2021101113_Reliability_Class_Activity

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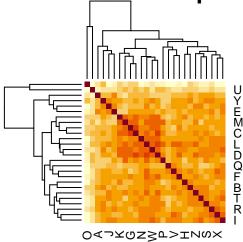
13/2/2024

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Advert Rating: Outlier Detection
library(readxl)
data <- readxl::read_excel("BRSM_Assignment_Datasets.xlsx", sheet = 1)</pre>
print(data)
## # A tibble: 110 x 26
##
                В
                       C
                             D
                                   Ε
                                         F
                                               G
                                                      Η
                                                            Ι
                                                                  J
                                                                        K
                                                                               L
                                                                                     М
##
      <dbl> <dbl> <dbl> <dbl> <
                               <dbl>
                                     <dbl>
                                           <dbl>
                                                  <dbl>
                                                        <dbl>
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                                                                    <dbl>
                                                                           <dbl>
##
    1
          2
                                                                 -2
                                                                        -3
               -1
                      -1
                            -1
                                  -1
                                        -1
                                               4
                                                     -2
                                                            3
                                                                              -1
                                                                                    -1
##
    2
         -3
               -2
                      -2
                            -3
                                  -3
                                        -4
                                               -4
                                                     -2
                                                           -1
                                                                  -3
                                                                        -2
                                                                              -4
                                                                                    -4
##
    3
          2
                3
                      1
                             0
                                               2
                                                     -1
                                                            2
                                                                  3
                                                                        -3
                                  -1
                                        -1
                                                                                    -3
    4
          3
                            -2
                                                     -2
                                                           -3
                                                                  0
                                                                        -3
##
                1
                      -1
                                  -1
                                        -1
                                                                                    -3
##
    5
         -2
                3
                      -1
                             1
                                  -1
                                         1
                                               -2
                                                      1
                                                            3
                                                                  2
                                                                        -3
                                                                                    -3
##
    6
         -3
                2
                      -2
                             0
                                  -4
                                         1
                                               -2
                                                     -4
                                                           -1
                                                                  -2
                                                                        -3
                                                                              -2
                                                                                    -2
    7
         -1
               -1
                     -2
                                  -3
                                              -3
                                                     -3
                                                                              -3
                                                                                    -4
##
                            -1
                                        -3
                                                           -1
                                                                 -1
                                                                        1
##
    8
         -3
               -3
                      -2
                            -4
                                  -4
                                        -4
                                               -4
                                                      2
                                                                 -3
                                                                        -3
                                                                              -3
                                                                                    -4
                                                           -4
          2
                      -2
                                        -2
                                                                              -2
##
    9
               -1
                            -3
                                  -2
                                               -4
                                                     -3
                                                           -2
                                                                  -3
                                                                        -3
                                                                                    -3
##
   10
          3
                            -1
                                  -2
                                               -2
  # i 100 more rows
## # i 13 more variables: N <dbl>, O <dbl>, P <dbl>, Q <dbl>, R <dbl>, S <dbl>,
       T <dbl>, U <dbl>, V <dbl>, W <dbl>, X <dbl>, Y <dbl>, Z <dbl>
library(reshape2)
library(ggplot2)
correlation_matrix <- round(cor(data), 2)</pre>
melted correlation <- melt(correlation matrix)</pre>
ggplot(data = melted_correlation, aes(x = Var1, y = Var2, fill = value)) +
```

