ESM 262 Assignment 2

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May 11, 2017

PART 1

1. Reading in the data as-is

```
gaz_raw <- read.delim("C:/boxsync/rthakar/Courses/Spring2017/ESM262/EnvInformatics/Assignment2/CA_Featu
```

2. Selecting required columns and converting data frame to tibble

```
gaz <- gaz_raw %>% select (ï..FEATURE_ID,FEATURE_NAME,
                           FEATURE_CLASS,STATE_ALPHA, COUNTY_NAME,
                           PRIM_LAT_DEC, PRIM_LONG_DEC, SOURCE_LAT_DEC,
                           SOURCE_LONG_DEC, ELEV_IN_M, MAP_NAME,
                           DATE_CREATED, DATE_EDITED)

colnames(gaz) <- c("featureID","feature_name","feature_class", "state_alpha",
                   "county_name", "primary_latitude", "primary_longitude",
                   "source_latitude", "source_longitude", "elevation",
                   "map_name", "date_created", "date_edited")

gaz <- as.tibble(gaz)
```

3. Change class to appropriate types

Using https://geonames.usgs.gov/domestic/states_fileformat.htm as reference, data types of descriptors were changed.

```
gaz$primary_latitude <- as.numeric(gaz$primary_latitude)
gaz$primary_longitude <- as.numeric(gaz$primary_longitude)
gaz$source_latitude <- as.numeric(gaz$source_latitude)
gaz$source_longitude <- as.numeric(gaz$source_longitude)
gaz$elevation <- as.numeric(gaz$elevation)
gaz$date_created <- mdy (gaz$date_created)
gaz$date_edited <- mdy (gaz$date_edited)
```

4. Removing unknown data

According to https://geonames.usgs.gov/domestic/states_fileformat.htm, records showing "Unknown" and zeros for the latitude and longitude DMS and decimal fields, respectively, indicate that the coordinates of the feature are unknown. They are recorded in the database as zeros to satisfy the format requirements of a numerical data type. They are not errors and do not reference the actual geographic coordinates at 0 latitude, 0 longitude.

```
gaz <- gaz %>% filter (primary_longitude != 0 | primary_latitude != 0)
```

In addition, drop NA values

```
gaz <- gaz %>%
  drop_na(primary_latitude) %>%
  drop_na(primary_longitude)
```

5. Selecting only features belonging to California

Removed all features that do not belong to the state of California, USA

```
California <- gaz %>% filter(state_alpha == "CA")
```

6. Saving file to disk

Writing final file to the disk as final_file_part1.csv using "|" as separator

```
write.table(California, file="California_Data.csv", sep = "|")
```

PART 2

1. Most-frequently-occuring feature name in California

```
Frequent_Name <- California %>% count (feature_name)%>% filter (n == max(n))

Fr_Name <- Frequent_Name$feature_name[1]
Fr_Count <- Frequent_Name$n[1]
```

Church of Christ is the most frequently occuring feature name in California. It occurs 228 times.

2. least-frequently-occuring feature class in California

```
Rare_class <- California %>% count (feature_class)%>% filter (n == min(n))
```

Isthmus and Sea occur the least frequently in California. They occur 1 time and 1 time, respectively.

3. approximate center point of each county

Removing empty county names

```
California <- California %>% filter (county_name != "")

County_Group <- group_by(California, county_name)
County_Mean <- summarize (County_Group, mean (primary_longitude), mean (primary_latitude))

head (County_Mean)
```

```
## # A tibble: 6 × 3
##   county_name `mean(primary_longitude)` `mean(primary_latitude)`
##         <chr>                     <dbl>                    <dbl>
## 1     Alameda                  -122.1109                 37.72641
## 2      Alpine                  -119.8411                 38.60157
## 3      Amador                  -120.6859                 38.43400
## 4       Butte                  -121.5643                 39.66573
## 5   Calaveras                  -120.5478                 38.17118
## 6      Colusa                  -122.3094                 39.19792
```

4. Fractions of the total number of features in each county that are natural vs. man-made

63 feature classes are categorized between natural and man-made according to the classification described in https://geonames.usgs.gov/apex/f?p=gnispq:8:0:::::

```
manmade <- c("Airport", "Bridge", "Building",
             "Canal", "Cemetery", "Census", "Church",
             "Civil", "Crossing", "Dam",
             "Harbor", "Hospital", "Levee", "Locale",
             "Military", "Pillar", "Populated Place", "Post Pffice",
             "Reservoir", "School", "Tower", "Tunnel", "Well")

California$feature <- ifelse(California$feature_class %in% manmade, "Manmade", "Natural")

Display_Data <- data.frame(California$feature_class, California$feature)
head (Display_Data)
```

```
##   California.feature_class California.feature
## 1                     Park            Natural
## 2                   School            Manmade
## 3                   Valley            Natural
## 4                   Valley            Natural
## 5                   Spring            Natural
## 6                   Tunnel            Manmade
```

Calculate fractions of natural vs man-made feature classes

```
feature_count <- California %>% count (feature)

Manmade_Fraction <- feature_count$n[1]/sum(feature_count$n)
Natural_Fraction <- feature_count$n[2]/sum(feature_count$n)
```

Man-made feature classes are 0.5691267 in proportion to all feature classes in California. Natural feature classes 0.4308733 in proportion to all feature classes in California.