

# Penalized Complexity Priors for ARMA-processes

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## Background

The construction of good and interpretable priors for Bayesian analysis of Gaussian ARMA( $p, q$ ) processes is difficult. The somewhat non-interpretable parameters makes it difficult to think about, and understand parameters, and essentially makes the standard approach to setting priors somewhat arbitrary. The new concept of Penalized Complexity (PC) priors (Simpson et al., 2014) is really useful in such problems, since it propose to define priors implicitly through the distance between distributions instead of defining them directly on the parameters itself.

## Task

The task is to understand the concept of PC-priors, then generalise and modify recent results<sup>1</sup> about constructing PC-priors for the AR( $p$ ) process, to MA( $q$ ) process, and (if time) also discuss the ARMA( $p, q$ ) case.

## Workload and prerequisites

Knowledge of Bayesian statistics is an advantage, although not absolutely necessary. If you are unfamiliar with Bayesian statistics, you can pick up the basis by self-reading. The workload is expected to be about 100 hours.

## References

Simpson, D. P., Rue, H., Martins, T. G., Riebler, A., and Sørbye, S. H. (2014). Penalising model component complexity: A principled, practical approach to constructing priors. arxiv:1403.4630 (revised in 2015), Norwegian University of Sciences and Technology, Trondheim, Norway.

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<sup>1</sup>Sørbye & Rue (2016) *Penalized Complexity priors for AR( $p$ ) processes*, in preparation