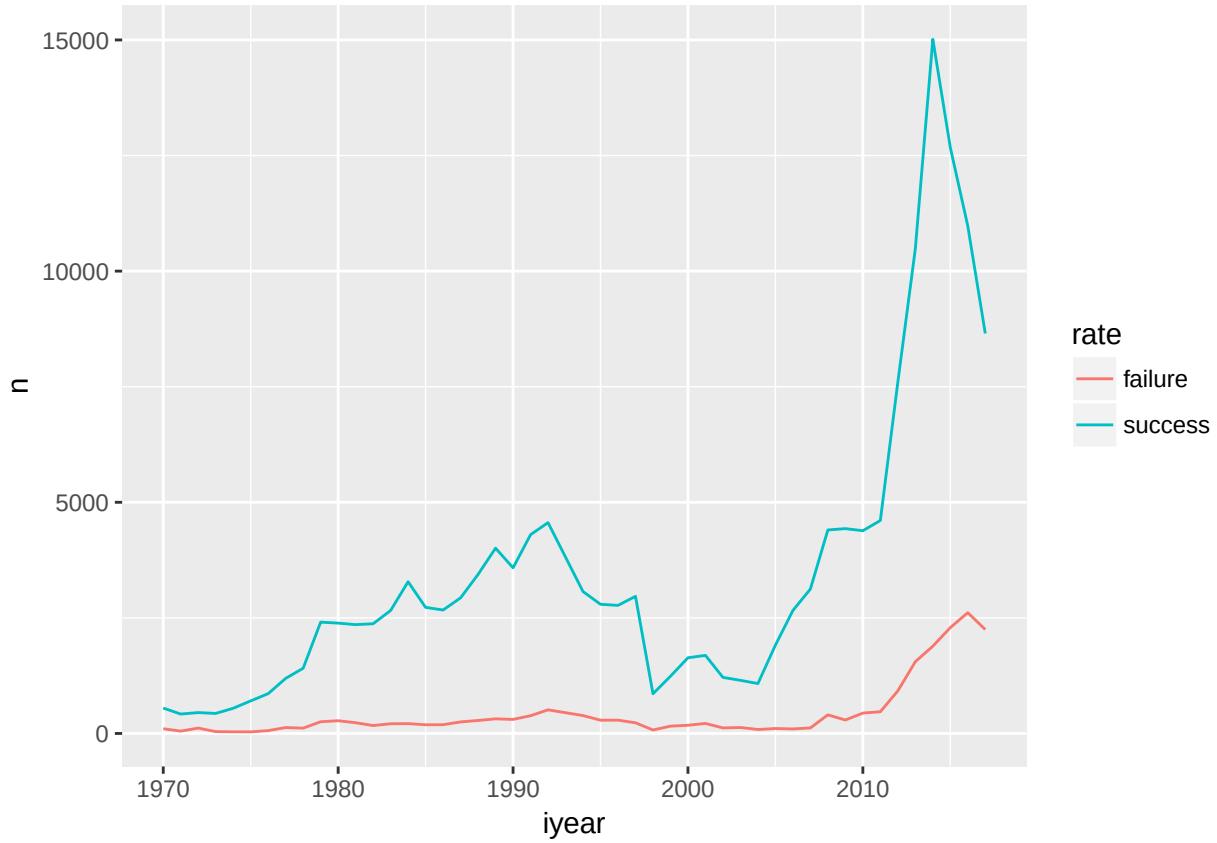
```
##
## Attaching package: 'RCurl'

## The following object is masked from 'package:tidyr':
##
##     complete
```

2] Load Data

```
data.url = getURL("https://media.githubusercontent.com/media/mlforsachid/Data607-Project3/master/Misc/gl
attack <- read_csv(data.url,
  col_types = cols(
    nkill = col_double(), #The number of total confirmed fatalities for the incident
    nhours = col_double(),
    propvalue = col_double(),
    nwound = col_double(), #Number of confirmed non-fatal injuries to both perpetrators and victims.
