US FIRES DATASET CLEANING AND PREPARATION

1. Loading packages required for Data Pre-processing

```
# Loading Dplyr and VIM packages if
(require(dplyr,VIM)==FALSE) {
library("dplyr") library("VIM")
}
```

```
## Loading required package: dplyr

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##             filter, lag

## The following objects are masked from 'package:base':
##
##                 intersect, setdiff, setequal, union

## Loading required package: colorspace

## Loading required package: grid ## VIM is

ready to use.

## Suggestions and bug-reports can be submitted at: https://github.com/statistikat/VIM/issues

##
## Attaching package: 'VIM'

## The following object is masked from 'package:datasets':
##
##          sleep
```

2. Loading all datasets for the project

```
# Loading datasets us_fires1 =
read.csv("us_fires_7.csv") us_fires_all =
read.csv("all_fires.csv") us_cities =
read.csv("uscities.csv")
```

3. Select the required columns from the dataset

```
# Selecting required columns from dataset all_fires_us <- us_fires_all %>%
select(FIRE_YEAR,STATE,STAT_CAUSE_DESCR,FIRE_SIZE,FIRE_SIZE_m2,FIRE_SIZE_ha,
               IGNITION,Wind,NBCD_countrywide_biomass_mosaic,GROUPVEG,EcoArea_km2,
               LATITUDE,LONGITUDE) #---------------------------------------------
fires_us_sub <- us_fires1 %>%
select(county,fire_name,nwcg_reporting_unit_name,
source_reporting_unit,fire_year,discovery_date,
discovery_doy,stat_cause_code,stat_cause_descr,
fire_size,fire_size_class,fips_code,fips_name,latitude, longitude)
#---------------------------------------------cities_us_sub <- us_cities %>%
select(city,state_name,state_id,county_name,
               population,density,id,lat,lng)
```

4.Joining the shortlisted datasets

```
test <- inner_join(all_fires_us,cities_us_sub,by=c("STATE" = "state_id","LATITUDE"="lat")) dim(test)
```

```
## [1] 12664          20
```

```
sumNa(test)
```

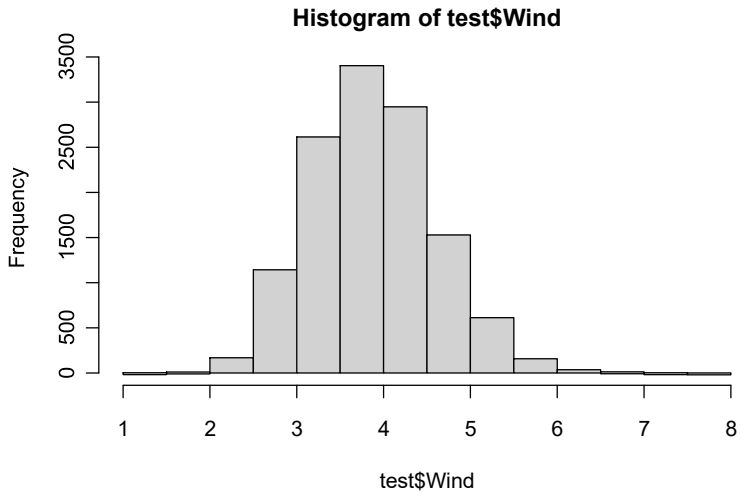
```
## [1] 19
```

```
apply(test,       2, sumNa)
```

```
##                                FIRE_YEAR                                    STATE
##                                        0                                        0
##                            STAT_CAUSE_DESCR                                FIRE_SIZE
##                                        0                                        0
##                                FIRE_SIZE_m2                             FIRE_SIZE_ha
##                                        0                                        0
##                                   IGNITION                                     Wind
##                                        0                                       19
## NBCD_countrywide_biomass_mosaic                                         GROUPVEG
##                                        0                                        0
##                                EcoArea_km2                                 LATITUDE
##                                        0                                        0
##                                  LONGITUDE                                     city
##                                        0                                        0
##                                 state_name                              county_name
##                                        0                                        0
##                                 population                                  density
##                                        0                                        0
##                                         id                                      lng
##                                        0                                        0
```

5. Histogram of wind variable

```
hist(test$Wind)
```



6. kNN clustering Imputation method

```
# Rational for this imputation technique is the shape of the distribution which,
        # suggests that the mean is a good parametric and validates kNN as an adequate imputation technique. imp
                                        VIM::kNN(test,variable = "Wind",numFun = weighted.mean,weight
                                                                                                    k = 5)

imputed_test$Wind_imp = NULL apply(imputed_test, 2,
sumNa)
```

```
##                         FIRE_YEAR                              STATE
##                                 0                                  0
##                      STAT_CAUSE_DESCR                       FIRE_SIZE
##                                 0                                  0
##                       FIRE_SIZE_m2                       FIRE_SIZE_ha
##                                 0                                  0
##                          IGNITION                               Wind
##                                 0                                  0
## NBCD_countrywide_biomass_mosaic                           GROUPVEG
##                                 0                                  0
##                       EcoArea_km2                           LATITUDE
##                                 0                                  0
##                         LONGITUDE                               city
##                                 0                                  0
##                        state_name                        county_name
##                                 0                                  0
##                        population                            density
##                                 0                                  0
##                                id                                lng
##                                 0                                  0
```

