Is the temperature of one year significantly correlated with the next year (successive years), across the years?

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Hypothesis: The temperature of one year is significantly correlated with the next year.

1   Methods

In Key West, Florida, annual mean temperatures were collected throughout the 20th century. The aim of this practical was to find a correlation between one years temperature and the temperature of the subsquent year. This was achieved by calculating the correlation between t-1 pairs of years, where t is the total number of years.

Firstly, the correlation coefficient was computed between successive years within an R script. Two sets of vectors, t years and t-1 years were created and the correlation was then calculated by using the function $cor(t-1, t)$.

Secondly, the correlation between t and random permutations of the time series was calculated. These correlations were compared with that of the first set.
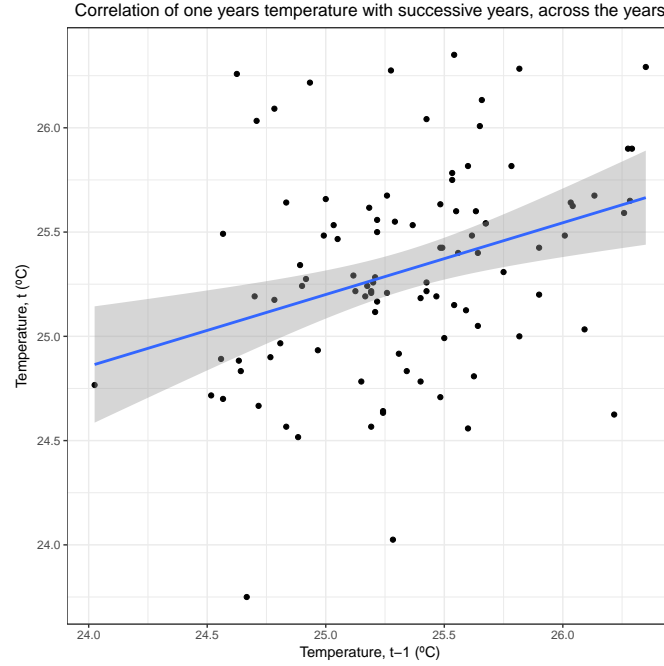
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2 Results

Figure 1: Temperature in Key West, Florida for the 20th century.

3 Interpretation

Figure 1 shows a graph with positive correlation between t and t-1 years. The positive correlation shown in the graph is also backed up the correlation value of 0.326, which was attained by computing t and t-1 years using R's $cor()function$. We can interpret that one years temperature is positively correlated with the temperature of the following year with high significance as $p < 0.005$.