    nperpcap= col_double(),
    nhostkid = col_double(),
    nreleased= col_double(),
    nkillter= col_double(),
    nkillus = col_double(),
    nwoundus = col_double(), #The number of confirmed non-fatal injuries to U.S. citizens, both perpetr
    ransomamt = col_double(),
    ransompaid= col_double(),
    nwoundte= col_double()
  )
)
```

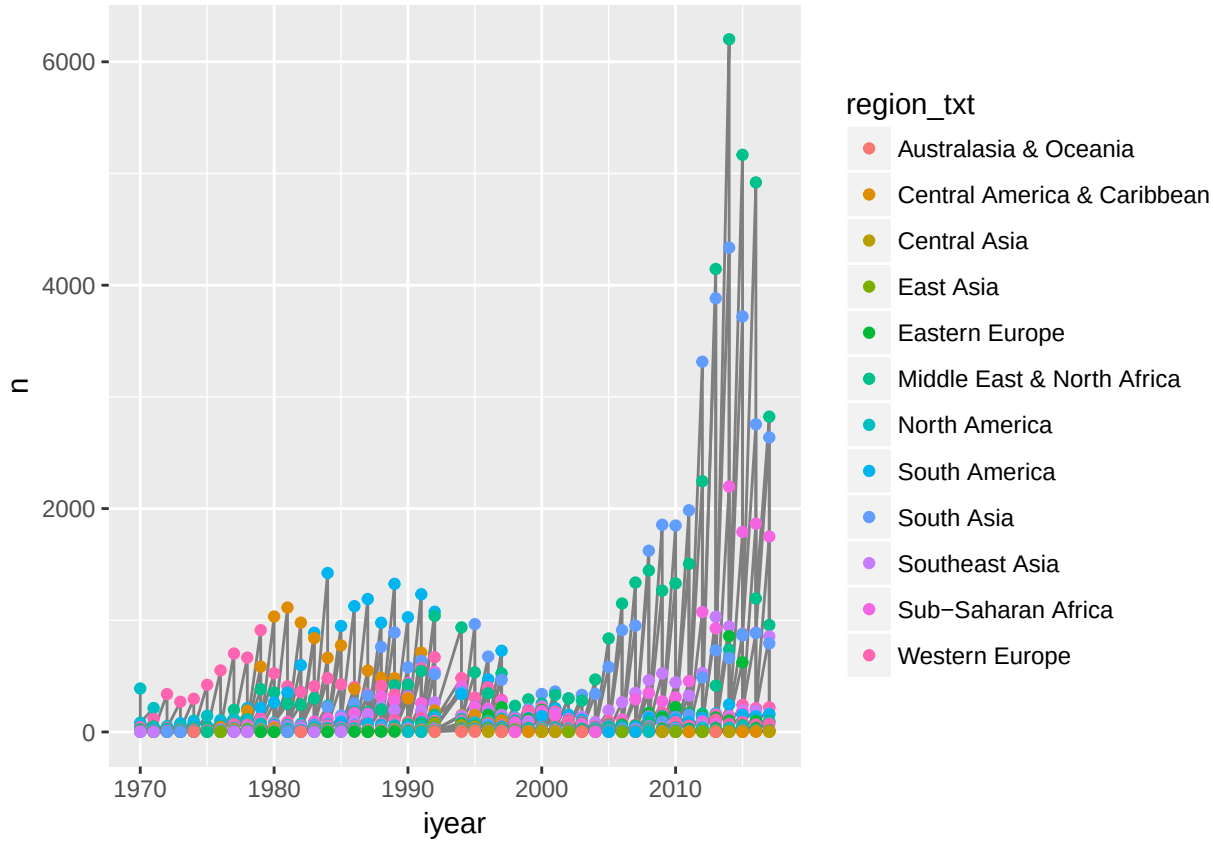
3] Analyze success and failure rate

```
#iyearThis field contains the year in which the incident occurred.

