615 Assignment Strawberries 1

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#Preparing data for analysis —— Strawberries

##read and explore the data

```
library(knitr)
library(kableExtra)
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.3     v readr     2.1.4
## v forcats   1.0.0     v stringr   1.5.0
## v ggplot2   3.4.4     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.0
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter()     masks stats::filter()
## x dplyr::group_rows() masks kableExtra::group_rows()
## x dplyr::lag()        masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(dplyr)
library(readr)
library(tidyr)
library(stringr)
library(ggplot2)
```

Read the data and take a first look

```
strawberry <- read_csv("strawberries25_v3.csv", col_names = TRUE)
```

```
## Rows: 12669 Columns: 21
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (15): Program, Period, Geo Level, State, State ANSI, Ag District, County...
## dbl  (2): Year, Ag District Code
## lgl  (4): Week Ending, Zip Code, Region, Watershed
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
head(strawberry)
```

```
## # A tibble: 6 x 21
##   Program  Year Period `Week Ending` `Geo Level` State   `State ANSI`
##   <chr>   <dbl> <chr>  <lgl>         <chr>       <chr>   <chr>
## 1 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 2 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 3 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 4 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 5 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 6 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## # i 14 more variables: `Ag District` <chr>, `Ag District Code` <dbl>,
## #   County <chr>, `County ANSI` <chr>, `Zip Code` <lgl>, Region <lgl>,
## #   watershed_code <chr>, Watershed <lgl>, Commodity <chr>, `Data Item` <chr>,
## #   Domain <chr>, `Domain Category` <chr>, Value <chr>, `CV (%)` <chr>
```

```
#remove the (D) term in Value and CV% columns
strawberry <- strawberry %>%
  mutate(
    Value = ifelse(Value == "(D)", NA, Value),
    `CV (%)` = ifelse(`CV (%)` == "(D)", NA, `CV (%)`)
  )
head(strawberry)
```

```
## # A tibble: 6 x 21
##   Program  Year Period `Week Ending` `Geo Level` State   `State ANSI`
##   <chr>   <dbl> <chr>  <lgl>         <chr>       <chr>   <chr>
## 1 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 2 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 3 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 4 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 5 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 6 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## # i 14 more variables: `Ag District` <chr>, `Ag District Code` <dbl>,
## #   County <chr>, `County ANSI` <chr>, `Zip Code` <lgl>, Region <lgl>,
## #   watershed_code <chr>, Watershed <lgl>, Commodity <chr>, `Data Item` <chr>,
## #   Domain <chr>, `Domain Category` <chr>, Value <chr>, `CV (%)` <chr>
```

```
# do data cleaning for the Domain column, rearrange the info in this column into three columns: chemica
strawberry <- strawberry %>%
  mutate(Category = case_when(
    Domain == "Total" ~ NA_character_,
    str_detect(Domain, "CHEMICAL") ~ str_trim(str_remove(Domain, "CHEMICAL, ")),
    TRUE ~ Domain
  ))
unique(strawberry$Category)
```

```
## [1] "TOTAL"           "AREA GROWN"     "ORGANIC STATUS" "FUNGICIDE"
## [5] "INSECTICIDE"    "OTHER"          "HERBICIDE"      "FERTILIZER"
```

```
head(strawberry)
```

```
## # A tibble: 6 x 22
##   Program  Year Period `Week Ending` `Geo Level` State   `State ANSI`
##   <chr>   <dbl> <chr>  <lgl>         <chr>       <chr>   <chr>
## 1 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 2 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 3 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 4 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 5 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 6 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## # i 15 more variables: `Ag District` <chr>, `Ag District Code` <dbl>,
## #   County <chr>, `County ANSI` <chr>, `Zip Code` <lgl>, Region <lgl>,
## #   watershed_code <chr>, Watershed <lgl>, Commodity <chr>, `Data Item` <chr>,
## #   Domain <chr>, `Domain Category` <chr>, Value <chr>, `CV (%)` <chr>,
## #   Category <chr>
```

```
strawberry <- strawberry %>%
  mutate(
    Name = case_when(
      Category == "TOTAL" ~ NA_character_,
      str_detect(`Domain Category`, fixed(Category)) & str_detect(`Domain Category`, "\\(.*=.*\\)") ~
        str_extract(`Domain Category`, "(?<=\\().*?(?=\\s?=)"),
      str_detect(`Domain Category`, fixed(Category)) & str_detect(`Domain Category`, "\\(.*\\)") ~
        str_extract(`Domain Category`, "(?<=\\().*?(?=\\))"),
      TRUE ~ NA_character_
    ),
    Number = case_when(
      Category == "TOTAL" ~ NA_real_,
      str_detect(`Domain Category`, fixed(Category)) & str_detect(`Domain Category`, "\\(.*=.*\\)") ~
