Feature and Quantile Selection for the Actuarial Climate Index: Everything, Everywhere, All at Once

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Abstract

The actuarial climate index (ACI) has traditionally been computed as the average of standardized anomalies across several climatic variables, a method that uniformly weights features and lacks a statistically robust mechanism for feature and quantile selection.
In this presentation, we challenge these limitations by introducing an advanced statistical framework that leverages Time-Penalised Trees (TpT) to dynamically select and weight the features based on their predictive power for extreme events and climate-related mortality, while also rigorously assessing the importance of the climatic variables to refine the quantile selection process.
By focusing on key risk areas and integrating a more adaptable, data-driven methodology, this approach enhances the interpretability and sensitivity of the index, thereby offering insurers and policymakers a more tailored tool for assessing and managing evolving climate risks. Preliminary results indicate significant improvements in the index's ability to capture localized risk variations and provide a nuanced understanding of climate impacts on insurance claims, paving the way for further research and broader applications in actuarial science.

Keywords: Actuarial Climate Index; Feature Selection; Time-Penalised Trees (TpT); Extreme Compound Events; Climate Risk;

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