

Estimating the covariance of fragmented functional data

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Abstract: We consider the problem of estimating the covariance function of functional data which are only observed on a subset of their domain, such as fragments observed on small intervals or related types of functional data. We focus on situations where the data enable to compute the empirical covariance function or smooth versions of it only on a subset of its domain which contains a diagonal band. We show that estimating the covariance function consistently outside that subset is possible as long as the curves are sufficiently smooth. We establish conditions under which the covariance function is identifiable on its entire domain and propose a tensor product series approach for estimating it consistently. We derive asymptotic properties of our estimator and illustrate its finite sample properties on simulated and real data.