```
Z - 0.420.520.520.59 0.5 0.52 0.5 0.450.520.530.450.620.54 0.5 0.220.490.440.490.540.570.320.490.460.490.39
        Y - 0.420.540.460.490.490.480.420.470.510.510.450.430.390.390.39 0.3 0.330.550.530.510.210.460.550.47
        X - 0.380.44 0.4 0.490.420.520.450.42 0.6 0.470.410.580.490.520.090.490.48 0.6 0.530.510.210.610.53
       W - 0.290.490.570.670.440.540.630.520.62 0.4 0.650.650.630.620.220.490.410.550.550.570.250.49
        V - 0.420.510.420.45 0.4 0.570.330.450.540.45 0.4 0.670.430.430.09 0.5 0.55 0.5 0.440.390.23 0.490.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.460.49 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40 0.610.40
        U = 0.140.340.340.370.26 0.2 0.290.340.230.250.290.350.340.280.010.41 0.3 0.320.230.21 0.230.250.210.210.32
        T - 0.430.52 0.5 0.53 0.5 0.43 0.5 0.47 0.6 0.530.44 0.5 0.340.51 0.130.350.330.490.59 0.210.390.570.510.510.5
        S - 0.470.570.530.540.470.380.47 0.5 0.5 0.370.420.480.470.480.140.530.340.51 0.590.230.440.550.530.530.540.50
        R - 0.440.350.510.510.540.450.41 0.5 0.560.47 0.5 0.520.470.550.21 0.5 0.39 0.510.490.32 0.5 0.55 0.6 0.550.49
                                                                                                                                                                                         Pearson Correlation
        Q -0.260.380.360.410.370.490.380.370.52 0.4 0.34 0.5 0.390.440.080.42 0.390.340.33 0.3 0.550.410.480.330.44
                                                                                                                                                                                                    1.0
        P - 0.29 0.47 0.54 0.53 0.5 0.45 0.5 0.31 0.42 0.32 0.35 0.6 0.6 0.5 0.15 0.42 0.5 0.53 0.35 0.41 0.5 0.49 0.49 0.3 0.49
        O = 0.250.280.310.150.170.140.280.040.050.07 0.3 0.110.240.08 0.150.080.210.140.130.010.090.220.090.390.22
                                                                                                                                                                                                    0.5
        N - 0.360.470.520.620.45 0.5 0.53 0.5 0.560.370.520.64 0.5 0.08 0.5 0.440.550.480.510.280.430.620.520.39 0.5
M -0.190.42 0.6 0.660.320.490.630.380.450.330.590.67 0.5 0.24 0.6 0.390.470.470.340.340.430.630.490.390.54
                                                                                                                                                                                                    0.0
        L - 0.380.550.670.680.490.590.580.540.580.520.53 0.670.640.11 0.6 0.5 0.520.48 0.5 0.350.670.650.580.430.62
        K - 0.280.420.610.670.340.470.510.510.490.35 0.530.590.52 0.3 0.350.34 0.5 0.420.440.29 0.4 0.650.410.450.45
                                                                                                                                                                                                    -0.5
         J = 0.420.410.36 0.5 0.53 0.5 0.340.440.52 0.350.520.330.370.070.32 0.4 0.470.370.530.250.45 0.4 0.470.510.53
         -1.0
        H - 0.4 0.560.460.460.360.470.39 0.460.440.510.540.38 0.5 0.040.310.37 0.5 0.5 0.470.340.450.520.420.470.45
        G - 0.390.460.730.630.460.54 0.390.480.340.510.580.630.530.28 0.5 0.380.410.47 0.5 0.290.330.630.450.42 0.5
        F - 0.380.510.49 0.6 0.47 0.540.470.56 0.5 0.470.590.49 0.5 0.140.450.490.450.380.43 0.2 0.570.540.520.480.52
        E - 0.530.450.480.42 0.470.460.360.520.530.340.490.320.450.17 0.5 0.370.540.47 0.5 0.26 0.4 0.440.420.49 0.5
        D -0.32 0.5 0.67 0.42 0.6 0.630.460.55 0.5 0.670.680.660.620.150.530.410.510.540.530.370.450.670.490.490.59
        C -0.380.48 0.670.480.490.730.460.450.360.610.67 0.6 0.520.310.540.360.510.53 0.5 0.340.420.57 0.4 0.460.52
        B - 0.44 0.48 0.5 0.450.510.460.560.480.410.420.550.420.470.280.470.380.350.570.520.340.510.490.440.540.52
```

Correlation Heatmap of Ratings



```
outlier <- which.min(apply(correlation_matrix, 1, function(x) sum(x)))
outlier_label <- LETTERS[outlier]
cat("Outlier participant:", outlier_label, "\n")</pre>
```

Outlier participant: 0

Conclusion from the Correlation Heatmap

- 1. It's evident from the correlation heatmap that participants labeled A through Z, except for O, exhibit positive correlations between them as anticipated, indicating similar rating patterns.
- 2. However, for participant O, it's apparent that the correlations are consistently low, approaching zero in many instances. This suggests that participant O is an outlier, likely providing random ratings.

Reliable Job: Internal Consistency

