

Title: Bayesian structural time series

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Bayesian structural time series (BSTS) model is a statistical technique used for feature selection , time series forecasting, nowcasting , inferring causal impact and other applications. The model is designed to work with time series data.

The model has also promising application in the field of analytical marketing . In particular, it can be used in order to assess how much different marketing campaigns have contributed to the change in web search volumes, product sales, brand popularity and other relevant indicators.

Difference-in-differences models and interrupted time series designs are alternatives to this approach. "In contrast to classical difference-in-differences schemes, state-space models make it possible to (i) infer the temporal evolution of attributable impact, (ii) incorporate empirical priors on the parameters in a fully Bayesian treatment, and (iii) flexibly accommodate multiple sources of variation, including the time-varying influence of contemporaneous covariates, i.e., synthetic controls."

General model description

The model consists of three main components:

Kalman filter . The technique for time series decomposition. In this step, a researcher can add different state variables: trend, seasonality, regression, and others.

Spike-and-slab method. In this step, the most important regression predictors are selected.

Bayesian model averaging . Combining the results and prediction calculation.

The model could be used to discover the causations with its counterfactual prediction and the observed data.

A possible drawback of the model can be its relatively complicated mathematical underpinning and difficult implementation as a computer program. However, the programming language R has ready-to-use packages for calculating the BSTS model, which do not require strong mathematical background from a researcher.

See also

Bayesian inference using Gibbs sampling

Correlation does not imply causation

Spike-and-slab regression

References

Further reading

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