

Abstract: Functional regression is an extension of regression when both dependent and independent variables are function-valued. In this talk, we regard spatial data as square integrable function-valued random variables, and construct a regression model for spatio-temporal data by a bounded linear operator on $L^2(\mathbb{R}^2)$, where a convolution operator will be employed. We propose a frequency domain approach to estimate parameters that can overcome typical difficulties in spatial data analysis, including irregularly spaced observation locations with huge sample sizes, lots of NAs and so on. We clarify the asymptotic regime under which the estimator is consistent and asymptotic normal, as asymptotics for spatial data is not trivial at all unlike time series one. We apply our functional regression to the spatial dataset of NTT Docomo human mobility survey in order to examine COVID-19 pandemic in Japan. As I expect audiences are not necessarily familiar with frequency domain approach esp. for spatial data, I will include a brief introductory summary of spectral analysis in the talk.