```
library(psych)
data <- readxl::read_excel("BRSM_Assignment_Datasets.xlsx", sheet = 2)
js_items <- data[, c("JS1", "JS2", "JS3", "JS4")]
print(js_items)</pre>
```

```
## # A tibble: 30 x 4
##
        JS1
             JS2 JS3
                          JS4
      <dbl> <dbl> <dbl> <dbl> <
##
##
              9.5 9.75 7.88
   1
          9
##
          5
              6.5 6.25 7.12
##
  3
          4
             5
                  3.5
                        6.75
## 4
          6
             7
                  5.5
                         4.75
             7.5 6.75 7.38
## 5
         7
## 6
         1
              2.5 3.25 3.62
## 7
            5.5 7.75 7.88
         1
## 8
          5
            7.5 4.75 5.38
                         2.5
## 9
          6
                  3
              4
              2.5 3.25 6.62
## 10
          1
## # i 20 more rows
jp_items <- data[, c("JP1", "JP2", "JP3", "JP4")]</pre>
print(jp_items)
## # A tibble: 30 x 4
        JP1
              JP2
                   JP3
##
      <dbl> <dbl> <dbl> <dbl> <
##
##
  1
         1
              1.5 1.75 4.88
## 2
          6
              4
                   4
## 3
          5
              6.5 5.25 4.62
## 4
          6
            7
                  8.5
                         8.25
## 5
          6 5
                   4.5
                         9.25
## 6
         9
             7.5 4.75 2.38
##
  7
          8
            8
                   6
         7
## 8
             8.5 9.25 5.62
## 9
              3
                  6.5
                         5.25
          2
## 10
          9
              9.5 6.75 4.38
## # i 20 more rows
calculate_alpha <- function(items) {</pre>
  cor_matrix <- cor(items, method = "spearman")</pre>
  mean_corr <- mean(cor_matrix[lower.tri(cor_matrix)])</pre>
  num_items <- ncol(items)</pre>
  alpha <- (num_items * mean_corr) / (1 + (num_items - 1) * mean_corr)</pre>
  return(alpha)
alpha_js <- calculate_alpha(js_items)</pre>
cat("Cronbach's Alpha for Job Satisfaction (JS):", alpha_js, "\n")
## Cronbach's Alpha for Job Satisfaction (JS): 0.8584497
cat("For Job Satisfaction (JS):\n")
## For Job Satisfaction (JS):
```

```
cat("Cronbach's Alpha:", alpha_js, "\n")
## Cronbach's Alpha: 0.8584497
if (alpha_js >= 0.7) {
  cat("The internal consistency of the JS items is considered acceptable as Cronbach's Alpha is above 0
  cat("The internal consistency of the JS items is considered poor as Cronbach's Alpha is below 0.7.\n"
}
## The internal consistency of the JS items is considered acceptable as Cronbach's Alpha is above 0.7.
alpha_jp <- calculate_alpha(jp_items)</pre>
cat("Cronbach's Alpha for Job Performance (JP):", alpha_jp, "\n")
## Cronbach's Alpha for Job Performance (JP): 0.5242351
cat("\nFor Job Performance (JP):\n")
## For Job Performance (JP):
cat("Cronbach's Alpha:", alpha_jp, "\n")
## Cronbach's Alpha: 0.5242351
if (alpha_jp >= 0.7) {
  cat("The internal consistency of the JP items is considered acceptable as Cronbach's Alpha is above 0
  cat("The internal consistency of the JP items is considered poor as Cronbach's Alpha is below 0.7.\n"
```

The internal consistency of the JP items is considered poor as Cronbach's Alpha is below 0.7.

Conclusions from the Cronbach alpha for Job Performance and Job Satisfaction.

- 1. We know that the Cronbach alpha greater than 0.7 is treated as acceptable for internal consistency.
- 2. In the case of Job Satisfaction, Cronbach alpha = 0.858. Hence, the measure of Job satisfaction is acceptable
- 3. But in the case of Job Performance, Cronbach alpha = 0.524. Hence, the measure of Job Performance is not acceptable