A GEOSTATISTICAL APPROACH TO CLASSIFICATION OF TOPOGRAPHY AND CLIMATE ZONES FOR RWIS NETWORK PLANNING

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Abstract

Road Weather Information System (RWIS) is a combination of advanced technologies that collect, process, disseminate road weather and condition information. This information is subsequently used by road maintenance authorities for making operative decisions for improved safety and mobility during inclement weather events. For this reason, many North American transportation agencies have invested millions of dollars to deploy RWIS stations to improve the monitoring coverage of winter road surface conditions. Currently, however, there are substantial gaps in knowledge in determining the network density (i.e., number of stations) to provide an acceptable level of coverage. To fill this gap, an investigation was done on the hypothesis that the optimal RWIS density is dependent on the spatial variability of the road weather conditions as well as its respective topographical characteristics. To test this hypothesis, geostatistical semivariogram models were developed to quantify the underlying spatial autocorrelation structures, in which the RWIS network optimization model is employed to examine the potential relationship between the density and topography. The study area combines several North American States and Provinces with varying zonal characteristics and includes regions of higher or lower elevations, fairly flat or highly varied terrain, and warm or cold regions. This study proposes that the RWIS data collected from a specific region can be used to estimate the number of stations required for another region of similar zonal characteristics. The outcome of this study can be used as a decision-making tool for RWIS network expansion planning thus maximizing the RWIS network monitoring capability using zonal classifications.

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