        as.numeric(str_extract(`Domain Category`, "(?<=\\=\\s?).*?(?=\\))")),
      str_detect(`Domain Category`, fixed(Category)) & str_detect(`Domain Category`, "\\(.*\\)") ~
        NA_real_,
      TRUE ~ NA_real_
    )
  )

strawberry <- strawberry %>%
  mutate(Category = case_when(
    `Domain Category` == "NOT SPECIFIED" ~ NA_character_,
    TRUE ~ Category
  ))

head(strawberry)
```

```
## # A tibble: 6 x 24
##   Program  Year Period `Week Ending` `Geo Level` State   `State ANSI`
##   <chr>   <dbl> <chr>  <lgl>         <chr>       <chr>   <chr>
## 1 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 2 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 3 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 4 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 5 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 6 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## # i 17 more variables: `Ag District` <chr>, `Ag District Code` <dbl>,
## #   County <chr>, `County ANSI` <chr>, `Zip Code` <lgl>, Region <lgl>,
## #   watershed_code <chr>, Watershed <lgl>, Commodity <chr>, `Data Item` <chr>,
## #   Domain <chr>, `Domain Category` <chr>, Value <chr>, `CV (%)` <chr>,
## #   Category <chr>, Name <chr>, Number <dbl>
```

```
#data cleaning for AREA GROWN, the numerical intervals of the planted area are reintegrated inside the
strawberry <- strawberry %>%
  mutate(
    Min = case_when(
      str_detect(Name, "100 OR MORE ACRES") ~ 100,
      str_detect(Name, "TO") ~ as.numeric(str_extract(Name, "^[0-9.]+")),
      TRUE ~ NA_real_
```

```r
    ),
    Max = case_when(
      str_detect(Name, "100 OR MORE ACRES") ~ "MORE",
      str_detect(Name, "TO") ~ str_extract(Name, "(?<=TO )^[0-9.]+"),
      TRUE ~ NA_character_
    )
)

# View the resulting data
head(strawberry)
```

```
## # A tibble: 6 x 26
##   Program  Year Period `Week Ending` `Geo Level` State   `State ANSI`
##   <chr>   <dbl> <chr>  <lgl>         <chr>       <chr>   <chr>
## 1 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 2 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 3 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 4 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 5 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 6 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## # i 19 more variables: `Ag District` <chr>, `Ag District Code` <dbl>,
## #   County <chr>, `County ANSI` <chr>, `Zip Code` <lgl>, Region <lgl>,
## #   watershed_code <chr>, Watershed <lgl>, Commodity <chr>, `Data Item` <chr>,
## #   Domain <chr>, `Domain Category` <chr>, Value <chr>, `CV (%)` <chr>,
## #   Category <chr>, Name <chr>, Number <dbl>, Min <dbl>, Max <chr>
```

```r
# Create a new column 'Unit' by extracting the substring after 'MEASURED'
strawberry <- strawberry %>%
  mutate(Unit = str_extract(strawberry$`Data Item`, "(?<=MEASURED ).*"))

# Create a new column 'Type' by extracting either 'BEARING' or 'ORGANIC'
strawberry <- strawberry %>%
  mutate(Type = str_extract(strawberry$`Data Item`, "BEARING|ORGANIC"))

# Create a new column 'Operation' by extracting the remaining parts of the string
# Removing the 'MEASURED' part, the Unit and the Type, keeping the rest
strawberry <- strawberry %>%
  mutate(Operation = str_replace_all(strawberry$`Data Item`, "MEASURED.*|BEARING|ORGANIC", "") %>%
         str_trim())

# Create a new column 'Operation' by extracting the remaining parts of the string,
# Removing the 'MEASURED', 'BEARING', 'ORGANIC', and 'STRAWBERRIES' parts
strawberry <- strawberry %>%
  mutate(Operation = str_replace_all(strawberry$`Data Item`, "MEASURED.*|BEARING|ORGANIC|STRAWBERRIES(,
         str_replace_all("[-,]", "") %>%
         str_trim())

# View the resulting dataset
head(strawberry)
```

```
## # A tibble: 6 x 29
##   Program  Year Period `Week Ending` `Geo Level` State   `State ANSI`
##   <chr>   <dbl> <chr>  <lgl>         <chr>       <chr>   <chr>
## 1 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 2 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 3 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 4 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 5 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## 6 CENSUS   2022 YEAR   NA            COUNTY      ALABAMA 01
## # i 22 more variables: `Ag District` <chr>, `Ag District Code` <dbl>,
## #   County <chr>, `County ANSI` <chr>, `Zip Code` <lgl>, Region <lgl>,
## #   watershed_code <chr>, Watershed <lgl>, Commodity <chr>, `Data Item` <chr>,
## #   Domain <chr>, `Domain Category` <chr>, Value <chr>, `CV (%)` <chr>,
## #   Category <chr>, Name <chr>, Number <dbl>, Min <dbl>, Max <chr>, Unit <chr>,
## #   Type <chr>, Operation <chr>
```

```r
view(strawberry)
```

```r
# Export the cleaned dataset as a CSV file
write.csv(strawberry, "cleaned_strawberries.csv", row.names = FALSE)
```

```r
#EDA
# Check data types
str(strawberry)
```

