HOW TO DEVELOP A MULTI-FACET QC PROCEDURE FOR A GROUND-BASED WEATHER MONITORING NETWORK

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Ground-based monitoring is essential for collecting environment information (e.g., air temperature, soil moisture) and evaluating its effectiveness. However, environmental uncertainties may have various impacts impairing data quality (e.g., outliers, reading delay). To mitigate these impacts, a multi-facet Quality Control (QC) strategy is developed and tested using Florida Automated Weather Network (FAWN) as an experiment platform. A flagging system with multiple types of labels (e.g., pass, suspicious, warning, erroneous, etc.) is integrated with multi-facet QC methods, including missing and duplicate check, three-level range checks, step checks, internal consistency checks, and spatiotemporal variance checks, to classify data quality. Range checks detect the outliers according to three hierarchical geographical levels of global, state, and region. While the boundaries of global and state ranges are relatively static, regional ranges are determined statistically and dynamically using z-test updated by new observations. The step checks detect unusual drastic changes between consecutive time steps or of a designated interval. Due to the drastic local weather variations in FL, data changes of consecutive steps could be too sensitive to be benchmarked than the ones of longer intervals and with more consistency trends. Physical concepts, such as dew point is no greater than air temperature, are encoded into internal consistency checks for all types of measures to minimize physical violation of data. Moreover, a spatial-temporal variance check considering the dynamics of data across multiple locations is under development to study the weather events' behaviors in Fl focusing on the similarity of time series patterns from surrounding stations. All those algorithms above can be generally applied for other loT-based monitoring networks.

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