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Seasonal Test for Non-Stationary Time Series Data by Means of Periodogram Analysis

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Abstract. A seasonal phenomenon is common in our daily activities. Many business and economic time series data contain a seasonal phenomenon that repeats itself after a regular period of time. The smallest time period for this repetitive phenomenon is called the seasonal period. A seasonal test for time series data is well identified by Fisher's exact test in periodogram analysis. However, the test is only accurate for stationary seasonal time series data without trend. So, in this research we apply seasonal test not only for stationary time series data but also for non-stationary data . Performance of this test is applied for both types of seasonal time series data.

Keywords: Fisher's Exact Test, Periodogram Analysis, Seasonal Time Series Data.

INTRODUCTION

The weather in the tropical regions is dominated by the tropical rain belt, which moves from the northern to the southern hemisphere and back over the course of the year. The tropical rain belt lies in the southern hemisphere roughly from October to March. During the period, the northern tropical regions have a dry season with low precipitations. The days are typically sunny throughout. From April to September, the rain belt lies in the northern hemisphere, and the southern tropical regions have their dry season. Under the Köppen climate classification, for tropical climates, a dry season month is defined as a month with a precipitation average of 60 millimeters or below.

Dry season is the couple of rainy season in two-season region such as Indonesia. Although Indonesia has only two seasons, the forecast of rainy season or dry season is very difficult. Furthermore, anomalies increase the uncertainty in predicting the displacement of rainy season and dry season. The forecast is required by the government to anticipate drought and flood.

This research studied the seasonal pattern of rainfall in Indonesia. Particularly, it answered the question of "whether the rainy and dry season period had shifted from the pattern they used to be or they had change into cyclical patterns". To answer these questions we need a precise identification of seasonal patterns. Hence the prediction of dry and rainy season periods can be accurate despite of a weather anomaly.

The current identification tool of seasonal existence in a time series is based on Buys Ballot or ACF plot (Wei,2006) . There are two drawbacks of this approach. First, it is highly influence by subjectivity of the researchers. And second, results can not conclude a phenomenon simply by using time series data plot. Darmawan (2012) built an R macro of a seasonal test. However, this procedure is only suitable for non-