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Data Science Project SoSe 2022

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1 Introduction

1.1 Computational Tools

1.1.1 Dimension reduction

1.1.1.1 PCA

1.1.1.2 UMAP

1.1.2 Statistical analysis

1.1.2.1 Shapiro-Wilks test

Shapiro-Wilks test is a normality test based on regression and correlation. It tests the null hypothesis that the data follows a normal distribution. Small values of SW test statistic indicate no normality of the data thus the null hypothesis is rejected. SW values of one suggest normality Yap and Sim (2011).

1.1.2.2 Wilcoxon rank-sum and signed-rank test

Wilcoxon rank-sum test and Wilcoxon signed-rank test both are non-parametric statistical hypothesis tests that can be used when the data does not follow a normal distribution. Wilcoxon signed-rank test is used to analyze matched-pair or one-sample data. It tests the null hypothesis that there is no difference in probability distribution of first and second sample, hence the distribution of pairwise differences is centered at zero. The test is based on ranked absolute values of differences Woolson (2007). Wilcoxon rank-sum test is performed when analyzing unpaired-data and is likewise based on ranked values. The null hypothesis states that there is no association between the two samples Rey and Neuhäuser (2011).

1.1.2.3 H-test

1.1.2.4 Bonferroni correction

Multiple statistical testing results in an increased risk for type I errors. Bonferroni correction is used to reduce this type I error rate. For this, the significance level is adjusted by dividing the critical p -value α by the number of tests Armstrong (2014).

1.1.3 Clustering

1.1.3.1 Kmeans

1.1.3.2 Hierarchial clustering

1.1.4 GSEA

1.1.5 Regression

2 Materials and Methods

2.1 Data cleaning

2.2 TCGA pan-cancer analysis

2.3 KIRC specific analysis

2.4 Packages

3 Results

3.1 TCGA pan-cancer analysis

3.2 KIRC specific analysis

4 Discussion

5 Concluding remarks/Outlook

6 References

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7 Appendix