task3_report

December 7, 2025

[86]:
```r
#https://www.emilyzabor.com/survival-analysis-in-r.html
data <- read.csv("data_t3.csv")
```

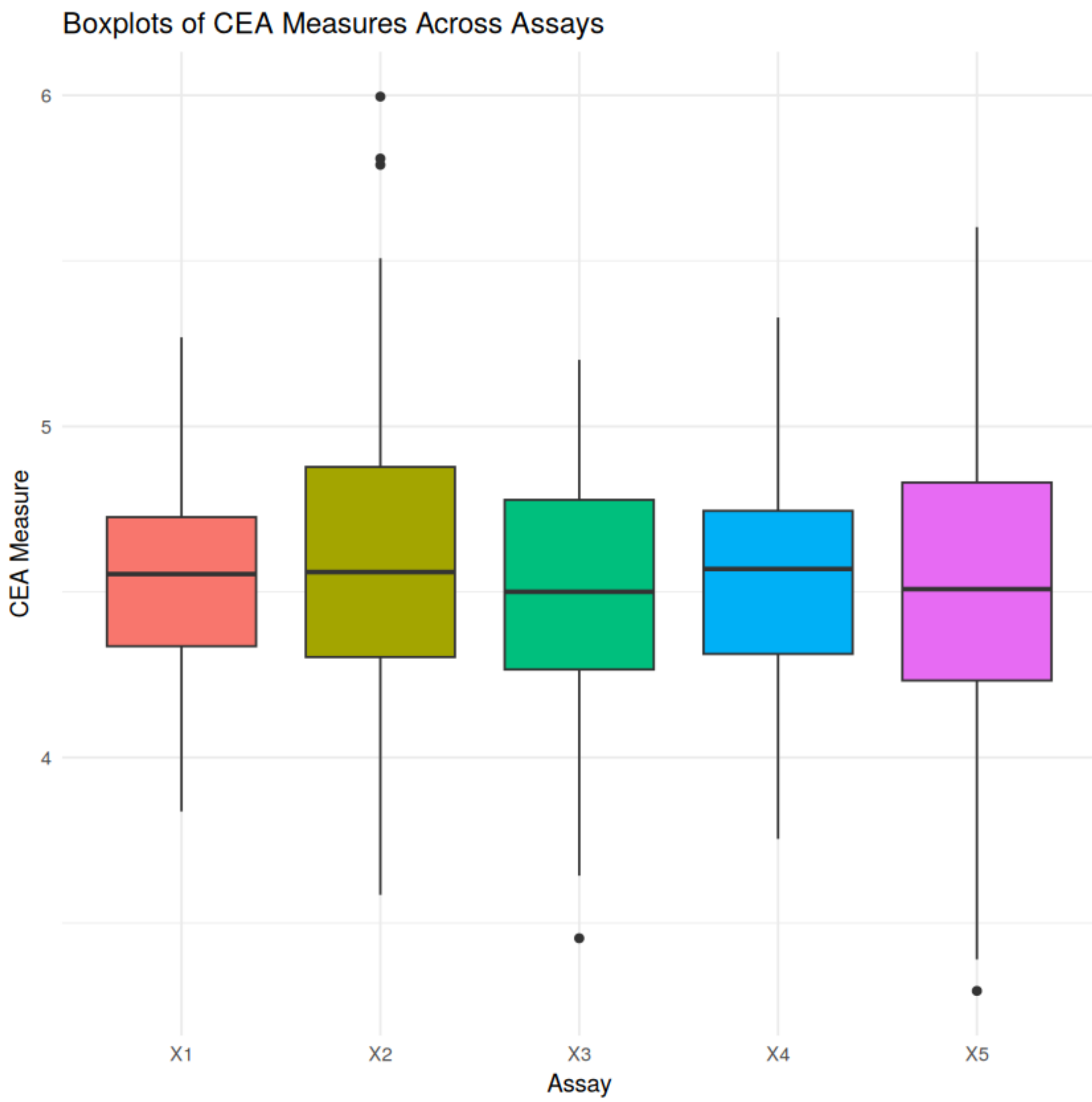
[78]:
```r
# a first look at the data
head(data)
summary(data)
```

