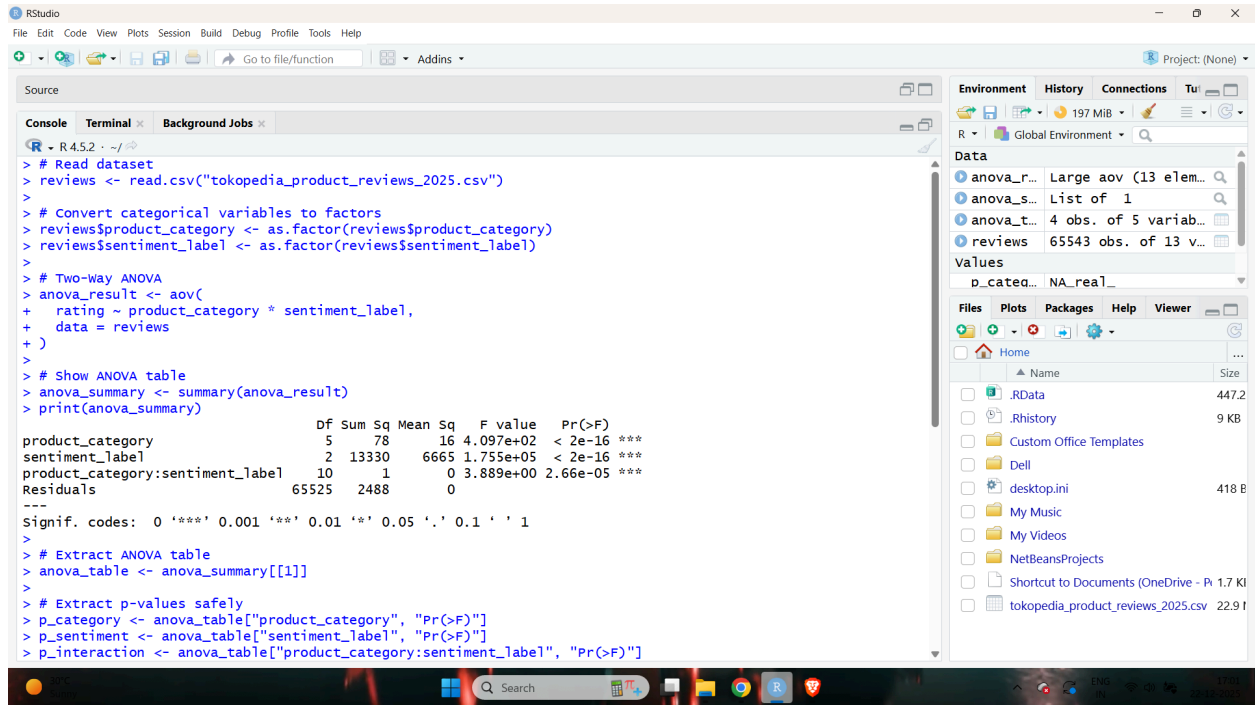


# SHETH L.U.J & SIR M.V COLLEGE OF SCIENCE

## SUBJECT : R-PROGRAMMING

**AIM : Performing two-way ANOVA using aov() (R).**

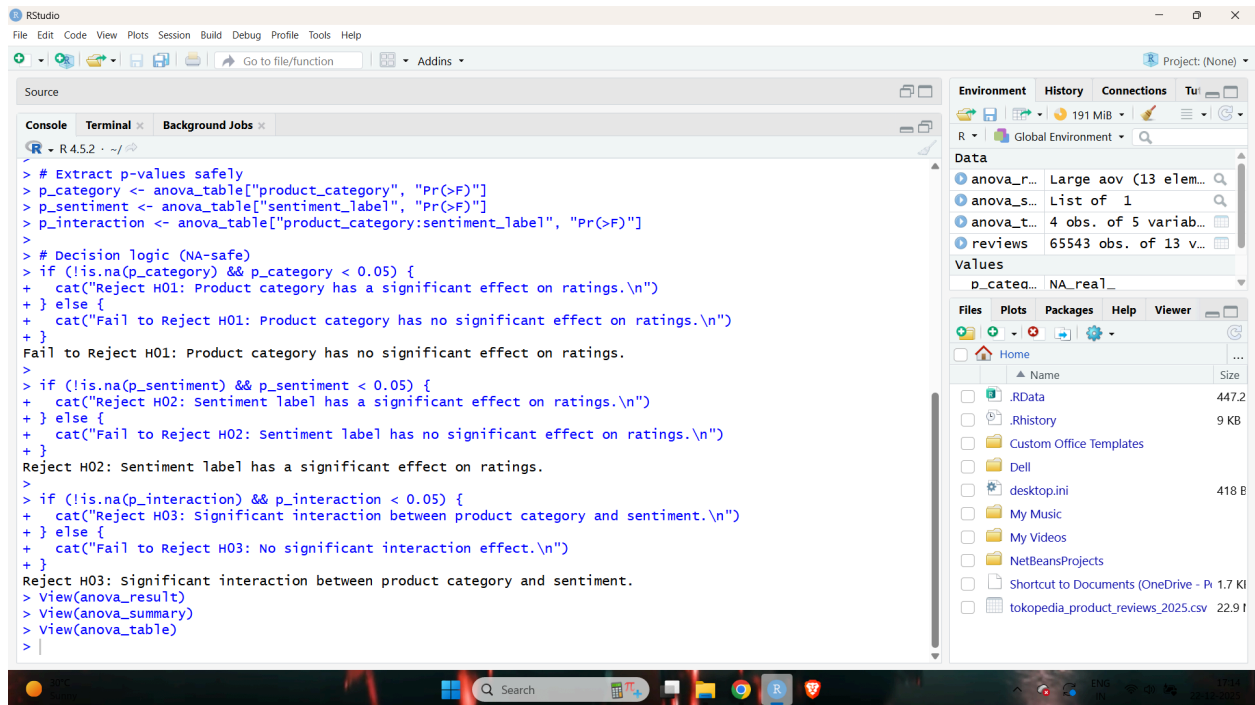
### OUTPUT



```
R - R4.5.2 - ~/
File Edit Code View Plots Session Build Debug Profile Tools Help
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Console Terminal Background Jobs
R - R4.5.2 - ~/
> # Read dataset
> reviews <- read.csv("tokopedia_product_reviews_2025.csv")
>
> # Convert categorical variables to factors
> reviews$product_category <- as.factor(reviews$product_category)
> reviews$sentiment_label <- as.factor(reviews$sentiment_label)
>
> # Two-Way ANOVA
> anova_result <- aov(
+ rating ~ product_category * sentiment_label,
+ data = reviews
+ )
>
> # Show ANOVA table
> anova_summary <- summary(anova_result)
> print(anova_summary)

              Df Sum Sq Mean Sq  F value    Pr(>F)    ***
product_category      5      78      16  4.097e+02 < 2e-16 ***
sentiment_label       2  13330     6665  1.755e+05 < 2e-16 ***
product_category:sentiment_label  10      1      0  3.889e+00  2.66e-05 ***
Residuals          65525    2488      0
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

>
> # Extract ANOVA table
> anova_table <- anova_summary[[1]]
>
> # Extract p-values safely
> p_category <- anova_table["product_category", "Pr(>F)"]
> p_sentiment <- anova_table["sentiment_label", "Pr(>F)"]