attack %>%
  mutate(total = 1) %>% # total attacks that year (creates a new variable)
  count(iyear, wt=total-success) %>% # failed attempt
  cbind("failure") -> failure
  colnames(failure)[3] <- "rate"

attack %>%
  count(iyear, wt = success) %>%
  cbind("success")-> success
colnames(success)[3] <- "rate"

rbind(failure,success) %>%
  ggplot(aes(iyear, n)) +
  geom_line(aes(group=rate, colour=rate))
```



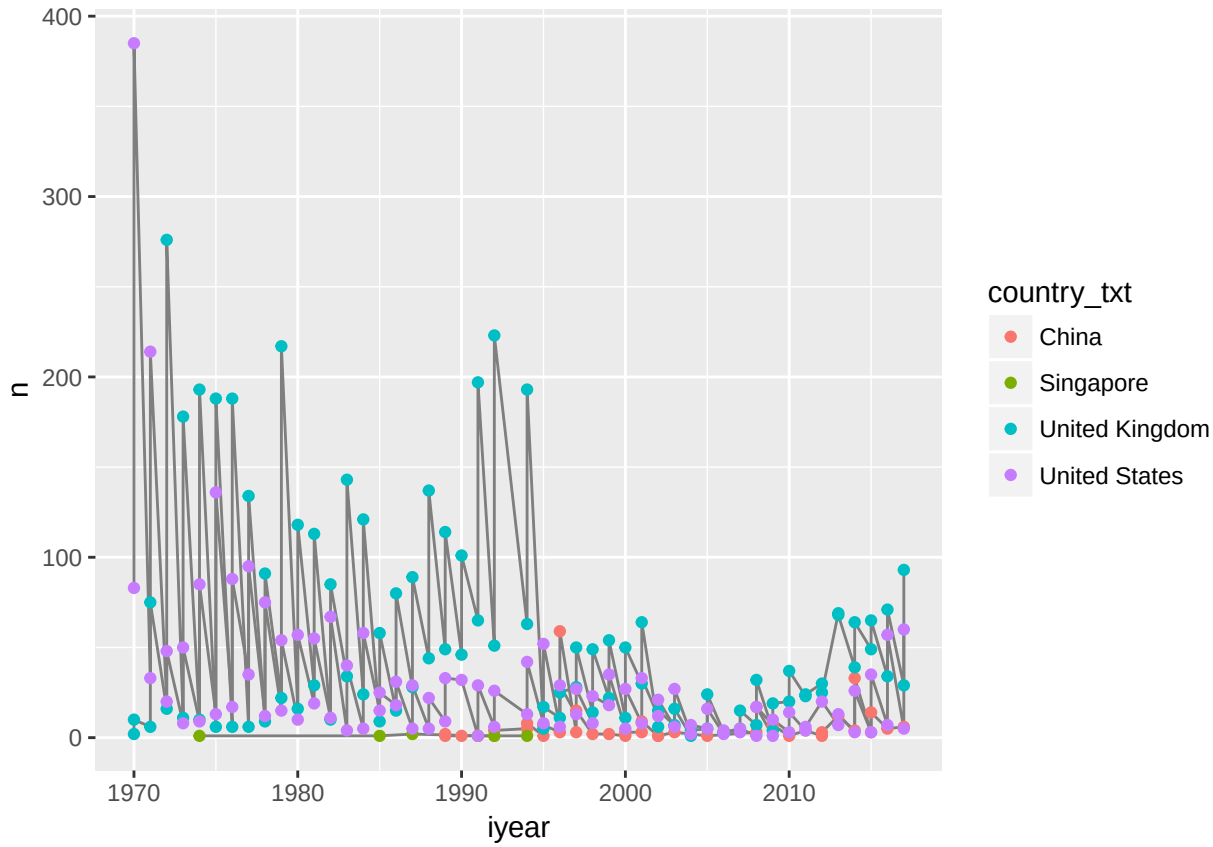
4] Success rate per region

```
attack %>%
  group_by(iyear,region_txt) %>% # allow operations to be performed by groups
  count(success) %>% # In case, count success rate conditional on the year and country
  arrange(desc(n))%>%  # arrange in descending order
  ggplot(aes(iyear, n)) +  # x axis- year, y = success rate
