University of Stuttgart
Visualization Research Center

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Theoretical and Methodological Foundations of Visual Computing

(Assignment 11)

Please submit your solution to ILIAS by 2025-01-19, 23:55 . Solutions will be discussed in the tutorial on Thursday, 2025-01-23. Please note that source code will only be accepted if it compiles.

Exercise 11.1 (6 points)

Never trust summary statistics alone; always visualize your data.
Download the accompanying file DatasaurusDozen.csv and write a script in R for the following tasks.

a) Read the file DatasaurusDozen.tsv. Inspect your data – it should be a data.frame with the variables 'dataset', 'x', 'y', with 1846 observations.

b) For each group in the 'dataset' variable, compute the mean and standard deviation for the x and y variables. You can use off-the-shelf R functions.

c) For each group in the 'dataset' variable, produce a scatterplot of the entries in this group.

d) What do you notice from the results in b) and c)?

Exercise 11.2 (8 points)

a) What can we conclude from a p-value lower than the alpha level of e.g. 0.05? **Note:** any number of answers might apply (even none at all)!

1. The result is statistically significant.
2. The result is not statistically significant.
3. The effect is important.
4. The effect is not important.
5. H_0 is true.
6. H_0 is false.

7. The result is not different enough from H_0.

8. We can reject H_0.

b) Why should you report effect sizes? Name two common measures for effect sizes.

c) Name two things you can do with power analysis.

d) What are benefits and drawbacks of outlier removal?

Exercise 11.3 (6 points)

You performed an experiment and got 13 data results. You want to perform tests in order to determine statistical significance, but they require normally distributed data.

a) You think of the Kolmogorov-Smirnov and Shapiro-Wilk tests but you are in a hurry for a deadline, so you only want to run a single test for normality. Which one should you perform and why?

b) The deadline has been postponed! You make use of the additional time and actually run both tests. However, you can't trust them because of the small sample size. What additional step can you take to ensure normality?