Name: Yash Brid

Roll No.: 2019130008

Course: DA (Data

Analytics)Exp No.: 3

Name of the Experiment: Hypothesis testing

Objective: Perform Hypothesis testing using f-test with SAS

Problem Statement:

This analysis is aimed at those who are interested in statistics related to earthquakes that have occurred on the Earth. The dataset contains various attributes associated with earthquakes such as latitude, longitude, depth, magnitude, nearest station, RMS time and type. The main aim is to determine ifthe mean of magnitudes of all types of earthquakes is same or different.

Implementation:

Dataset used: SASHELP.QUAKES

Null hypothesis: The mean of magnitudes of all types of earthquakes is same

Alternate hypothesis: The mean of magnitudes of all types of earthquakes isdifferent

Code:

```
CREATE TABLE WORK.query AS
SELECT Latitude , Longitude , 'Depth'n , Magnitude , dNearestStation
, RootMeanSquareTime , 'Type'n FROM SASHELP.QUAKES;
RUN;
QUIT
;

PROC DATASETS NOLIST NODETAILS;
CONTENTS DATA=WORK.query OUT=WORK.details;
RUN;

PROC ANOVA DATA = WORK.query;
CLASS type;
MODEL Magnitude = type;
MEANS type / tukey lines;
RUN;

PROC PRINT DATA=WORK.details;
RUN;
```

Output:

The ANOVA Procedure

Class Level Information		
Class	Levels	Values
Type	6	earthquake explosion landslide mining_exp quarry rock_burst

Number of Observations Read	15578
Number of Observations Used	15578

The ANOVA Procedure

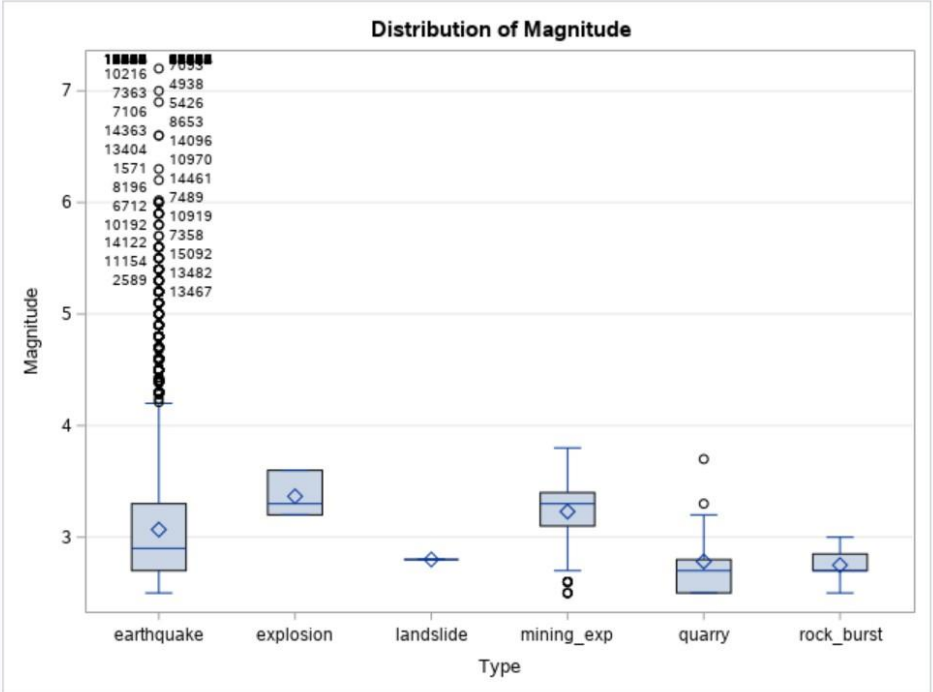
Dependent Variable: Magnitude

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	7.764177	1.552835	6.02	<.0001
Error	15572	4019.243354	0.258107		
Corrected Total	15577	4027.007531			

R-Square	Coeff Var	Root MSE	Magnitude Mean
0.001928	16.55175	0.508042	3.069418

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	5	7.76417716	1.55283543	6.02	<.0001

The ANOVA Procedure



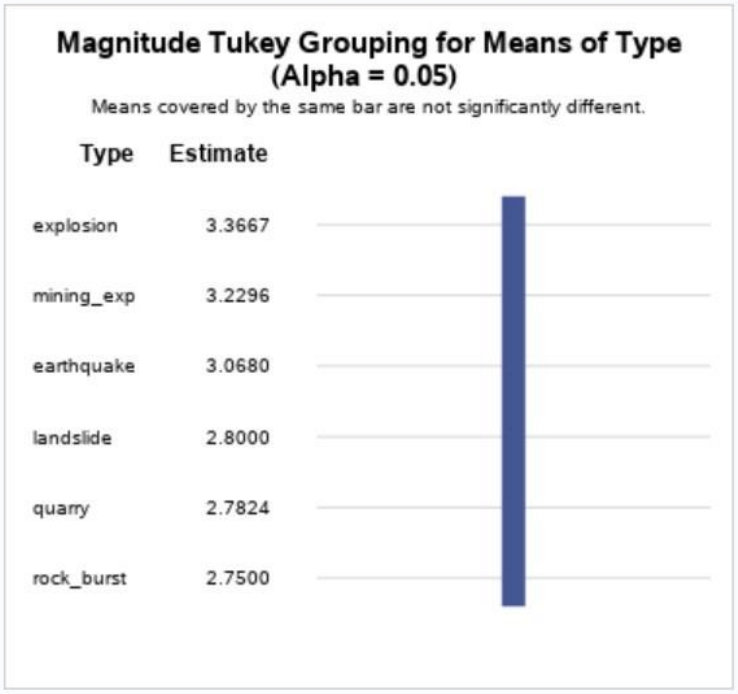
The ANOVA Procedure

Tukey's Studentized Range (HSD) Test for Magnitude

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	15572
Error Mean Square	0.258107
Critical Value of Studentized Range	4.03060
Minimum Significant Difference	1.0173
Harmonic Mean of Cell Sizes	4.051504

Note: Cell sizes are not equal.



Conclusion:

- Since the p-value obtained in the table above is < 0.001, i.e., the p-valueis < 0.01, the null hypothesis can be rejected. Therefore, the mean of magnitudes of all types of earthquakes is different.