  geom_line(aes(group = region_txt), colour = "grey50") +
  geom_point(aes(colour = region_txt))
```



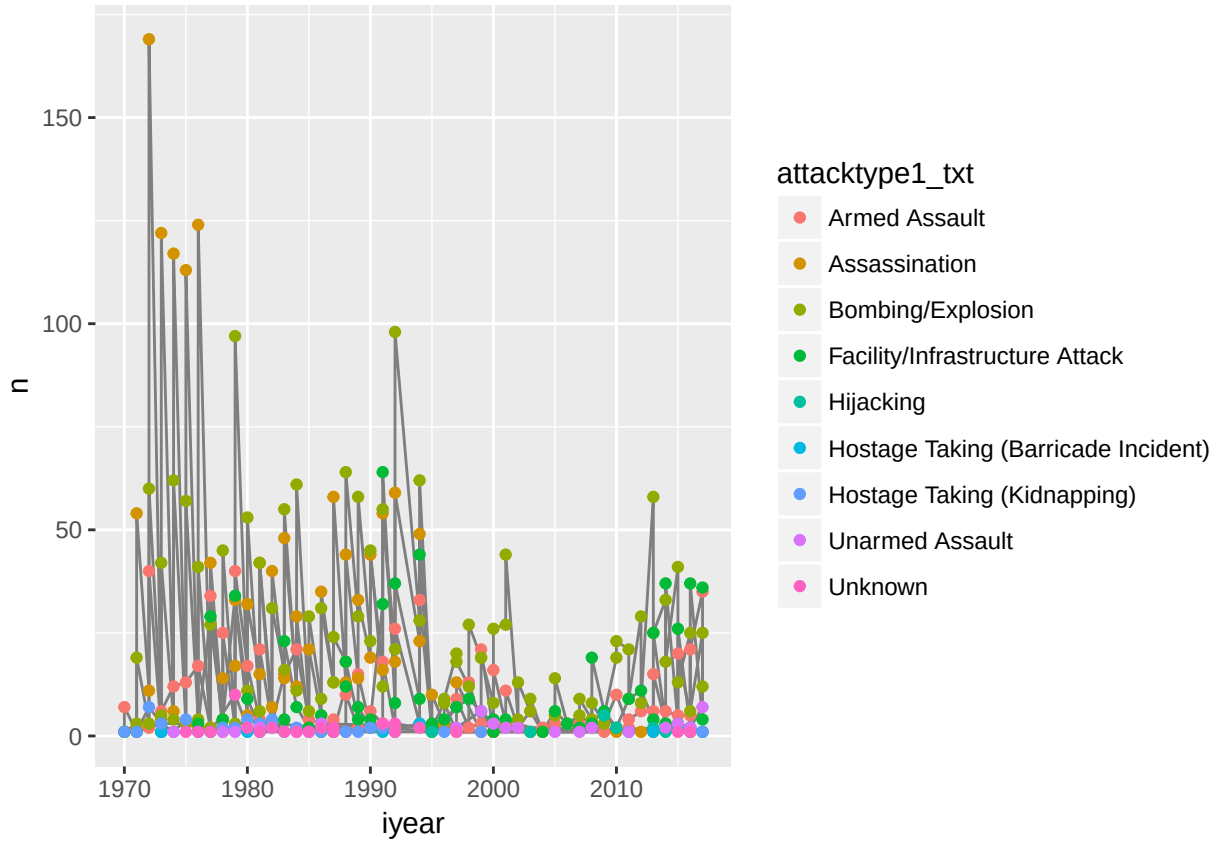
5] Analyze Success rate for selected countries

```
attack %>%
  # With multiple conditions for filter, make sure to use %in% and not ==
filter(parse_character(country_txt) %in% c("Singapore", "China","United States","United Kingdom")) %>% 
  group_by(iyear,country_txt) %>% # allow operations to be performed by groups
  count(success) %>% # In case, count success rate conditional on the year and country
  ggplot(aes(iyear, n)) +  # x axis- year, y = success rate
  geom_line(aes(group = country_txt), colour = "grey50") +
  geom_point(aes(colour = country_txt))
```



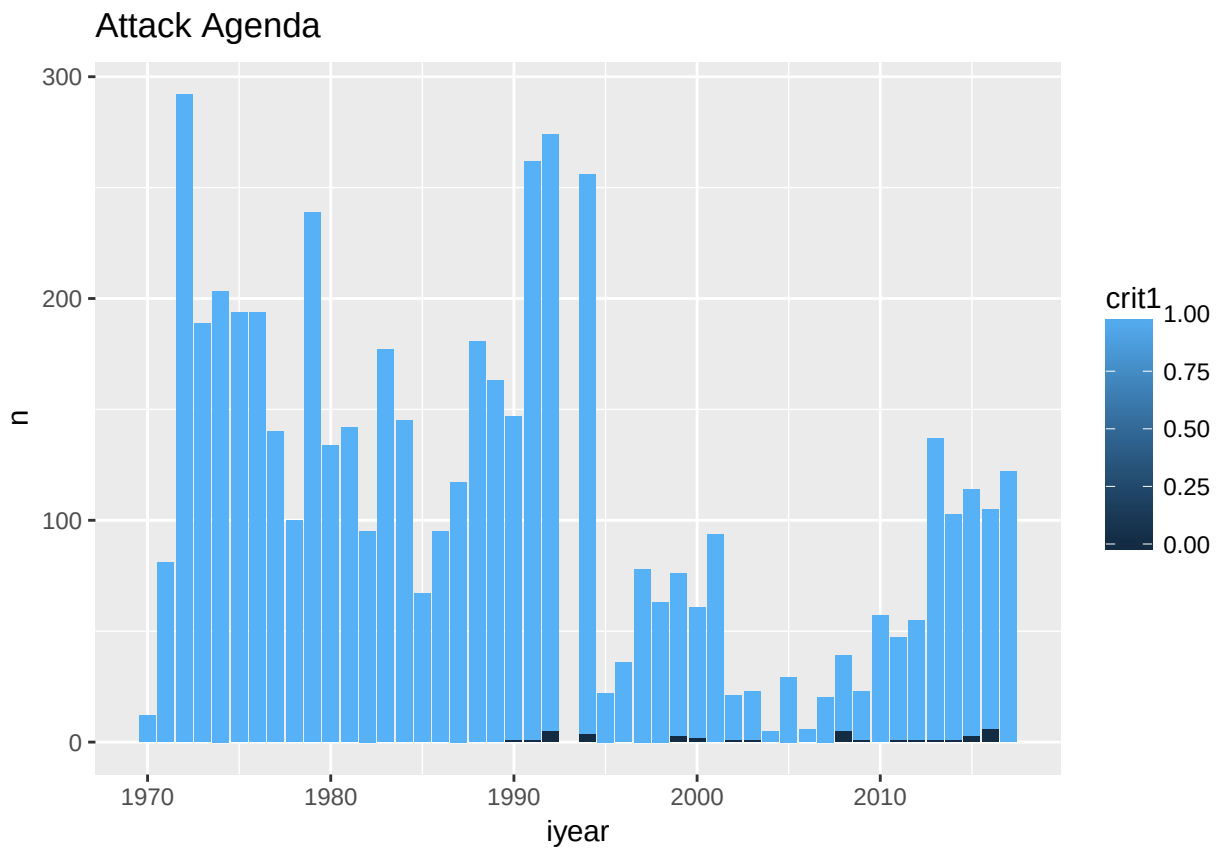
6] Attack Type

```
attack %>%
