

Statement of my research

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My current research is related to one problem in time series, named seasonal adjustment. As the name implies, this problem is to solve the influence brought by 'seasons' initially, which could be the seasons people always talk about or other recurrent time patterns, like weeks or months. With the seasonal adjusted series and other useful information from this process, people(usually some decision maker in the government) could give a better conclusion aimed at one dataset or make a better strategy for the future.

Generally speaking, for one time series dataset, we usually suppose it is composed by trend, seasonal component, irregular and some outliers four parts. Our goal is to decompose one series observed or gathered by official departments or other organizations into these different components and different components play different roles in our analysis. So basically how to decompose our data into these components is what I am trying to figure out.

The research of this problem has last for a long time. Traditional methods are based on the S-ARIMA model, which is powerful and generalized from the ARIMA(ARMA) model. Two methods used to treat seasonal adjustment problems usually are called

TRAMO-SEATS and X-12ARIMA. Since they have been used for decades in government and other companies, we have reason to believe that the results from them are reasonable and satisfying. Therefore, my current work is under the assumption that the result from them is the 'correct' answer (actually, there is no explicit answer here cause we don't have a formal definition of these components), and how to get the similar result is another requirement of my research.

Different from conventional methods, my research is to use state-space models and the Kalman filter to achieve seasonal adjustment. Dr. Durbin and Dr. Koopman have contributed a lot in this field and some of their papers are my main reference. Compared with ARIMA models, state-space models are more flexible and more general. For example, we can switch a random ARIMA model into a state-space model but sometimes can't switch a complex state-space model into a ARIMA model. Meanwhile, out of reality, state-space models have more strong interpretation, which is convenient for us to understand and analyze data. It has too many advantages so I would stop here.

In a word, my final purpose for now is to use Kalman filter and state-space models to reproduce the results from conventional methods to achieve seasonal adjustment without using them. Since there are some parameters in our state-space models, how to figure out the choices of them is our main difficulty now. I will talk about the details in the next part.