Bi-variate Continuous ARMA Random Fields

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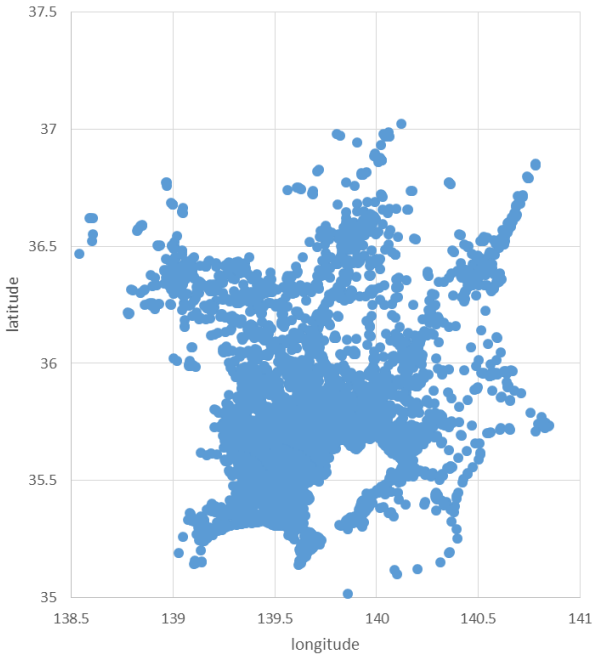
Brockwell and Matsuda (2017) extended CARMA models for time series to those for random fields, which we call as "CARMA random fields". In this talk, we consider a bivariate extension of CARMA random fields to analyze spatially scattered bivariate observations. After defining bivariate CARMA random fields, we introduce Whittle likelihoods to estimate the parameters with applications to imputation for missing components of bivariate observations. There is a gap between discrete observations and continuous models to conduct the imputation. We employ Bayesian ways to fill the gap. We demonstrate them by applying to bivariate samples of land price in Tokyo with the distance to the closest station.



lon	lat	log_dist	return
139.00	36.02	9.55	−5.67
139.02	36.01	9.39	−6.74
139.08	35.99	6.80	NA
139.08	36.00	6.62	−1.00
139.08	35.99	6.11	−3.81
139.08	36.00	6.68	−1.49
139.08	36.01	7.50	NA
139.09	35.99	5.19	−5.46
139.09	36.07	5.99	−10.38
139.10	36.20	7.74	−5.81
139.10	35.99	6.80	−4.13
139.11	35.98	7.44	NA
139.12	36.22	7.31	−4.71
139.13	36.19	7.31	−7.41
139.13	36.20	6.75	NA

Fig.: 6000 sampling points of land price in Tokyo and part of the bi-variate dataset

References

1. Brockwell, P. J. and Matsuda, Y. (2017). Continuous auto-regressive moving average random fields on Rn. *J. R. Statist. Soc. B*, Vol. 79(3), 833-857.
2. Matsuda, Y. and Yajima, Y. (2009). Fourier analysis of irregularly spaced data on Rd. *J. R. Statist. Soc.* B, Vol. 71(1), 191-217.