A data.frame: 6 × 6

	X <int>	X1 <dbl>	X2 <dbl>	X3 <dbl>	X4 <dbl>	X5 <dbl>
1	1	4.248	5.321	4.185	4.318	4.123
2	2	4.492	5.022	4.275	4.209	4.083
3	3	4.954	4.848	4.771	4.847	5.337
4	4	4.492	4.766	4.300	4.516	4.793
5	5	4.419	4.352	4.453	4.666	4.008
6	6	5.031	4.800	5.097	4.701	4.986

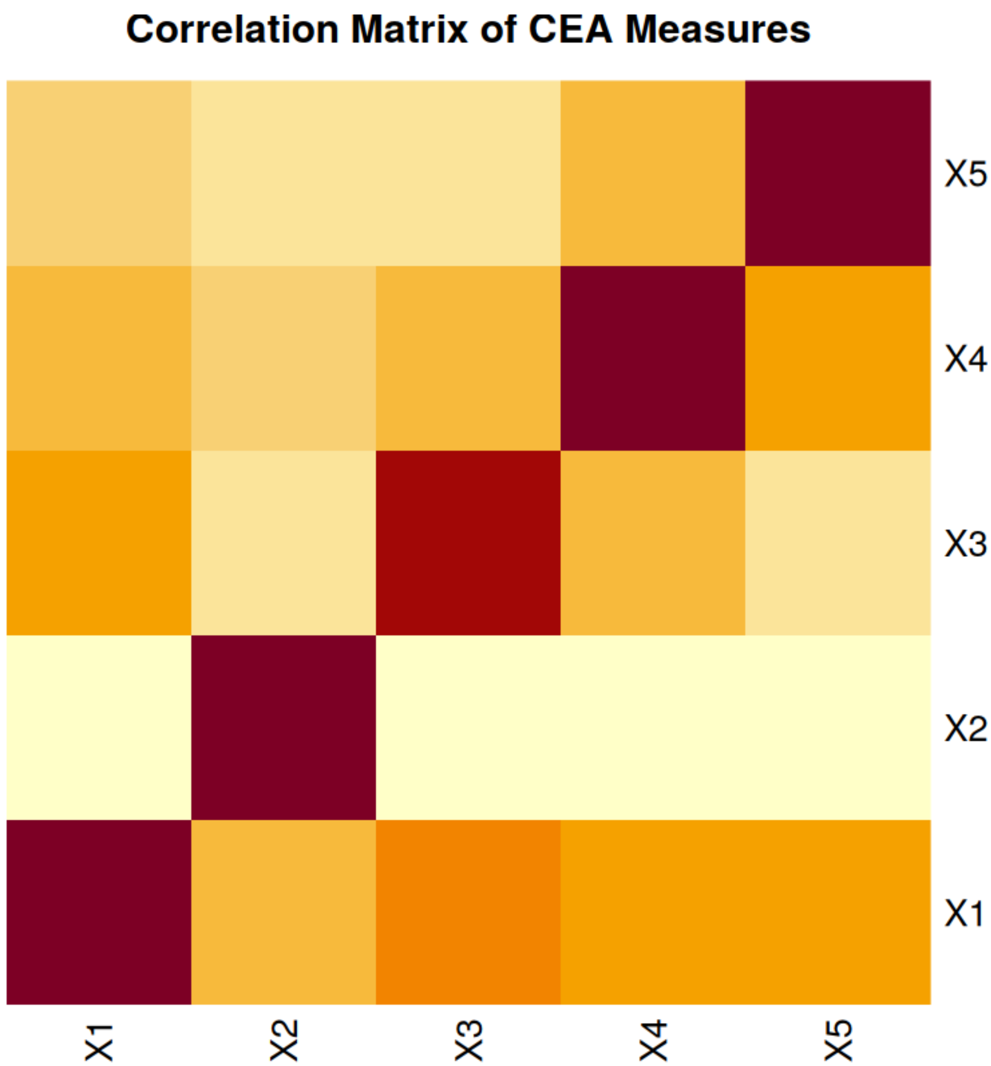
```
       X                X1              X2              X3
 Min.   :  1.00   Min.   :3.837   Min.   :3.585   Min.   :3.454
 1st Qu.: 25.75   1st Qu.:4.336   1st Qu.:4.303   1st Qu.:4.266
 Median : 50.50   Median :4.554   Median :4.560   Median :4.500
 Mean   : 50.50   Mean   :4.534   Mean   :4.581   Mean   :4.529
 3rd Qu.: 75.25   3rd Qu.:4.726   3rd Qu.:4.878   3rd Qu.:4.778
 Max.   :100.00   Max.   :5.269   Max.   :5.996   Max.   :5.201
       X4              X5
 Min.   :3.754   Min.   :3.295
 1st Qu.:4.313   1st Qu.:4.232
 Median :4.569   Median :4.508
 Mean   :4.547   Mean   :4.517
 3rd Qu.:4.745   3rd Qu.:4.830
 Max.   :5.329   Max.   :5.602
```

