

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

SUBJECT : R-PROGRAMMING

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

OUTPUT

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R 4.5.2 · ~/
> # 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
> aov_result <- aov(
+ rating ~ product_category * sentiment_label,
+ data = reviews
)
>
> # Show ANOVA table
> aov_summary <- summary(aov_result)
> print(aov_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
> aov_table <- aov_summary[[1]]
>
> # Extract p-values safely
> p_category <- aov_table["product_category", "Pr(>F)"]
> p_sentiment <- aov_table["sentiment_label", "Pr(>F)"]
> p_interaction <- aov_table["product_category:sentiment_label", "Pr(>F)"]

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R 4.5.2 · ~/
>
> # Extract p-values safely
> p_category <- aov_table["product_category", "Pr(>F)"]
> p_sentiment <- aov_table["sentiment_label", "Pr(>F)"]
> p_interaction <- aov_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(aov_result)
> View(aov_summary)
> View(aov_table)
> |

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RStudio

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Go to file/function Addins

S108-M-2 PRAC8 R-PROGRAM.R anova_result anova_summary anova_table

Name Type Value

- anova_result list [13] (S3: aov, lm)
 - coefficients double [18] 1.3333 -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 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

(No selection)

Console Terminal Background Jobs

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

RStudio

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Go to file/function Addins

S108-M-2 PRAC8 R-PROGRAM.R anova_result anova_summary anova_table

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

(No selection)

Console Terminal Background Jobs

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

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The screenshot shows the RStudio interface with the following details:

- File Menu:** File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Search Bar:** Go to file/function, Addins.
- Code Editor:** S108-M-2 PRAC8 R-PROGRAM.R, showing the following R code:

```
> # Show ANOVA table
> anova_summary <- summary(anova_result)
```
- Data View:** anova_table, displaying the following ANOVA table:

	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

- Environment View:** Shows objects in the Global Environment, including anova_r..., anova_s..., anova_t..., reviews, p_cated..., NA_real_.
- Files View:** Shows files in the current directory, including .RData, .Rhistory, Custom Office Templates, Dell, desktop.ini, My Music, My Videos, NetBeansProjects, Shortcut to Documents (OneDrive - P), and tokopedia_product_reviews_2025.csv.