```
## tibble [12,669 x 29] (S3: tbl_df/tbl/data.frame)
##  $ Program         : chr [1:12669] "CENSUS" "CENSUS" "CENSUS" "CENSUS" ...
##  $ Year            : num [1:12669] 2022 2022 2022 2022 2022 ...
##  $ Period          : chr [1:12669] "YEAR" "YEAR" "YEAR" "YEAR" ...
##  $ Week Ending     : logi [1:12669] NA NA NA NA NA NA ...
##  $ Geo Level       : chr [1:12669] "COUNTY" "COUNTY" "COUNTY" "COUNTY" ...
##  $ State           : chr [1:12669] "ALABAMA" "ALABAMA" "ALABAMA" "ALABAMA" ...
##  $ State ANSI      : chr [1:12669] "01" "01" "01" "01" ...
##  $ Ag District     : chr [1:12669] "BLACK BELT" "BLACK BELT" "BLACK BELT" "BLACK BELT" ...
##  $ Ag District Code: num [1:12669] 40 40 40 40 40 40 40 40 40 40 ...
##  $ County          : chr [1:12669] "BULLOCK" "BULLOCK" "BULLOCK" "BULLOCK" ...
##  $ County ANSI     : chr [1:12669] "011" "011" "011" "011" ...
##  $ Zip Code        : logi [1:12669] NA NA NA NA NA NA ...
##  $ Region          : logi [1:12669] NA NA NA NA NA NA ...
##  $ watershed_code  : chr [1:12669] "00000000" "00000000" "00000000" "00000000" ...
##  $ Watershed       : logi [1:12669] NA NA NA NA NA NA ...
##  $ Commodity       : chr [1:12669] "STRAWBERRIES" "STRAWBERRIES" "STRAWBERRIES" "STRAWBERRIES" ...