  # With multiple conditions for filter, make sure to use %in% and not ==
  filter(parse_character(country_txt) %in% c("United Kingdom")) %>% # select four countries
  group_by(iyear,attacktype1_txt) %>% # allow operations to be performed by groups
  count(success) %>% # In case, count success rate conditional on the year and attacktype1_txt
  ggplot(aes(iyear, n)) +  # x axis- year, y = success rate
  geom_line(aes(group = attacktype1_txt), colour = "grey50") +
  geom_point(aes(colour = attacktype1_txt))
```



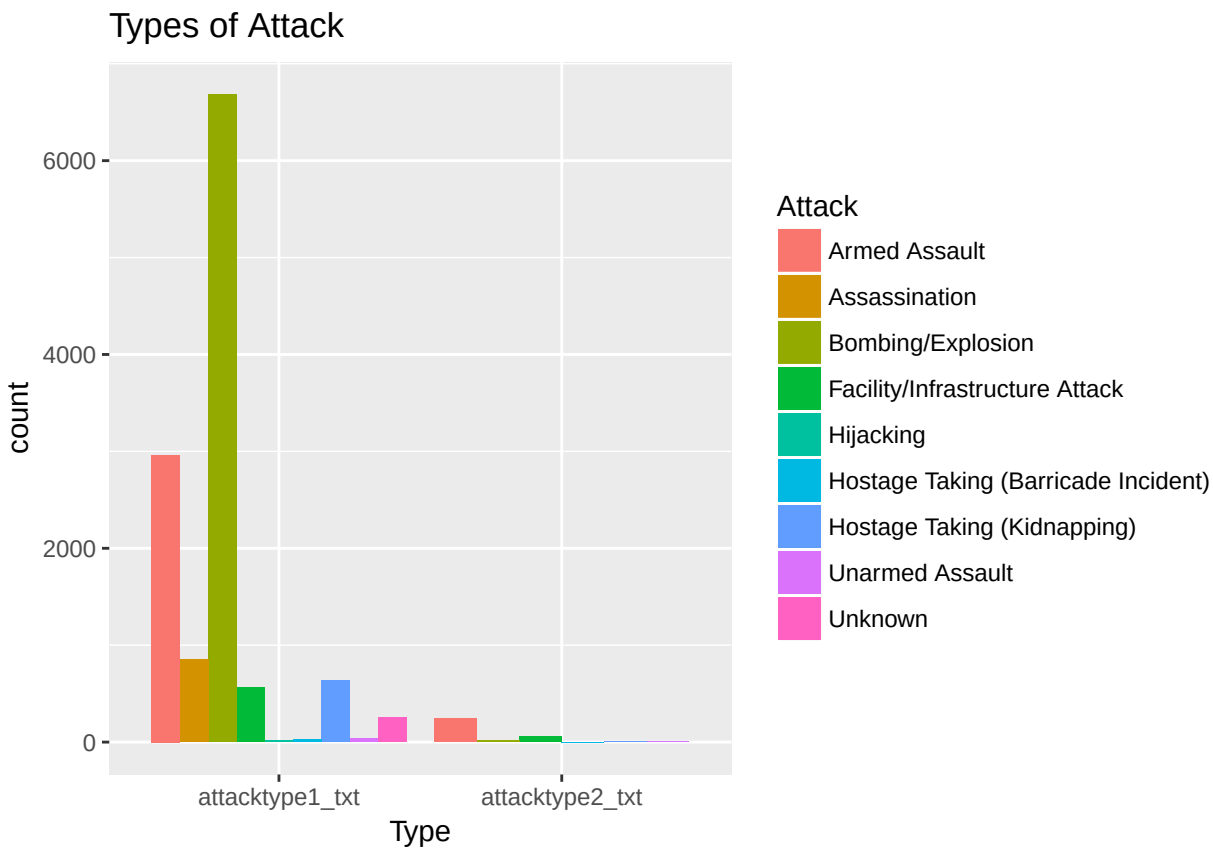
7] Attack Agenda

```
# Criterion 1: POLITICAL, ECONOMIC, RELIGIOUS, OR SOCIAL GOAL (CRIT1)
# 1 =   The incident meets Criterion 1.
# 0 = "No   The incident does not meet Criterion 1.
attack %>%
# With multiple conditions for filter, make sure to use %in% and not ==
filter(parse_character(country_txt) %in% c("United Kingdom")) %>% # select four countries
group_by(iyear,crit1) %>% # allow operations to be performed by groups
count(success) %>% # In case, count success rate conditional on the year and crit1
ggplot(aes(iyear, n, fill=crit1)) +  # x axis- year, y = success rate
geom_bar(stat="identity") +  # stacking on top of each other
  ggtitle("Attack Agenda")
```



8] Most frequent attack

```
attack %>%
  select(iyear, attacktype1_txt, attacktype2_txt) %>% # select variable
  filter(iyear == 2013) %>% # subset by rows based on condition
  gather(attacktype1_txt,attacktype2_txt, key = 'Type', value = 'Attack') %>% # transform wide to long
  filter(Attack != ".") %>% # remove all '.'
