Appendix for "A test for deterministic dynamics in spatial processes"

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Abstract

We propose a statistical procedure to determine if a spatial structure that is observed in the data is generated by a deterministic (even chaotic) spatial process, rather than by a stochastic process. This procedure can be used as a specification test. It is robust against nonlinearity and nonstationarity and can complete the toolbox for testing diagnosis as well. The advantages of the presented methods are high power, simplicity, and ease and ample applicability for tests to be conducted, provided that weak conditions are required. Herein, we conduct several simulations to evaluate the performance of our procedure on well-known spatial processes and in situations where standard tests for spatial autocorrelation fail to detect spatial dependence. Guidelines for using the technique are also provided herein.

Appendix

Table A1: $Pr(Reject\ determinism/s-deterministic)$ for fixed R and increasing m

s	**0,1**	**0,5**	**1**	**1,5**	**2**	**0,1**	**0,5**	**1**	**1,5**	**2**
Model 1						**Model 5**				
m = 5	0,18	0,17	0,21	0,17	0,15	0,25	0,24	0,3	0,25	0,24
m = 6	0,04	0,02	0,1	0,06	0,08	0,06	0,16	0,13	0,15	0,26
m = 7	0	0	0	0	0	0	0	0,02	0	0
m = 8	0	0	0	0	0	0	0	0	0	0
Model 2						**Model 6**				
m = 5	0,19	0,24	0,21	0,27	0,17	0,17	0,27	0,22	0,24	0,2
m = 6	0,06	0,05	0,05	0,02	0,04	0,06	0,11	0,1	0,09	0,11
m = 7	0	0,01	0	0	0	0	0	0	0	0
m = 8	0	0	0	0	0	0	0	0	0	0
Model 3						**Model 7**				
m = 5	0,18	0,19	0,17	0,16	0,16	0,69	0,84	0,91	1	1
m = 6	0,04	0,09	0,1	0,08	0,04	0,59	0,94	0,99	1	1
m = 7	0	0,01	0	0,01	0	0,44	0,83	0,97	1	1
m = 8	0	0	0	0	0	0,2	0,67	0,93	0,99	1
Model 4						**Model 8**				
m = 5	0,22	0,21	0,28	0,23	0,31	0,22	0,24	0,31	0,31	0,47
m = 6	0,06	0,08	0,13	0,15	0,16	0,03	0,12	0,13	0,22	0,44
m = 7	0,01	0	0,02	0	0	0,03	0	0	0,03	0,13
m = 8	0	0	0	0	0	0	0	0	0	0

R=1000, parameter s is a rate of variances: variance of the stochastic part on variance of the deterministic part