##  $ Data Item       : chr [1:12669] "STRAWBERRIES - ACRES BEARING" "STRAWBERRIES - ACRES GROWN" "STRAW
##  $ Domain          : chr [1:12669] "TOTAL" "TOTAL" "TOTAL" "TOTAL" ...
##  $ Domain Category : chr [1:12669] "NOT SPECIFIED" "NOT SPECIFIED" "NOT SPECIFIED" "NOT SPECIFIED" .
##  $ Value           : chr [1:12669] NA "3" NA "1" ...
##  $ CV (%)          : chr [1:12669] NA "15.7" NA "(L)" ...
##  $ Category        : chr [1:12669] NA NA NA NA ...
##  $ Name            : chr [1:12669] NA NA NA NA ...
##  $ Number          : num [1:12669] NA NA NA NA NA NA NA NA NA NA ...
##  $ Min             : num [1:12669] NA NA NA NA NA NA NA NA NA NA ...
##  $ Max             : chr [1:12669] NA NA NA NA ...
##  $ Unit            : chr [1:12669] NA NA NA NA ...
##  $ Type            : chr [1:12669] "BEARING" NA "BEARING" "BEARING" ...
##  $ Operation       : chr [1:12669] "ACRES" "ACRES GROWN" "ACRES NON" "OPERATIONS WITH AREA" ...
```

```r
# Convert 'Value' to numeric, removing non-numeric characters
strawberry$Value <- as.numeric(gsub("[^0-9.]", "", strawberry$Value))

# Convert 'CV (%)' to numeric, removing non-numeric characters (including %, parentheses)
```

```
strawberry$`CV (%)` <- as.numeric(gsub("[^0-9.]", "", strawberry$`CV (%)`))

# Check if conversion was successful
str(strawberry$Value)
