

# How can I perform Fisher's Exact Test in Python?

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## RECOMMENDED CITATION

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Fisher's Exact Test is a statistical method used to analyze the significance of the association between two categorical variables. In Python, this test can be performed by using the "scipy.stats.fisher\_exact" function from the SciPy library. This function takes in a contingency table as input and returns the probability of obtaining the observed data under the assumption of independence between the two variables. By comparing this probability to a chosen significance level, the test can determine whether there is a significant relationship between the two variables. This can be useful in various fields such as medicine, genetics, and social sciences where the analysis of categorical data is common.

## Perform Fisher's Exact Test in Python

**is used to determine whether or not there is a significant association between two categorical variables.**

**It is typically used as an alternative to the when one or more of the cell counts in a 2x2 table is less than 5.**

**This tutorial explains how to perform Fisher's Exact Test in Python.**

**Example: Fisher's Exact Test in Python**

**Suppose we want to know whether or not gender is associated with political party preference at a particular college.**

**To explore this, we randomly poll 25 students on campus. The number of students who are Democrats or**

**Republicans, based on gender, is shown in the table below:**

	Democrat	Republican
Female	8	4
Male	4	9

**To determine if there is a statistically significant association between gender and political party preference, we can use the following steps to perform Fisher's Exact Test in Python:**

**Step 1: Create the data.**

**First, we will create a table to hold our data:**

```
data = ,  
]
```

**Step 2: Perform Fisher's Exact Test.**

**Next, we can perform Fisher's Exact Test using the from the SciPy library, which uses the following syntax:**

```
fisher_exact(table, alternative='two-sided')
```

**where:**

**table:** A 2×2 contingency table  
**alternative:** Defines the alternative hypothesis. Default is 'two-sided', but you can also choose 'less' or 'greater' for one-sided tests.

The following code shows how to use this function in our specific example:

```
import scipy.stats as stats  
  
print(stats.fisher_exact(data))  
  
(4.5, 0.1152)
```

The p-value for the tests is 0.1152.

Fisher's Exact Test uses the following null and alternative hypotheses:

**H0:** (null hypothesis) The two variables are independent.  
**H1:** (alternative hypothesis) The two variables are *not* independent.

Since this p-value is not less than 0.05, we do not reject the null hypothesis.

Thus, we don't have sufficient evidence to say that

**there is a significant association between gender and political party preference.**

**In other words, gender and political party preference are independent.**

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