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Time series methods to forecast patent filings

Abstract

In 2001 the European Patent Office (EPO) announced the three years lasting research programme titled *Improvements to methods for forecasting patent filings*. Part of this research programme focuses on *Time series methods to forecast patent filings* and this paper summarizes the results of the first year obtained in this part of the programme.

The filings reaching the EPO as European Patent applications can do this in different ways. In this paper we concentrate on Euro-Direct filings, on Euro-PCT filings in the international phase, and on Euro-Total filings which are the sum of the Euro-direct and Euro-PCT filings. We do not distinguish between first and subsequent filings here. The filings are analyzed as totals but also in some cases by blocs of origin. In particular we consider four blocs: EPC member states, USA, Japan, and others.

In our first approach we used exponential smoothing techniques to analyze the data. This method is applied to the Euro-PCT and to the Euro-Total data on a monthly base in order to get short-term forecasts, i.e. 12 months ahead, and some seasonal filing patterns which are useful in the controlling process during the year. In the paper we give a short introduction to exponential smoothing and some results of the analysis based on this method.

The second method we used is the classical univariate ARIMA approach introduced by Box and Jenkins. We applied this approach on the yearly data to get long-term forecasts, i.e. 5 years ahead, together with some prediction bands to characterize the precision of the forecast. In our paper we will briefly sketch the univariate ARIMA approach. Furthermore, some of the results based on this analysis will be presented.

To improve the accuracy of the long-term forecast based on the univariate ARIMA approach we incorporated information about the expenditures on research and development. Since these expenditures will finally influence patent application, one could use the time lag between expenditure and patent application to set up an ARIMA model where the expenditures are used as regressors. Again, we will give a short sketch of the methodology in our paper and also some of the results obtained.