Experimental Design and Data Analysis

Statistical tests:

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| Test name | Test statistic | Assumptions | Tests for | Information |
| Shapiro-Wilk |  |  | Normality | is rejected for small values of W |
| Bootstrap test |  |  | Difference in distributions or expected statistics | Generate representative T\* and compare with test statistic T |
| t-test |  | Normally distributed | Difference from mean | Under , has distribution |
| Binomial (sign) test |  |  | Difference in median |  |
| Wilcoxon signed rank test |  | Symmetrically distributed | Difference in median |  |
| Permutation test |  |  | Whether T is expected under | Generate T\* with samples of permuted pairs |
| Pearson correlation test |  | Normally distributed | Correlation | Under , has distribution |
| Spearman’s rank correlation test |  |  | Rank correlation |  |
| Independent t-test |  | Normally distributed | Difference in means | Under , has distr. |
| Mann-Whitney test |  |  | Difference in medians |  |
| Kolmogorov-Smirnov test | Distance in EDF |  | Difference in distributions | One-sided tests are reversed |
| ANOVA |  | Normally distributed, equal variances, | Difference somewhere | Only right-sided |
| Kruskal-Wallis |  | All | Difference in some distributions | One-sided |
| 1-way ANOVA permutation test |  |  | Whether T is expected under | Generate T\* with samples of permuted levels |
| 2-way ANOVA |  | Normally distributed, equal variances, | Effects of factors and interaction between them | Only right-sided |
| Friedman test |  |  | Effects of factor in presence of a block or unit | Similar to 2-way ANOVA but does not assume normality |
| test |  | At least 80% of | If two factors are independent | Compare observed counts with expected |
| Fisher’s exact test |  | 2x2 table | If two factors are independent | Like but exact |
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