> p_interaction <- anova_table["product_category:sentiment_label", "Pr(>F)"]
```



```
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Console Terminal Background Jobs
R - R4.5.2 - ~/
> # Extract p-values safely
> p_category <- anova_table["product_category", "Pr(>F)"]
> p_sentiment <- anova_table["sentiment_label", "Pr(>F)"]
> p_interaction <- anova_table["product_category:sentiment_label", "Pr(>F)"]
>
> # Decision logic (NA-safe)
> if (!is.na(p_category) && p_category < 0.05) {
+   cat("Reject H01: Product category has a significant effect on ratings.\n")
+ } else {
+   cat("Fail to Reject H01: Product category has no significant effect on ratings.\n")
+ }
Fail to Reject H01: Product category has no significant effect on ratings.
>
> if (!is.na(p_sentiment) && p_sentiment < 0.05) {
+   cat("Reject H02: Sentiment label has a significant effect on ratings.\n")
+ } else {
+   cat("Fail to Reject H02: Sentiment label has no significant effect on ratings.\n")
+ }
Reject H02: Sentiment label has a significant effect on ratings.
>
> if (!is.na(p_interaction) && p_interaction < 0.05) {
+   cat("Reject H03: Significant interaction between product category and sentiment.\n")
+ } else {
+   cat("Fail to Reject H03: No significant interaction effect.\n")
+ }
Reject H03: Significant interaction between product category and sentiment.
> View(anova_result)
> View(anova_summary)
> View(anova_table)
> |
```

