

How do you perform a Wilcoxon Signed Rank Test in SAS?

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The Wilcoxon Signed Rank Test is a non-parametric statistical method used to compare two related samples. It is often used when the data does not follow a normal distribution or when the sample size is small. In SAS, the Wilcoxon Signed Rank Test can be performed by using the PROC UNIVARIATE or PROC NPAR1WAY procedures. First, the data should be organized in a SAS dataset with two variables representing the two related samples. Then, the appropriate procedure should be called and the test should be specified as the test option. The output will include the test statistic, p-value, and confidence intervals, which can be used to determine the significance of the results. It is important to note that the Wilcoxon Signed Rank Test assumes that the two samples are dependent and that the observations within each sample are paired.

Perform a Wilcoxon Signed Rank Test in SAS

The is the non-parametric version of the .

It is used to test whether or not there is a significant difference between two population means when the distribution of the differences between the two samples cannot be assumed to be normal.

The following example shows how to perform a Wilcoxon Signed-Rank Test in SAS.

Example: Wilcoxon Signed-Rank Test in SAS

Suppose an engineer want to know if a new fuel treatment leads to a change in the average miles per gallon of a certain car. To test this, he measures the mpg of 12 cars with and without the fuel treatment.

The results are shown in the table below:

With Treatment	Without Treatment
20	24
23	25
21	21
25	22
18	23
17	18
18	17
24	28
20	24
24	27
23	21
19	23

We can use the following code to perform a Wilcoxon Signed-Rank test in SAS to determine if there is a significant difference in the mean mpg between the two groups:

```
/*create dataset*/  
data my_data;  
input car with_fuel without_fuel;  
datalines;  
1 20 24  
2 23 25  
3 21 21  
4 25 22
```

```
5 18 23
6 17 18
7 18 17
8 24 28
9 20 24
10 24 27
11 23 21
12 19 23
;
run;
```

```
/*create new dataset with difference between two fuel
treatments*/
```

```
data my_data2;
set my_data;
diff=with_fuel-without_fuel;
run;
```

```
/*perform Wilcoxon Signed Rank Test*/
```

```
proc univariate data=my_data2;
var diff;
run;
```

The UNIVARIATE Procedure
Variable: diff

Moments			
N	12	Sum Weights	12
Mean	-1.75	Sum Observations	-21
Std Deviation	2.70100991	Variance	7.29545455
Skewness	0.5792226	Kurtosis	-1.101612
Uncorrected SS	117	Corrected SS	80.25
Coeff Variation	-154.34342	Std Error Mean	0.7797144

Basic Statistical Measures			
Location		Variability	
Mean	-1.75000	Std Deviation	2.70101
Median	-2.50000	Variance	7.29545
Mode	-4.00000	Range	8.00000
		Interquartile Range	4.50000

Tests for Location: Mu0=0				
Test		Statistic	p Value	
Student's t	t	-2.24441	Pr > t	0.0463
Sign	M	-2.5	Pr >= M	0.2266
Signed Rank	S	-22.5	Pr >= S	0.0469

From the output we can see that the mean difference in mpg between the cars that received the treatment and those that didn't is -1.75.

In the table titled Tests for Location we can observe the following:

The Wilcoxon Signed-Rank Test statistic: -22.5
The corresponding p-value: 0.0469

Recall that the Wilcoxon Signed-Rank Test uses the

following null and alternative hypotheses:

H0: The mpg is equal between the two groups
HA: The mpg is *not* equal between the two groups

Since the of the test (.0469) is less than .05, we reject the null hypothesis.

This means we have sufficient evidence to say that the mean mpg is not equal between the two groups.

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