Sheth l.u.j. And sir m.v. college of arts science and commerce

Practical no. 7 mod2

Aim: Performing one-way ANOVA using aov() (R).

RStudio

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Source

R 4.5.2 · ~/

```
> library(dplyr)
> data <- read.csv("laptop_battery_health_usage.csv")
>
> head(data)
  device_id  brand model_year      os  usage_type daily_usage_hours charging_cycles
1     LB001     HP       2021 Windows      Office                 6             420
2     LB002   Dell       2020 Windows Programming                 8             610
3     LB003  Apple       2022   macOS    Creative                 7             310
4     LB004 Lenovo       2019 Windows     Student                 5             700
5     LB005   Asus       2021 Windows      Gaming                 9             820
6     LB006   Acer       2020 Windows      Office                 6             540
  avg_charge_limit_percent battery_health_percent battery_age_months overheating_issues
1                       90                     86                 36                 No
2                      100                     78                 48                Yes
3                       85                     92                 24                 No
4                      100                     70                 60                Yes
5                      100                     65                 40                Yes
6                       95                     80                 50                 No
  performance_rating
1                  4
2                  3
3                  5
4                  3
5                  2
6                  4
>
> data$brand <- as.factor(data$brand)
>
> anova_data <- data[, c("brand", "battery_health_percent")]
>
> anova_data <- na.omit(anova_data)
>
> anova_result <- aov(battery_health_percent ~ brand, data = anova_data)
> print(summary(anova_result))
             Df Sum Sq Mean Sq F value Pr(>F)
brand         5   1623   324.6   2.726 0.0313 *
Residuals    44   5238   119.0
```

Environment History Connections Tutorial

Import 241 MiB List

R Global Environment

summary_st…	6 obs. of 3 variables
yahooStock	1300 obs. of 13 variables
Values	
a	1
age	18
b	3
dice	num [1:6] 1 2 3 4 5 6
i	6
method	Factor w/ 3 levels "Method_A"…

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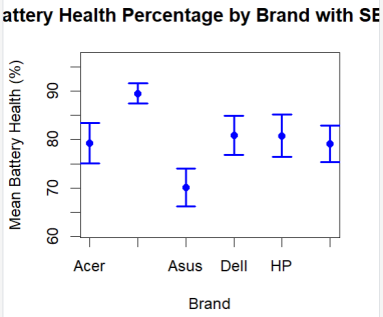
Zoom Export



RStudio

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Source

R 4.5.2 · ~/

```
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
>
> summary_stats <- anova_data %>%
+   group_by(brand) %>%
+   summarise(
+     mean_health = mean(battery_health_percent),
+     se_health = sd(battery_health_percent) / sqrt(n())
+   )
>
> print(summary_stats)
# A tibble: 6 × 3
  brand  mean_health se_health
  <fct>        <db1>     <db1>
1 Acer          79.2      4.22
2 Apple         89.6      2.06
3 Asus          70.1      3.93
4 Dell          80.9      4.02
5 HP            80.8      4.35
6 Lenovo        79.1      3.79
>
> plot(1:nrow(summary_stats), summary_stats$mean_health,
+      ylim = c(min(summary_stats$mean_health - summary_stats$se_health) - 5,
+               max(summary_stats$mean_health + summary_stats$se_health) + 5),
+      xaxt = "n",
+      pch = 19, col = "blue",
+      xlab = "Brand",
+      ylab = "Mean Battery Health (%)",
+      main = "Battery Health Percentage by Brand with SE Bars")
>
> axis(1, at = 1:nrow(summary_stats), labels = summary_stats$brand)
>
> arrows(x0 = 1:nrow(summary_stats),
+        y0 = summary_stats$mean_health - summary_stats$se_health,
+        x1 = 1:nrow(summary_stats),
+        y1 = summary_stats$mean_health + summary_stats$se_health,
+        code = 3, angle = 90, length = 0.1, col = "blue", lwd = 2)
```

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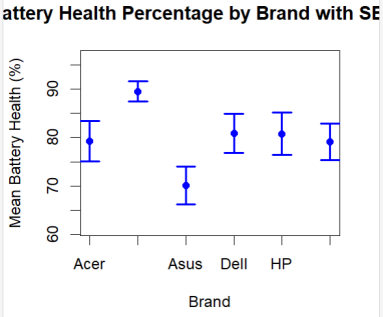

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```
2 Apple          89.6       2.06
3 Asus           70.1       3.93
4 Dell           80.9       4.02
5 HP             80.8       4.35
6 Lenovo         79.1       3.79
>
> plot(1:nrow(summary_stats), summary_stats$mean_health,
+      ylim = c(min(summary_stats$mean_health - summary_stats$se_health) - 5,
+               max(summary_stats$mean_health + summary_stats$se_health) + 5),
+      xaxt = "n",
+      pch = 19, col = "blue",
+      xlab = "Brand",
+      ylab = "Mean Battery Health (%)",
+      main = "Battery Health Percentage by Brand with SE Bars")
>
> axis(1, at = 1:nrow(summary_stats), labels = summary_stats$brand)
>
> arrows(x0 = 1:nrow(summary_stats),
+        y0 = summary_stats$mean_health - summary_stats$se_health,
+        x1 = 1:nrow(summary_stats),
+        y1 = summary_stats$mean_health + summary_stats$se_health,
+        code = 3, angle = 90, length = 0.1, col = "blue", lwd = 2)
>
>
> p_value <- summary(anova_result)[[1]][["Pr(>F)"]][1]
> if (p_value < 0.05) {
+   cat("Decision: Reject Null Hypothesis (H0).\n")
+   cat("Conclusion: Battery health percentage differs significantly among brands.\n")
+ } else {
+   cat("Decision: Accept Null Hypothesis (H0).\n")
+   cat("Conclusion: No significant difference in battery health percentage among brands.\n")
+ }
Decision: Reject Null Hypothesis (H0).
Conclusion: Battery health percentage differs significantly among brands.
> print("simran s113")
[1] "simran s113"
>
```

Environment | History | Connections | Tutorial

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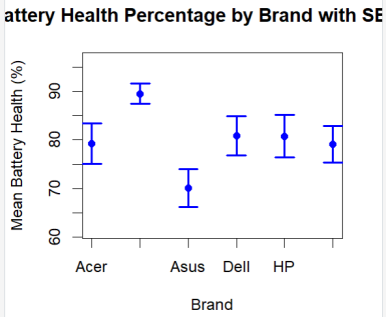

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