Weakly dependent functional data

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Functional data often arise from measurements on fine time grids, and are obtained by separating an almost continuous time record into natural consecutive intervals, for example one day. The functions thus obtained form a functional time series, and the central issue in the analysis of such data consists in taking into account the temporal dependence of these functional observations. Examples include daily curves of financial transaction data and daily patterns of pollution data. For scalar and vector valued stochastic processes, a large number of dependence notions have been proposed, but in time series analysis those based on moments have proven most useful (autocovariances and cumulants). We introduce a new moment based notion of dependence for functional time series and show how it impacts several statistical procedures, like estimation of functional principal components, change point detection and the functional linear model. We explain when dependence modifies the results obtained for iid functional observations, and when these results are robust to weak dependence.

This is joint work with Piotr Kokoszka from Utah State University.