```

```
##  num [1:12669] NA 3 NA 1 6 5 NA NA 2 2 ...
```

```
str(strawberry$`CV (%)`)
```

```
##  num [1:12669] NA 15.7 NA NA 52.7 47.6 NA NA 55.7 52.7 ...
```

```
# Check for any NAs introduced after conversion
sum(is.na(strawberry$Value))
```

```
## [1] 4744
```

```
sum(is.na(strawberry$`CV (%)`))
```

```
## [1] 7934
```

```
# Summary statistics for 'Value' and 'CV (%)'
summary(strawberry$Value)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.      NA's
## 0.000e+00 2.000e+00 4.000e+00 1.123e+07 2.100e+01 3.584e+09      4744
```

```
summary(strawberry$`CV (%)`)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.60   29.50   41.60   43.43   56.10   99.90    7934
```

```
# Check for missing values in 'Value' and 'CV (%)'
sum(is.na(strawberry$Value))
```

```
## [1] 4744
```

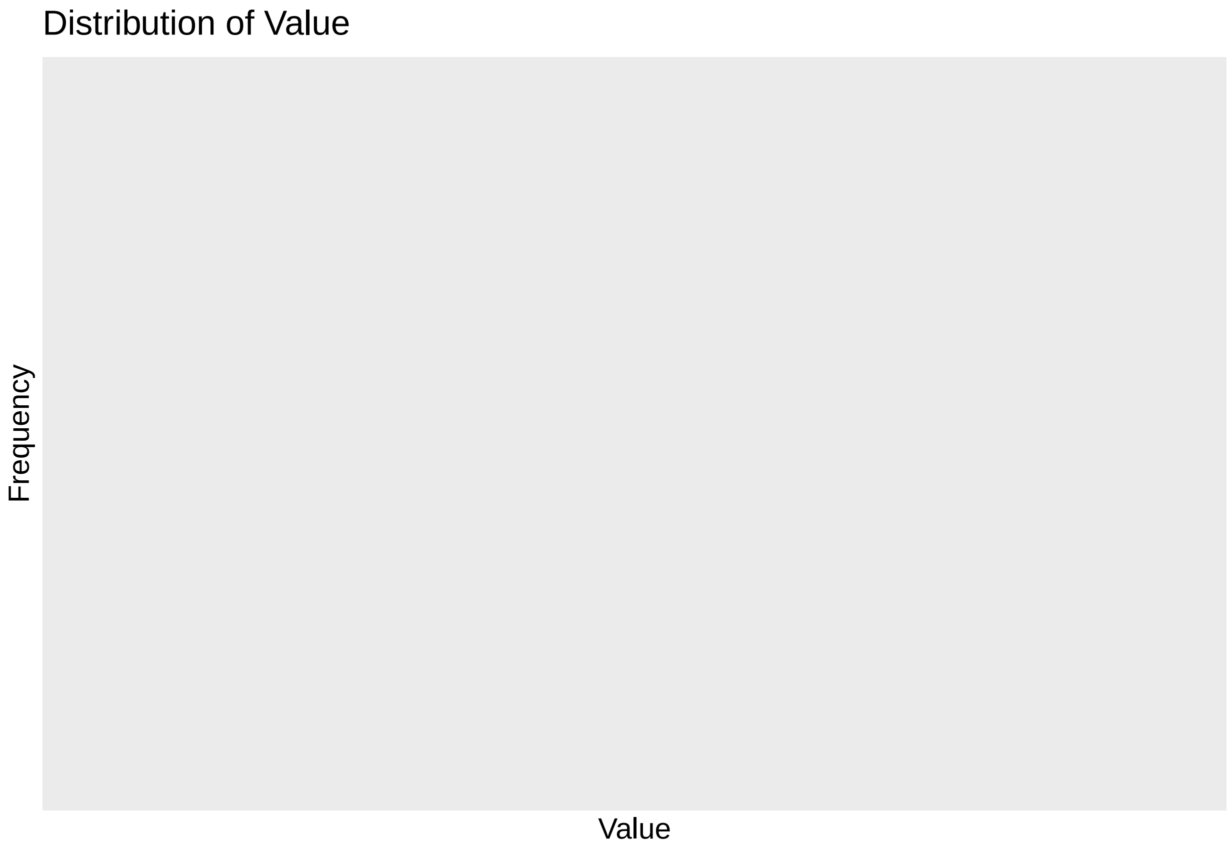
```
sum(is.na(strawberry$`CV (%)`))
```

```
## [1] 7934
```

```
# Histogram for 'Value'
ggplot(strawberry, aes(x = Value)) +
  geom_histogram(binwidth = 10, col = "skyblue", fill = "skyblue") +
  labs(title = "Distribution of Value", x = "Value", y = "Frequency")
```

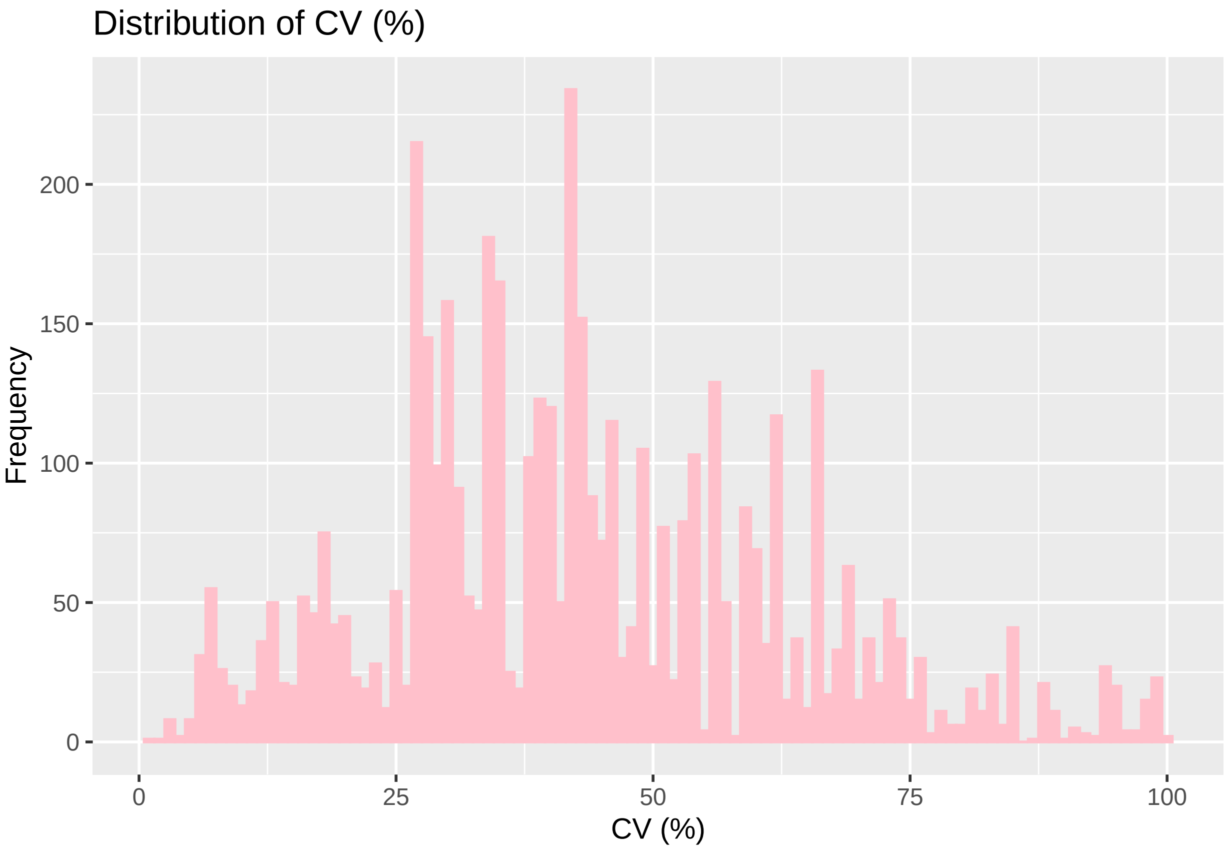
```
## Warning: Removed 4744 rows containing non-finite values (`stat_bin()`).
```

