



Hierarchical Bayesian Spatio-Temporal Interpolation including Covariates

Ijaz Hussain, Muhammad Mohsin, Gunter Spoeck, and Juergen Pilz

University of Klagenfurt, Austria, Statistics, Statistics, Klagenfurt, Austria (ijaz.hussain.kherani@gmail.com)

The space-time interpolation of precipitation has significant contribution to river control, reservoir operations, forestry interest and flash flood watches etc. The changes in environmental covariates and spatial covariates make space-time estimation of precipitation a challenging task. In our earlier paper [1], we used transformed hierarchical Bayesian space-time interpolation method for predicting the amount of precipitation. In present paper, we modified the [2] method to include covariates which varies with respect to space-time. The proposed method is applied to estimating space-time monthly precipitation in the monsoon periods during 1974 – 2000. The 27-years monthly average data of precipitation, temperature, humidity and wind speed are obtained from 51 monitoring stations in Pakistan. The average monthly precipitation is used as response variable and temperature, humidity and wind speed are used as time varying covariates. Moreover the spatial covariates elevation, latitude and longitude of same monitoring stations are also included. The cross-validation method is used to compare the results of transformed hierarchical Bayesian spatio-temporal interpolation with and without including environmental and spatial covariates. The software of [3] is modified to incorporate environmental covariates and spatial covariates. It is observed that the transformed hierarchical Bayesian method including covariates provides more accuracy than the transformed hierarchical Bayesian method without including covariates. Moreover, the five potential monitoring sites are selected based on maximum entropy sampling design approach.

References

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