Mini Project – Cold Storage

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1. Project Objective

The objective of this report work is to analyze the operation of cold storage to maintain the temperature within the specified range of 2 degree – 4 degree and to generate the insights from the data. The report will consist of the following:

- Importing the data set in R.
- Analyzing data set.
- Graphical representation.
- Descriptive statistics.
- Inferences from the result obtained

2. Exploratory Data Analysis – Step by step approach

- Importing the data set in R.
- Calculating mean and standard deviation.
- Calculating probability of temperature going beyond the specified limit.
- Hypothesis testing.

2.1Environment Setup and Data Import

2.1.1 Install necessary packages and Invoke Libraries

This section install the necessary packages and libraries required to read the data file.

2.1.2 Set up working directory

Setting up of a working directory in the initializing stage of the R session helps the user to import and export data files as well as code files easily.

2.1.3 Import and Read the data set

In this section the data file was read by the R. If it is in .csv format, read.csv command is used likewise if data file is in excel format read_excel command is used to read the data file.

2.2 Variable Identification

mean() – to calculate the mean value of overall temperature.

by() – to calculate the mean season wise.

setwd() – to set the working directory.

read.csv() – to read the data file.

boxplot() – to plot the boxplot.

hist() – to draw the histogram.

pnorm() – to calculating the probability.

t.test() – to solve one sample t-test.

2.2.1 Variable Identification – Inferences

Problem-1

Overall mean = 2.963

Mean_rainy = 3.039

Mean_summer = 3.153

Mean_winter = 2.701

Standard deviation = 0.508

prob_less_two = 0.0291

prob_above_four = 0.0207

penalty = 10% of AMC

Problem – 2

Part (a)

n=35

mu = 3.9

p_value = 0.803

s = 0.508

xbar = 3.974

z_test_value = 0.865

Part (b) One Sample t-test

data: Temperature

t = 147.25, df = 34, p-value < 2.2e-16

alternative hypothesis: true mean is greater than 0

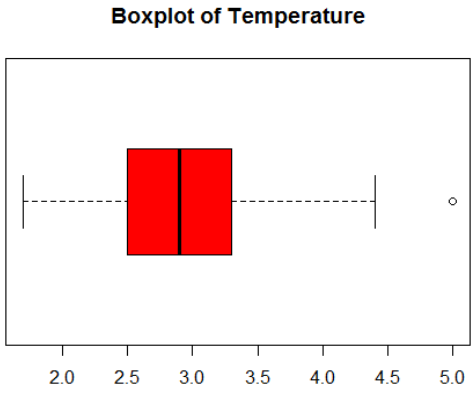
90 percent confidence interval:

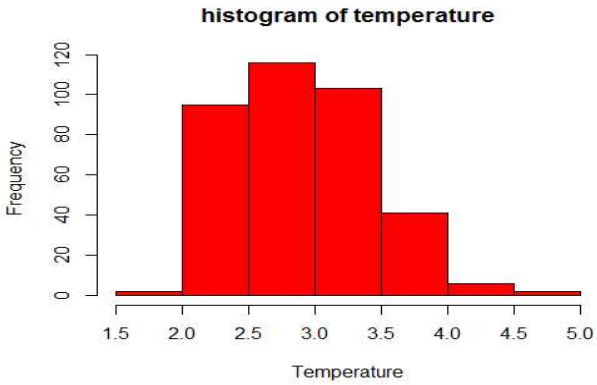
3.939011 Inf

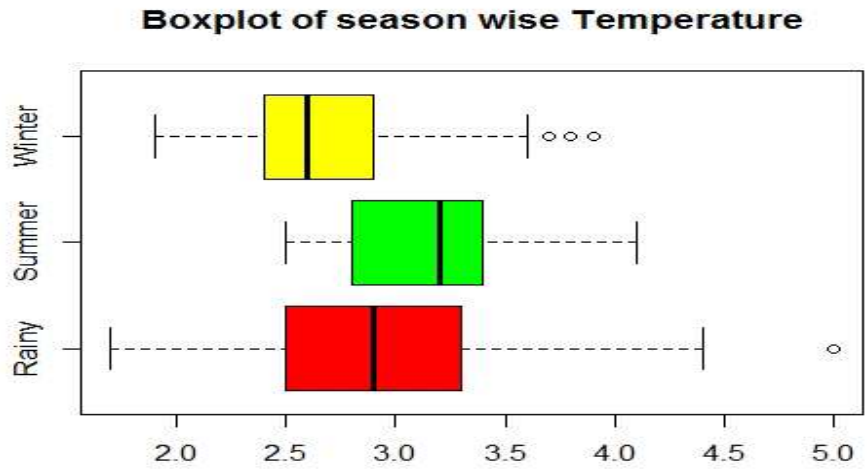
sample estimates:

mean of x

3.974286







4. Conclusion

In problem-1, it was found that the probability of temperature going below 2 degrees and above 4 degrees is too small i.e. 0.0291 and 0.0207 respectively and hence the penalty imposed is 10% on AMC company.

In problem-2, from the results obtained after performing z-test and t-test it was found that the p-value is less than the alpha = 0.1 and the null hypothesis is rejected.

After performing both the tests of hypothesis, we can infer that the temperature goes beyond the upper limit of 3.9 degrees which is main cause of dairy products going sour and smelling. In order to maintain the temperature below 3.9 degrees it was suggested to properly and periodically do maintenance of the cooling mechanism as well as the company official should watch the temperature more often to avoid temperature falling above 3.9 degrees.

5. Appendix-A: Source Code

Install Package

```
install.packages("readr")
```

```
library(readr)

### set working directory

setwd("D:/great learning/smdm/project-1")

### Importing data set

storage_data = read.csv("Cold_Storage_Temp_Data-1.csv",header = TRUE)

storage_data_march = read.csv("Cold_Storage_Mar2018-1.csv", header = TRUE)

attach(storage_data_march)

attach(storage_data)

### Calculating mean season wise

by(storage_data, INDICES = Season, FUN = summary)

boxplot(Temperature~Season, horizontal = TRUE, col = c("red","green","yellow"), main = "Boxplot of season wise Temperature")

### Calculating overall mean for full year

summary(storage_data)

xbar = mean(Temperature)

boxplot(Temperature, horizontal = TRUE, col = "red", main = "Boxplot of Temperature")

hist(Temperature, col = "red", main = "histogram of temperature")

### Calculating standard deviation for full year

sd_storage_data = sd(Temperature)

sd_storage_data

### Calculating probability of temperature having fallen below 2 deg C

prob_less_two = pnorm(2, mean = 2.963, sd = 0.5086, lower.tail = TRUE, log.p = FALSE)
```

Calculating probability of temperature having gone above 4 deg C

prob_above_four = pnorm(4, mean = 2.963, sd = 0.5086, lower.tail = FALSE, log.p = FALSE)

Calculation of Hypothesis using z test H0 <= 3.9 Ha > 3.9

n=35

mu = 3.9

xbar = mean(Temperature)

s = 0.508 **### same as previous problem-1 as mentioned in problem-2**

z_test_value = (xbar-mu)/(s/(n^0.5))

p_value = pt(z_test_value,34)

Calculation of Hypothesis using t test H0 <= 3.9 Ha > 3.9

alpha = 0.1

ttest = t.test(Temperature, alternative = "greater", mu = 0, paired = FALSE, var.equal = FALSE, conf.level = 0.9)