DATA-DRIVEN SMOOTHING PARAMETER SELECTION FOR CIRCULAR DATA ANALYSIS [*]

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ABSTRACT: In this talk, we introduce a novel data-based smoothing parameter tailored for circular kernel density estimation and its derivatives. Building upon the plug-in ideas, we replace unknown quantities with appropriate estimates to derive an optimal smoothing parameter. Specifically, we present a circular adaptation of the renowned Sheather and Jones bandwidths through direct and solve-the-equation plug-in rules. The theoretical underpinning of our approach is established, encompassing the asymptotic mean squared error of the density estimator, its derivatives, and its functionals for circular data. We further conduct a simulation study to compare the performance of our proposed selectors with existing data-based smoothing parameters. To illustrate the applicability of our plug-in rules, we apply them to a real data example.

KEYWORDS: circular data, directional statistics, kernel density estimation, plug-in rule