Nonparametric density estimation from covariate information

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Abstract: An increasing number of statistical problems arise in connection with functional calibration. In each case, inexpensive, indirect data in a particular context are combined with direct, expensive-to-acquire data from different but related settings, so as to estimate quantities in the former case. We observe data which give us access to the distribution of U given V, and, from these and data on U, we wish to estimate the density of V. The motivating real datasets are of age and covariate information in fish populations. We suggest two methodologies, each based on transforming the problem to one which involves inversion of a symmetric, linear operator. Our techniques have connections to methods for functional data analysis and for a variety of mixture and deconvolution problems, as well as to calibration techniques.