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A semiparametric approach to estimate reference curves for biophysical properties of the skin

Reference curves which take one covariable into account such as the age, are often required in medicine, but simple systematic and efficient statistical methods for constructing them are lacking. Classical methods are based on parametric fitting (polynomial curves). In this talk, we describe a methodology for the estimation of reference curves for data sets, based on nonparametric estimation of conditional quantiles. The derived method should be applicable to all clinical or more generally biological variables that are measured on a continuous quantitative scale. To avoid the curse of dimensionality when the covariate is multidimensional, a semiparametric approach is proposed. This procedure combines a dimension-reduction step (based on sliced inverse regression) and kernel estimation of conditional quantiles step. The usefulness of this semiparametric estimation procedure is illustrated on a simulated data set and on a real data set collected in order to establish reference curves for biophysical properties of the skin of healthy French women.