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Comparison of Spatial Interpolation Methods for Mapping Daily Air Temperature

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The sparsely distributed meteorological centers fails to provide enough information regarding spatial patterns. Even at places where dense meteorological stations are available, it is difficult to develop realistic gridded data due to the complex topography and climatic variability. Some of the climate as well as hydrological model require spatially continuous datasets as inputs. It is possible to obtain a continuous surface of raster datasets with the help of interpolation methods where each value is assigned based on surrounding values using specific mathematical formulas. For present study, various interpolation methods, like Inverse distance weighted, ordinary krigging, thin plate smoothing spline; has been compared for maximum and minimum temperature. Error in the interpolated data was analyzed by independent cross validation method, in which measurements like root mean square error (RMSE), mean squared relative error (MSRE), coefficient of determination (r^2) and coefficient of efficiency (CE) were adopted for performance evaluation. Method with minimum error was chosen for developing the final map. It provides an effective way for mapping the meteorological variables in a topographically diverse region. In this case, an Indian state Odisha is chosen as study area. The state consists of 10 different agro-climatic zones and sees several weather systems across the year. The area suffers with floods, drought, heat waves and costal erosion almost every year with variable intensity. Strong heat waves in summer affect the human health, agriculture, construction efficiency and labour productivity. As three-fourth of the state is filled with mountains and high lands, monitoring network is sparsely distributed. Despite small latitudinal difference, temperature changes considerably with respect to both space and time. Here interpolation method plays a vital role to avoid uncertainty in modelling. Based on the generated maps, vulnerable areas on the basis of maximum temperature in summer and minimum temperature in winter is identified. Several indicators and vulnerability indices has been used.