[83]:
```r
ggplot(data_long, aes(x = Assay, y = CEA, fill = Assay)) +
  geom_boxplot() +
  theme_minimal() +
  labs(title = "Boxplots of CEA Measures Across Assays",
       y = "CEA Measure",
       x = "Assay") +
  theme(legend.position = "none")
```



[84]:
```r
# Compute the correlation matrix
cor_matrix <- cor(data[-1])

# Plotting the heatmap
heatmap(cor_matrix, main = "Correlation Matrix of CEA Measures",
        Colv = NA, Rowv = NA, scale = "column", margins = c(5, 5))
```



[85]:
```
library(psych)

# Calculate the ICC
icc_result <- ICC(data[-1])

# Convert to data frame (if not already done)
icc_df <- as.data.frame(icc_result$results)

# View the structure to confirm
print(icc_df)
```

```
boundary (singular) fit: see help('isSingular')
```

```
                         type       ICC        F df1 df2            p
Single_raters_absolute   ICC1 0.4367499 4.877052  99 400 5.016847e-30
Single_random_raters     ICC2 0.4367499 4.877052  99 396 6.621512e-30
Single_fixed_raters      ICC3 0.4367499 4.877052  99 396 6.621512e-30
Average_raters_absolute ICC1k 0.7949581 4.877052  99 400 5.016847e-30
Average_random_raters   ICC2k 0.7949581 4.877052  99 396 6.621512e-30
Average_fixed_raters    ICC3k 0.7949581 4.877052  99 396 6.621512e-30
                        lower bound upper bound
Single_raters_absolute    0.3439548   0.5355998
Single_random_raters      0.3439500   0.5356031
Single_fixed_raters       0.3438419   0.5356767
Average_raters_absolute   0.7238657   0.8522148
Average_random_raters     0.7238615   0.8522164
Average_fixed_raters      0.7237657   0.8522537
```

Here above we can see the p values are quite significant for all the cases. ICC1 - One-way random-effects model. In this model, each subject is rated by a different set of randomly chosen raters. Here, raters are considered as the random effects ICC2 - Two-way random-effects model. A set of k raters are randomly selected, then, each subject is measured by the same set of k raters with similar characteristics. In this model, both subjects and raters are viewed as random effects. ICC3 - Two-way mixed effects model. Here the raters are considered as fixed.

We get the Similar ICC of 0.4467 for all the 3 models showing moderate agreement.

Similarly for Average ICC 1 to 3 the ICC is same and it's 0.749 showing good agreement i.e. the raters are usually consistent when averages are compared.

0.1 Alternative

[97]:
```
kripp.alpha(t(as.matrix(data[-1])), method = "interval")
```

```
 Krippendorff's alpha

 Subjects = 100
   Raters = 5
    alpha = 0.434
```

Krippoendorff's alpha shows a value of 0.434 which shows moderate agreement across all 5 raters.