

How can I perform a Mann-Whitney U Test in SAS?

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A Mann-Whitney U Test is a non-parametric statistical test used to compare two independent groups on a single continuous variable. To perform this test in SAS, the following steps can be followed:

1. Import the data into SAS and ensure that the data is organized with one column for the group variable and one column for the continuous variable.
2. Use the PROC NPAR1WAY procedure in SAS to run the Mann-Whitney U Test.
3. Specify the group variable and the continuous variable in the CLASS and VAR statements, respectively.
4. The U statistic, significance level, and other relevant statistics will be displayed in the output.
5. Interpret the results to determine if there is a significant difference between the two groups.

Perform a Mann-Whitney U Test in SAS

A Mann-Whitney U test (sometimes called the Wilcoxon rank-sum test) is used to compare the differences between two samples when the sample distributions are not normally distributed and the sample sizes are small ($n < 30$).

It is considered to be the nonparametric equivalent to the .

This tutorial explains how to perform a Mann-Whitney U test in SAS.

Example: Mann-Whitney U Test in SAS

Suppose researchers want to know if a fuel treatment leads to a change in the average mpg of a car. To test this, they conduct an experiment in which they measure

the mpg of 12 cars with the fuel treatment and 12 cars without it.

The results are shown below:

Treated	Untreated
24	20
25	23
21	21
22	25
23	18
18	17
17	18
28	24
24	20
27	24
21	23
23	19

Because the sample sizes are small and they suspect that the sample distributions are not , they decide to perform a Mann-Whitney U test to determine if there is a statistically significant difference in mpg between the two groups.

Use the following steps to perform a Mann-Whitney U test in SAS.

Step 1: Create the Dataset

First, we'll use the following code to create the dataset in SAS:

```
/*create dataset*/  
data mpg_data;  
input group $ mpg;  
datalines;  
treated 24  
treated 25  
treated 21  
treated 22  
treated 23  
treated 18  
treated 17  
treated 28  
treated 24  
treated 27  
treated 21  
treated 23  
untreated 20  
untreated 23  
untreated 21  
untreated 25  
untreated 18
```

```
untreated 17  
untreated 18  
untreated 24  
untreated 20  
untreated 24  
untreated 23  
untreated 19  
;  
run;
```

Step 2: Perform the Mann Whitney U Test

Next, we'll use `proc npar1way` to perform the Mann Whitney U test:

```
/*perform Mann Whitney U test*/  
proc npar1waydata=mpg_data wilcoxon;  
class group;  
var mpg;  
run;
```

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable mpg
Classified by Variable group

group	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
treated	12	172.0	150.0	17.203387	14.333333
untreat	12	128.0	150.0	17.203387	10.666667
Average scores were used for ties.					

Wilcoxon Two-Sample Test

Statistic	Z	Pr > Z	Pr > Z	t Approximation	
				Pr > Z	Pr > Z
172.0000	1.2498	0.1057	0.2114	0.1120	0.2240
Z includes a continuity correction of 0.5.					

Kruskal-Wallis Test

Chi-Square	DF	Pr > ChiSq
1.6354	1	0.2010

From the Wilcoxon Two-Sample Test table, we see that the two-sided p-value of the test turns out to be 0.2114.

H0: The two populations have the same median.HA: The two populations have different medians.

Since the p-value of the test (.2114) is not less than .05, we fail to reject the null hypothesis.

This means we do not have sufficient evidence to say that the mpg is different between the cars that receive fuel treatment and those that don't.

SAS also provides boxplots to visualize the distribution of mpg values for each group:



From the plot we can see the cars that received the fuel treatment tended to have higher mpg values, but from the results of the Mann Whitney U test we know that the differences between the two groups was not statistically significant.

Additional Resources

The following tutorials explain how to perform other

common statistical tests in SAS:

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