

Title: *Splinet – Efficient Orthogonalization of the B-splines*

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Abstract

In functional data analysis, choosing proper basis functions to represent the observations is a crucial step. In this study, a new efficient orthogonalization of the B-spline basis is proposed and contrasted with some previous orthogonalized methods. The resulting orthogonal basis of splines is best visualized as a network of functions rather than a sequence of them. For this reason, the basis is referred to as a splinet.

The splinet features have clear advantages over other spline bases. They efficiently exploit ‘near-orthogonalization’ featured by the B-splines and gains are achieved at two levels: locality that is exhibited through the small size of the total support of a splinet and computational efficiency that follows from a small number of orthogonalization procedures needed to be performed on the B-splines to achieve orthogonality. These efficiencies are formally proven by showing the asymptotic rates w.r.t. the number of elements in a splinet. The natural symmetry of the B-splines in the case of the equally spaced knots is preserved in the splinet, while quasi-symmetrical features are also seen for the case of arbitrarily spaced knots.

This approach has been implemented as an R package, 'splinet', and it will be available on CRAN soon.

This is joint work with Professor Krzysztof Podgorski and Hiba Nassar at the Department of Statistics of the Lund University.