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## SUBJECT : R-PROGRAMMING

RStudio interface showing the results of an ANOVA model. The Environment pane displays the following objects:

Name	Type	Value
anova_result	list [13] (S3: aov, lm)	List of length 13
coefficients	double [18]	1.33333 -0.12366 -0.05128 0.00887 -0.00842 -0.04010 ...
residuals	double [65543]	0.0362 0.0362 0.0362 0.0362 0.0362 0.0362 ...
effects	double [65543]	-1252.871 3.582 5.268 0.168 -5.066 -3.394 ...
rank	integer [1]	18
fitted.values	double [65543]	4.96 4.96 4.96 4.96 4.96 4.96 ...
assign	integer [18]	0 1 1 1 1 ...
qr	list [5] (S3: qr)	List of length 5
df.residual	integer [1]	65525
contrasts	list [2]	List of length 2
xlevels	list [2]	List of length 2
call	language	aov(formula = rating ~ product_category * sentiment_label, data = reviews)
terms	formula	rating ~ product_category * sentiment_label
model	list [65543 x 3] (S3: data.frame)	A data.frame with 65543 rows and 3 columns

The Console shows the following commands and output:

```
> # Show ANOVA table
> anova_summary <- summary(anova_result)
```

RStudio interface showing the summary of the ANOVA results. The Environment pane displays the following objects:

Name	Type	Value
anova_summary	list [1] (S3: summary.aov, listof)	List of length 1
[[1]]	list [4 x 5] (S3: anova, data.frame)	A data.frame with 4 rows and 5 columns

The Console shows the following commands and output:

```
> # Show ANOVA table
> anova_summary <- summary(anova_result)
```

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## SUBJECT : R-PROGRAMMING

The screenshot displays the RStudio environment. The main window shows an ANOVA table with the following data:

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
product_category	5	77.785696	1.555714e+01	4.096836e+02	0.000000e+00
sentiment_label	2	13329.802709	6.664901e+03	1.755143e+05	0.000000e+00
product_category:sentiment_label	10	1.476773	1.476773e-01	3.888951e+00	2.664292e-05
Residuals	65525	2488.216332	3.797354e-02	NA	NA

The console at the bottom shows the following commands:

```
R - R 4.5.2 ~ />  
>  
> # Show ANOVA table  
> anova_summary <- summary(anova_result)
```

The right sidebar shows the Environment pane with the following data objects:

- anova\_r... Large aov (13 elem...
- anova\_s... List of 1
- anova\_t... 4 obs. of 5 variab...
- reviews 65543 obs. of 13 v...

The Files pane shows the following files:

- .RData 447.2
- .Rhistory 9 KB
- Custom Office Templates
- Dell
- desktop.ini 418 B
- My Music
- My Videos
- NetBeansProjects
- Shortcut to Documents (OneDrive - P...
- tokopedia\_product\_reviews\_2025.csv 22.9 MB

