

Dana Analysis - Bayesian Statistics: Time Series Analysis

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1 Introduction

The present report aims to analyze time data from Google Trends (<https://trends.google.com/trends/>). In this case, we analyzed the number of searches on the platform for the NBA basketball team in the USA. The league was chosen because of properties found in the data that were suitable for the studies developed in this course, such as seasonality, increasing/decreasing trend, and time dependence. To better understand periodicity in the data, we considered periods of 4, 6, and 12 months, as well as a discount factor of 0.81, the best found in the case study.

2 Methodology

To better understand the data and the temporal structure, we can see that it is periodic, presents a certain increasing trend over time and some time dependency, showing that, when the league is playing on the court, more people search for NBA on Google than in other periods of the year as shown in the figure 1.

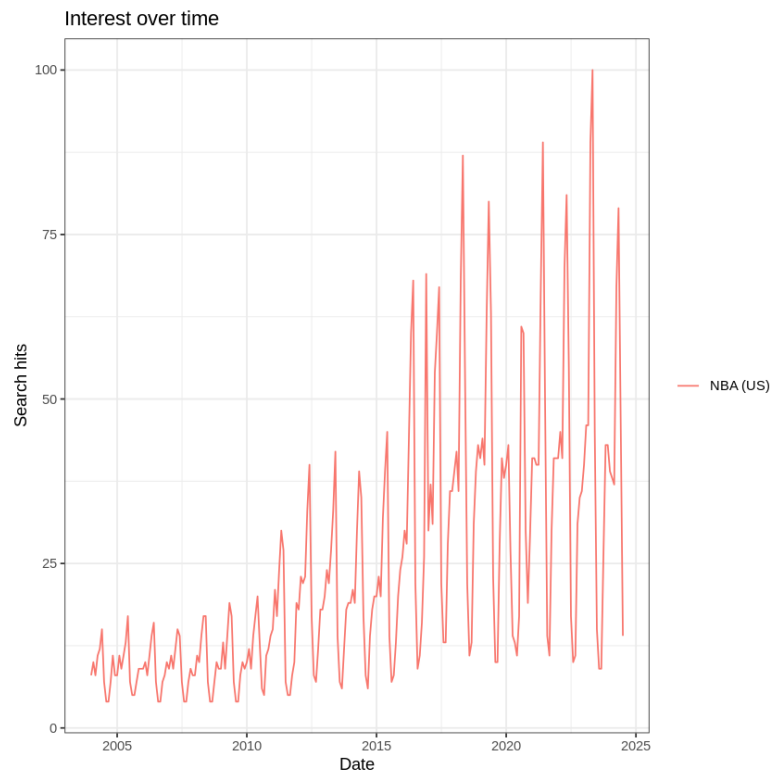


Figura 1: Trend for NBA on Google

To better understand the seasonal trend and how it affects the modeling, we plotted the seasonal components for periods of 4, 6 and 12 months. As can be seen in the figure 2.

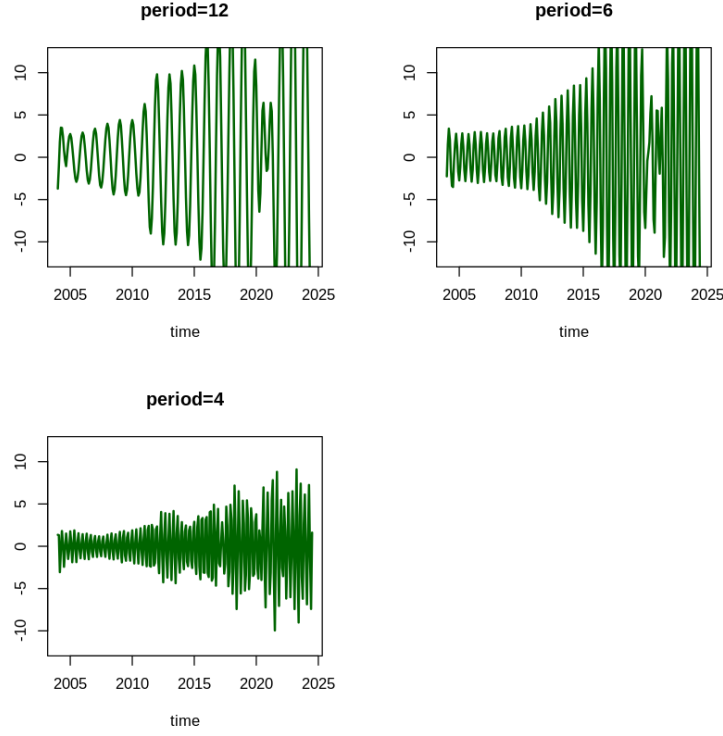


Figura 2: Seasonal components

The figure shows the seasonal behavior in the data, with oscillatory behavior through the year, this behavior is only attenuated around 2020, when the Covid-19 pandemic broke out and can be better understood in the periods of 6 and 12 months.

We also considered a discount factor to suit the best model for the data, which was around 0.81, the smoothed model fitted after the analysis, as well as the rate of change, can be seen in the figure 3.

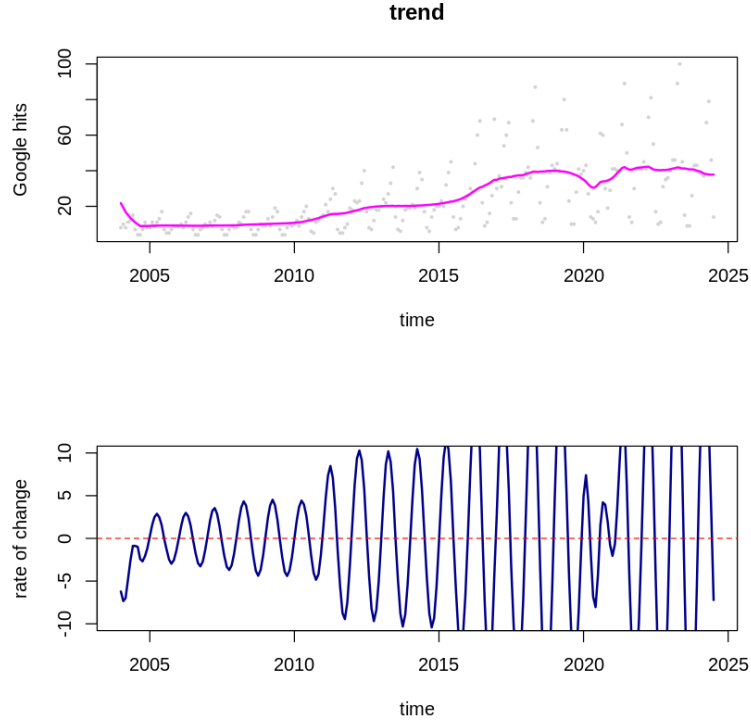


Figura 3: Smoothed trend for NBA research

As can be seen, it is possible to see an increasing trend between 2005 and 2020, and a period of stabilization ever since, indicating that interest in NBA might have reached its peak since 2020.

3 Conclusion

After all the investigation, it is possible to conclude that interest in NBA might have reached a peak, after years of steady increase, as well as the periodicity of the data, showing that interest increases during certain periods of the year, then returning to normality. The discount factor found, of 0.81, is also a reasonable one.