```
## Warning: Computation failed in `stat_bin()`
## Caused by error in `bin_breaks_width()`:
## ! The number of histogram bins must be less than 1,000,000.
## i Did you make `binwidth` too small?
```



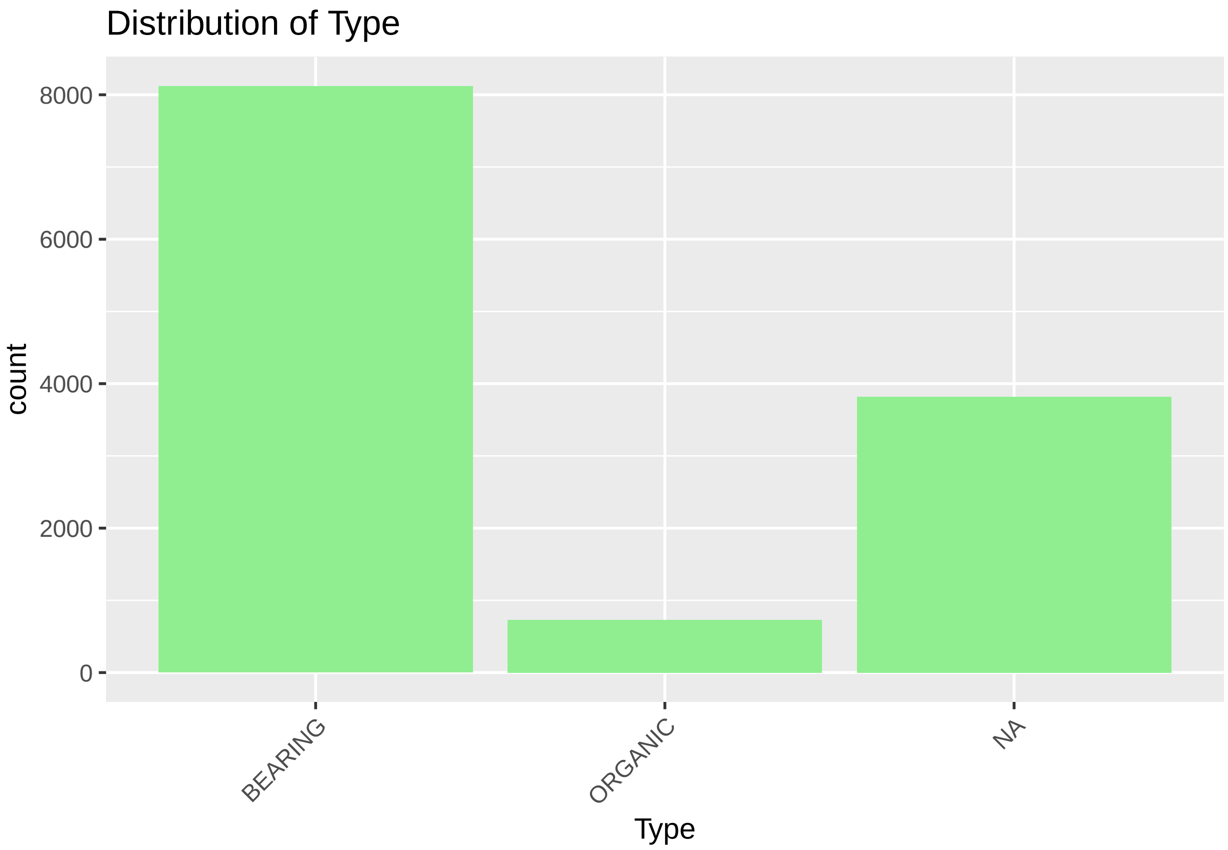
```
# Histogram for 'CV (%)'
ggplot(strawberry, aes(x = `CV (%)`)) +
  geom_histogram(binwidth = 1, col = "pink", fill = "pink") +
  labs(title = "Distribution of CV (%)", x = "CV (%)", y = "Frequency")
```

```
## Warning: Removed 7934 rows containing non-finite values (`stat_bin()`).
```



The Value column shows a strong right skew with most data concentrated at lower values and only a few larger ones. The CV (%) column displays a more spread distribution. The frequent occurrence of CV values between 20% and 30% may indicate that this range represents the typical variation in the dataset. However, the existence of high CV values suggests that certain categories or items show much higher variability.

```r
# Bar plot for 'Type' column
ggplot(strawberry, aes(x=Type)) +
  geom_bar(fill="lightgreen") +
  theme(axis.text.x = element_text(angle=45, hjust=1)) +
  labs(title="Distribution of Type")
```



The BEARING type is the most common category in the Type column, while ORGANIC data points are minimal. The significant proportion of NA values suggests that a substantial amount of Type information is missing, which could have implications for further analyses or interpretations related to strawberry types.