

Nonparametric Statistics ^[1]

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Nonparametric statistics are those data that do not assume a prior distribution. When an experiment is performed or data collected for some purpose, it is usually assumed that it fits some given probability distribution, typically the normal distribution. This is the basis on which the data is interpreted. When these assumptions are not made, it becomes nonparametric statistics.

There are several advantages of using nonparametric statistics ^[3]. As can be expected, since there are fewer assumptions that are made about the sample ^[4] being studied, nonparametric statistics are usually wider in scope as compared to parametric statistics that actually assume a distribution. This is mainly the case when we do not know a lot about the sample we are studying and making a priori assumptions about data distributions might not give us accurate results and interpretations. This directly translates into an increase in robustness.

However, there are also some disadvantages of nonparametric statistics. The main disadvantage is that the degree of confidence ^[5] is usually lower for these types of studies. This means for the same sample ^[4] under consideration, the results obtained from nonparametric statistics have a lower degree of confidence than if the results were obtained using parametric statistics. Of course, this is assuming that the study is such that it is valid to assume a distribution for the sample.

There are many experimental scenarios in which we can assume a normal distribution ^[6]. For example if an experiment looks at the correlation ^[7] between a healthy morning breakfast and IQ, the experimenter can assume beforehand that the IQs of the sample size ^[8] follow a normal distribution within the sample, assuming the sample is chosen randomly ^[9] from the population ^[10]. On the other hand, if this assumption is not made, then the experimenter is following nonparametric statistics methods.

However, there could be another experiment that measures the resistance of the human body to a strain of bacteria. In such a case, it is not possible to determine if the data will be normally distributed. It might happen that all people are resistant to the strain of bacteria under study or perhaps no one is. Again, there could be other considerations as well. It could be that people of a particular ethnicity are born with that resistance while none of the others are. In such cases, it is not right to assume a normal distribution of data. These are the situations in which nonparametric statistics should be used. There are many tests that tell us whether the data can be assumed to be normally distributed or not.

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