A New Statistical Test for Seasonality

by

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Abstract

This paper introduces a new test into inferential statistics to test for seasonality. A rigorous definition of seasonality that is not based on the graphical inspection of a dataset is given and discussed. A measure of seasonality as a statistic of the test is introduced. A procedure is outlined and described. A qualitative arguments are given in support of the introduced statistical test. Binomial distribution of the seasonality indicator is used to derive the formula for a test statistic. The level of significance is discussed and calculated for various outcomes. Various examples are considered to illustrate how the test for seasonality woks in practice. A notion of partial seasonality is introduced. A dataset is still considered to exhibit seasonal behavior with a certain fractional measure of partial seasonality even if not all seasons test positive – for example three out of four seasons indicating a positive effect would give value 3/4 for partial seasonality. In many cases in practice, a study might be sensitive to a certain season for which it needs to determine whether seasonal effect is present. For those studies the measure of partial seasonality can become very valuable. It can still detect the presence of seasonality even if it is only in one out of four seasons. Overall, this test can become a practical tool in environmental studies that are sensitive to the seasonal variation in data.