7. Renaming and re-structuring columns

```
# Standardising Column Names test34 <- imputed_test %>%
rename(State_id =STATE)
colnames(imputed_test)
```

```
## [1] "FIRE_YEAR"                                "STATE"
## [3] "STAT_CAUSE_DESCR"                         "FIRE_SIZE"
## [5] "FIRE_SIZE_m2"                             "FIRE_SIZE_ha"
## [7] "IGNITION"                                 "Wind"
## [9] "NBCD_countrywide_biomass_mosaic" "GROUPVEG"
## [11] "EcoArea_km2"                             "LATITUDE"
## [13] "LONGITUDE"                               "city"
## [15] "state_name"                              "county_name"
## [17] "population"                              "density"
## [19] "id"                                      "lng"
```

```
imputed_test_newcolname <- imputed_test %>% rename(Year = FIRE_YEAR,
   State_name = STATE, Ignition_method = STAT_CAUSE_DESCR,
              Fire_size = FIRE_SIZE, Fire_size_m2 = FIRE_SIZE_m2,
              Fire_size_hectares = FIRE_SIZE_ha, Cause = IGNITION,
    Wind_direction = Wind , Countrywide_biomass = NBCD_countrywide_biomass_mosaic,
              Vegetation_type = GROUPVEG, Eco_areakm2 = EcoArea_km2, Latitude =
              LATITUDE,
              Longitude = LONGITUDE, City = city,County = county_name,
              Population =population, Pop_density = density, Fire_ID =id, t=lng)
#-----------------------------------------------
# Removing Surplus Columns final_set
 <-
 imputed_test_newcolname[,c(1:19)]


#-----------------------------------------------
# Re-organising column sequence reorganised_final_set <-
 imputed_test_newcolname[, c(19, 14, 15, 2 ,16 , 1,
                                                                    3, 7, 4, 5, 6, 8, 17,
                                                                    18,
                                                                    9, 10, 11, 12, 13)]
#-----------------------------------------------
```

```
 # Renaming last columns reorganised_final_set <- reorganised_final_set %>%
 rename(State_id=State_name, State_name = state_name)
 colnames(reorganised_final_set)
```

```
## [1] "Fire_ID"                "City"                          "State_name"
## [4] "State_id"               "County"                        "Year"
## [7] "Ignition_method"        "Cause"                          "Fire_size"
## [10] "Fire_size_m2"          "Fire_size_hectares" "Wind_direction"
 ## [13] "Population"            "Pop_density"              "Countrywide_biomass"
 ## [16] "Vegetation_type"       "Eco_areakm2"              "Latitude"
 ## [19] "Longitude"
```

```
  head(reorganised_final_set)
```

```
##          Fire_ID                City State_name State_id          County Year
## 1 1840023113               Toyah          Texas       TX          Reeves 2005
## 2 1840013053 McCord Bend              Missouri       MO          Stone 2006
## 3 1840013053 McCord Bend              Missouri       MO          Stone 2006
## 4 1840022159 Livingston               Texas          TX          Polk 2006
## 5 1840028097               Muscoy California         CA San Bernardino 1997
## 6 1840026983               Swink      Oklahoma       OK          Choctaw 1993
##              Ignition_method Cause Fire_size Fire_size_m2 Fire_size_hectares
## 1 Debris Burning Human                55.0     222577.300          22.2577300
## 2                Arson Human           1.0       4046.860           0.4046860
## 3                Arson Human           1.5       6070.290           0.6070290
## 4                Arson Human          10.0      40468.600           4.0468600
## 5      Equipment Use Human             0.1        404.686           0.0404686
## 6 Debris Burning Human                3.0      12140.580           1.2140580
##              Wind_direction Population Pop_density Countrywide_biomass Vegetation_type
## 1              3.978921        108          25           788.7599 Hardwood-Conifer
## 2              4.443915        299         393           507.9600          Hardwood
## 3              4.443915        299         393           507.9600          Hardwood
## 4              4.322040       5242         231          1007.0100           Riparian
## 5              2.807137      12562        1606            42.8400          Shrubland
## 6              4.112240         50          79           148.1400 Hardwood-Conifer
##      Eco_areakm2 Latitude Longitude

## 1          151719.54 31.3125 -94.27083

## 2          106370.52 36.7875 -92.08500

## 3          106370.52 36.7875 -92.08611

## 4          151719.54 30.7100 -95.41083

## 5           20067.56 34.1550 -117.93833

## 6          151719.54 34.0168 -94.70020
```

Creating the final csv file for data visualisation

```
# Create final dataset write.csv(reorganised_final_set,"final_us_fires.csv")
```