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Forecast reconciliation: Geometry, optimisation, and insights beyond hierarchical time series

Forecasting hierarchical time series using reconciliation methods has become increasingly popular in recent years. In addition to significant academic contributions across fields including retail, energy, macroeconomics, and demography, the impact of forecast reconciliation in industry is testified by its use in organisations including Google, IBM, Huawei, Volkswagen, and the International Monetary Fund. This talk will cover three recent discoveries in forecast reconciliation. First, the development of probabilistic forecast reconciliation for continuous and discrete time series. Second, a novel approach to reconciliation for time series that follow non-linear constraints, for example ratios such as unemployment rates and mortality rates. Third, new methods underpinned by forecast reconciliation, that guarantee forecast improvement even when there is no hierarchical structure. Throughout, attention will be given to the role of geometric intuition and optimisation in both proving key theoretical results as well as paving the way for reconciliation methods to be extended to new domains. The talk will conclude with a discussion of open problems in the field of forecast reconciliation.