  ggplot(aes(x=Type, fill=Attack)) + geom_bar(position = "dodge") +# plot
  ggtitle("Types of Attack")
```

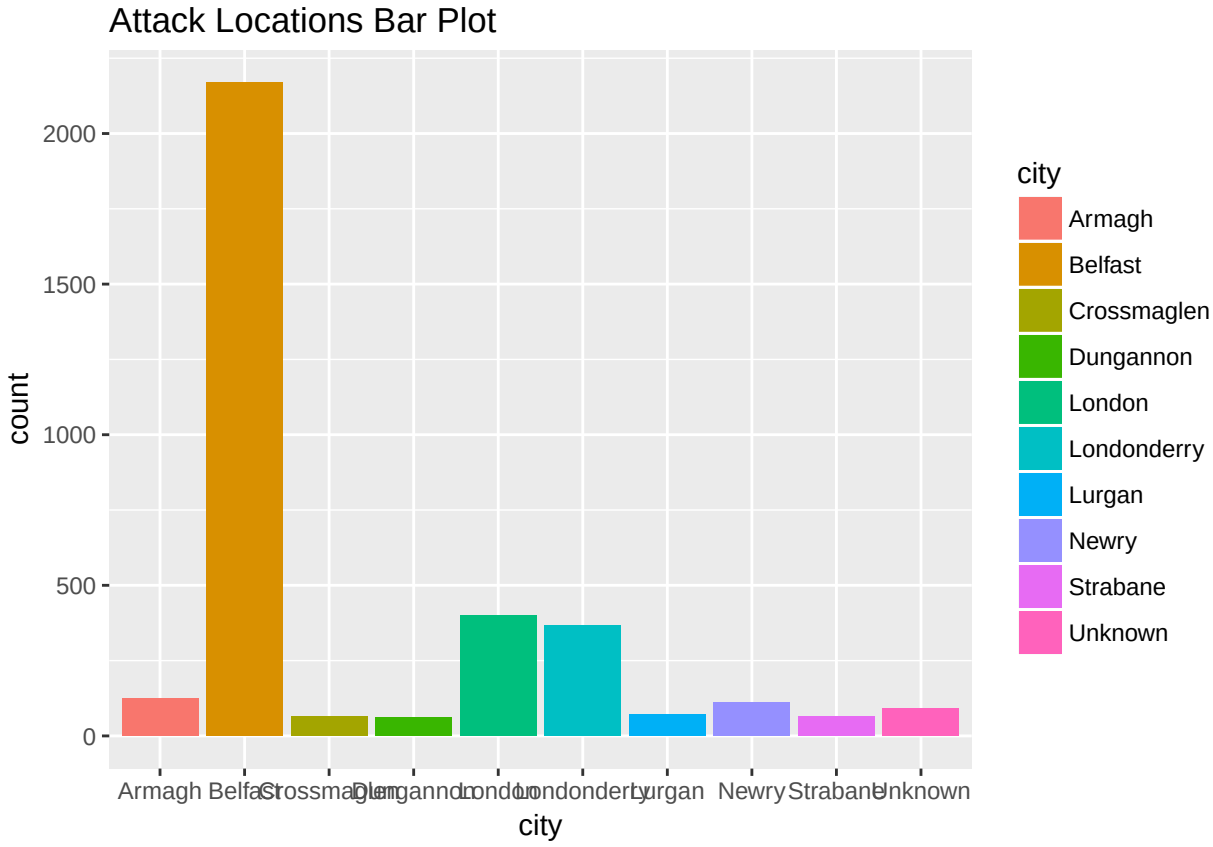


9] Attack Locations Bar Plot

```
attack %>%
    select(iyear, country_txt, city) %>% # select variable
    filter(country_txt == "United Kingdom") %>%
    group_by(city)%>% # group by city
    count() %>% # count the number of times a city appear
    arrange(desc(n)) %>% # subset by rows based on condition
    head(n=10) -> state
  state
```

```
## # A tibble: 10 x 2
## # Groups:   city [10]
##    city            n
##    <chr>       <int>
##  1 Belfast      2170
##  2 London        399
##  3 Londonderry   366
##  4 Armagh        125
##  5 Newry         112
##  6 Unknown        90
##  7 Lurgan         71
##  8 Crossmaglen    65
##  9 Strabane       65
## 10 Dungannon      62
```

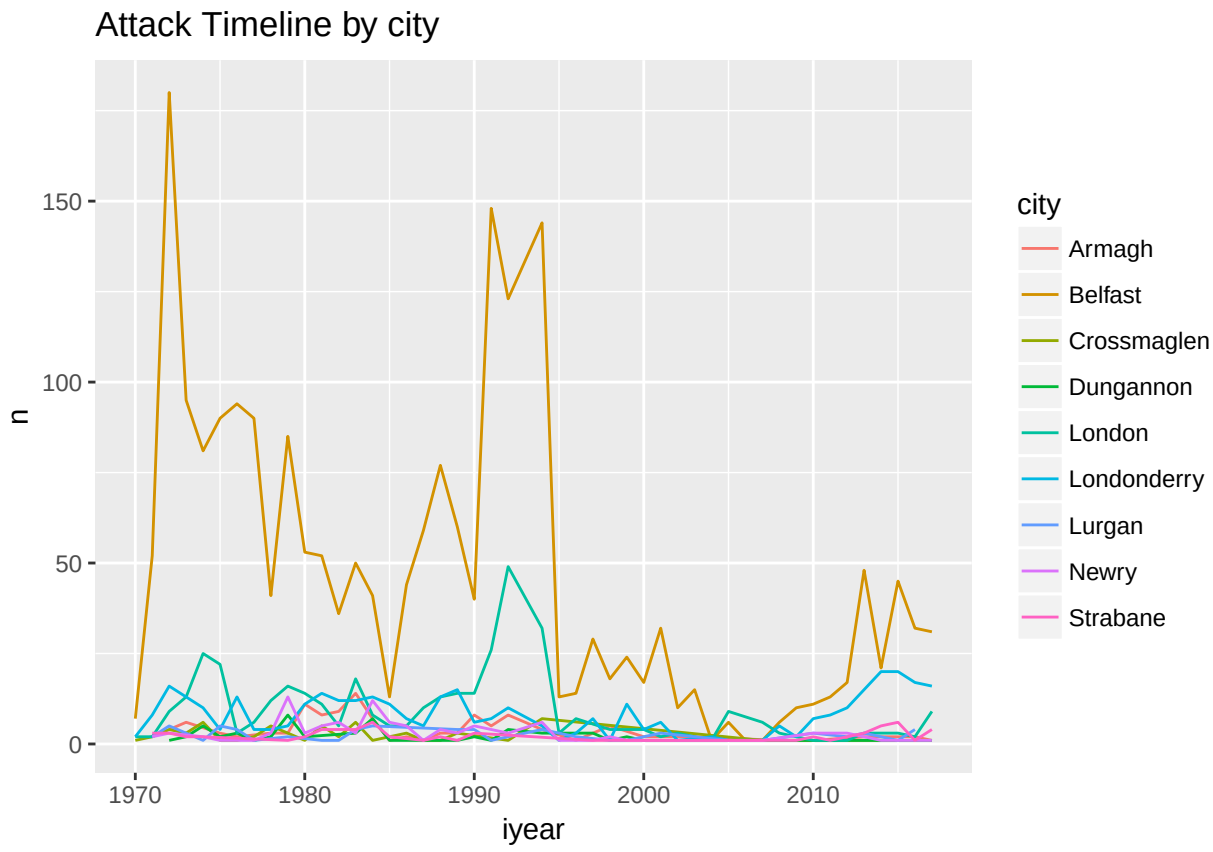
```
## plot top 10
attack %>%
  filter(country_txt == "United Kingdom") %>%
  select(iyear, city)%>%
  filter(city %in% state$city) %>%
  ggplot(aes(x=city, fill=city)) + geom_bar() +# plot
  ggtitle("Attack Locations Bar Plot")
```



10] Attack Timeline by city

```
attack%>%
      select(iyear, country_txt, city) %>% # select variable
      filter(country_txt == "United Kingdom") %>%
      group_by(city) %>% # group by city
      count() %>% # count the number of times a city appear
      arrange(desc(n))%>% # subset by rows based on condition
      head(n=10) -> state ## plot top 10

    attack %>%
      filter(country_txt == "United Kingdom") %>%
      select(iyear, city)%>%
      filter(city %in% state$city) %>% # select top 10
      filter(city !="Unknown") %>% # remove unknown
      group_by(iyear,city) %>%  #group to do calculations
```

```
    count() %>% # count
    ggplot(aes(x=iyear, y=n)) + geom_line(aes(color=city)) +# plot
    ggtitle("Attack Timeline by city")
```



11] Conclusion

Above example exhibits that following are the fundamental building blocks while working on any data analysis project

- **Data Understanding -** In depth understanding of the data
- **Technical knowhow -** Well versed with technology for data wrangling
- **Data Cleanup and Data imputation -** Skilled in advance data imputations techniques to fill missing data
- **Data Visualization -** Ability to visualize data on multiple faucets to gain additional insights
- **Data Comparison -** Compare meaningful metrics side by side to set important statistics apart
- **Critical Thinking -** Ability to come up with multiple questions and sought answers for those through data statistics