**#WHAT IS STATISTIC**

-Measure of Center : to see the best option between mean and median, look at the skew of the graph. If left or right skew then choose median. If normal distribution used mean.

-Mean and Median :

# Filter for Belgium

belgium\_consumption <- food\_consumption %>%

  filter(country == "Belgium")

# Filter for USA

usa\_consumption <- food\_consumption %>%

  filter(country == "USA")

# Calculate mean and median consumption in Belgium

mean(belgium\_consumption$consumption)

median(belgium\_consumption$consumption)

# Calculate mean and median consumption in USA

mean(usa\_consumption$consumption)

median(usa\_consumption$consumption)

food\_consumption %>%

  # Filter for Belgium and USA

  filter(country %in% c("Belgium", "USA")) %>%

  # Group by country

  group\_by(country) %>%

  # Get mean\_consumption and median\_consumption

  summarise(mean\_consumption = mean(consumption),

      median\_consumption = median(consumption))

-mean vs median

food\_consumption %>%

  # Filter for rice food category

  filter(food\_category == "rice") %>%

  # Create histogram of co2\_emission

  ggplot(aes(co2\_emission)) +geom\_histogram()

food\_consumption %>%

  # Filter for rice food category

  filter(food\_category == "rice") %>%

  # Create histogram of co2\_emission

  ggplot(aes(co2\_emission)) +

    geom\_histogram()

food\_consumption %>%

  # Filter for rice food category

  filter(food\_category == "rice") %>%

  # Get mean\_co2 and median\_co2

  summarize(mean\_co2 = mean(co2\_emission),

            median\_co2 = median(co2\_emission))

-Measure of Spread

-Variances : Average distance from each data point to the data’s mean

**-how to calculate variance :**

**\*dists <- msleep$sleep\_total – mean(msleep$sleep\_total) [deviate each data point with mean of total]**

**\*square\_dists <- (dists)^2**

**\*sum\_sq\_dists <- sum(square\_dists)**

**\*variance = sum\_sq\_dists/(number of sample-1)**

-The higher variance, the more spread out the data

-Calculate variance using one step :

**\*var(msleep$sleep\_total)**

-Standard Deviation

**\*sqrt(var(msleep$sleep\_total)**

**\*sd(msleep$sleep\_total)**

-Mean Absolute Deviation

**\*dists <- msleep$sleep\_total – mean(msleep$sleep\_total)**

**\*mean(abs(dists))**

-Quartiles :

**\*quantile(msleep$sleep\_total)** -> showing quartile of each data

**\*quantile(msleep$sleep\_total, probs = seq(0,1,0.2))** ->showing quartile form 0%-100% with jump every 20%

-IQR (Interquartile range) : Height of the box in boxplot

**\*quantile(msleep$sleep\_total, 0.75) –quantile(msleep$sleep\_total, 0.25)**

-Outliers : data point that is substantially different from the others

**If data <Q1-1.5 x IQR or if data > Q3 + 1.5 x IQR**

-Finding Outlier :

**\*iqr <- quantile(msleep$bodywt, 0.75) – quantile(msleep$bodywt, 0.25)**

**\*lower\_threshold <- quantile(msleep$bodywt, 0.25) – 1.5\*iqr**

**\*upper\_threshold <- quantile(msleep$bodywt, 0.75) + 1.5\*iqr**

**\*msleep %>% filter(bodywt < lower\_threshold | bodywt > upper\_threshold) %>%**

**select(name, vore, sleep\_total, bodywt)**

-Quartiles, Quantile, Quintiles :

# Calculate the quartiles of co2\_emission

quantile(food\_consumption$co2\_emission)

# Calculate the quintiles of co2\_emission

quantile(food\_consumption$co2\_emission, probs = seq(0,1,0.2))

# Calculate the deciles of co2\_emission

quantile(food\_consumption$co2\_emission, probs = seq(0,1,0.1))

-Varaince and Standard Deviation :

# Calculate variance and sd of co2\_emission for each food\_category

food\_consumption %>%

  group\_by(food\_category) %>%

  summarize(var\_co2 = var(co2\_emission),

     sd\_co2 = sd(co2\_emission))

# Plot food\_consumption with co2\_emission on x-axis

ggplot(food\_consumption, aes(co2\_emission)) +

  # Create a histogram

  geom\_histogram() +

  # Create a separate sub-graph for each food\_category

  facet\_wrap(~ food\_category)

-Finding Outlier using IQR :

# Calculate total co2\_emission per country: emissions\_by\_country

emissions\_by\_country <- food\_consumption %>%

  group\_by(country) %>%

  summarize(total\_emission = sum(co2\_emission))

# Compute the first and third quantiles and IQR of total\_emission

q1 <- quantile(emissions\_by\_country$total\_emission, 0.25)

q3 <- quantile(emissions\_by\_country$total\_emission, 0.75)

iqr <- q3 - q1

# Calculate the lower and upper cutoffs for outliers

lower <- q1 - 1.5 \* iqr

upper <- q3 + 1.5 \* iqr

# Filter emissions\_by\_country to find outliers

emissions\_by\_country %>%

  filter(total\_emission<lower | total\_emission>upper)