

How can I perform Tukey's test in Python?

Authored by
stats writer

April 23, 2024

RECOMMENDED CITATION

stats writer (2024). *How can I perform Tukey's test in Python?*. PSYCHOLOGICAL SCALES.
Retrieved from <https://scales.arabpsychology.com/?p=138500>

Tukey's test, also known as the Tukey-Kramer test, is a statistical method used to compare multiple groups and determine if there are significant differences between them. In Python, this test can be performed by using the "statsmodels" library, specifically the "pairwise_tukeyhsd" function. This function takes in the data from the different groups and conducts the necessary calculations to determine if there are any significant differences between the groups. The results of the test can then be further analyzed and interpreted to make informed decisions. Overall, performing Tukey's test in Python can provide valuable insights and aid in making data-driven decisions.

Perform Tukey's Test in Python

A one-way ANOVA is used to determine whether or not there is a statistically significant difference between the means of three or more independent groups.

If the overall p-value from the ANOVA table is less than some significance level, then we have sufficient evidence to say that at least one of the means of the groups is different from the others.

However, this doesn't tell us *which* groups are different from each other. It simply tells us that not all of the group means are equal. In order to find out exactly which groups are different from each other, we must conduct a post hoc test.

One of the most commonly used post hoc tests is Tukey's Test, which allows us to make pairwise comparisons between the means of each group while

controlling for the family-wise error rate.

This tutorial provides a step-by-step example of how to perform Tukey's Test in Python.

Step 1: Load Necessary Packages and Functions

First, we'll load the necessary packages and functions in Python:

```
import pandas as pd
import numpy as np
from scipy.statsimport f_oneway
from statsmodels.stats.multicompimport
pairwise_tukeyhsd
```

Step 2: Fit the ANOVA Model

The following code shows how to create a fake dataset with three groups (A, B, and C) and fit a one-way ANOVA model to the data to determine if the mean values for each group are equal:

```
#enter data for three groups
a =
b =
```

c =

#perform one-way ANOVA

f_oneway(a, b, c)

**F_onewayResult(statistic=5.167774552944481,
pvalue=0.012582197136592609)**

We can see that the overall p-value from the ANOVA table is 0.01258.

Since this is less than .05, we have sufficient evidence to say that the mean values across each group are not equal.

Thus, we can proceed to perform Tukey's Test to determine exactly which group means are different.

Step 3: Perform Tukey's Test

To perform Tukey's test in Python, we can use the `pairwise_tukeyhsd()` function from the `statsmodels` library:

#create DataFrame to hold data

df = pd.DataFrame({'score': ,

```
'group': np.repeat(, repeats=10))
```

```
# perform Tukey's test
```

```
tukey = pairwise_tukeyhsd(endog=df,
groups=df,
alpha=0.05)
```

```
#display results
```

```
print(tukey)
```

Multiple Comparison of Means - Tukey HSD, FWER=0.05

```
=====
=====
```

```
group1 group2 meandiff p-adj lower upper reject
```

```
-----
```

```
a b 8.4 0.0158 1.4272 15.3728 True
```

```
a c 1.3 0.8864 -5.6728 8.2728 False
```

```
b c -7.1 0.0453 -14.0728 -0.1272 True
```

```
-----
```

P-value for the difference in means between a and b: .0158
P-value for the difference in means between a and c: .8864
P-value for the difference in means between b and c: .0453

Thus, we would conclude that there is a difference between the means of groups *a* and *b* and groups *b* and *c*, but not a statistically significant difference between the means of groups *a* and *c*.

ARABPSYCHOLOGY.COM