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Hierarchical Electricity Demand Forecast Reconciliation with Time Series Filters

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Accurate electricity demand forecasting is essential for power system planning, but misaligned forecasts in deregulated markets cause inefficiencies like increased costs and grid instability. This study proposes a framework integrating seasonal-trend decomposition (STL) with Hodrick-Prescott (HP) and Christiano-Fitzgerald (CF) filters to enhance hierarchical forecast accuracy. Using monthly peak load data from the Nigerian power system, it evaluates optimal reconciliation methods. The CF symmetric filter method improved forecast accuracy as compared to direct methods and also outperformed the HP filter approach. The results also highlight the importance of selecting appropriate reconciliation methods based on the base forecasting method. These findings advance hierarchical forecasting, enhancing grid reliability and supports the reduction of planning costs.

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