Spatial Data Science: Time Series Analysis

Lauren Bennett, PhD
Alberto Nieto
Flora Vale

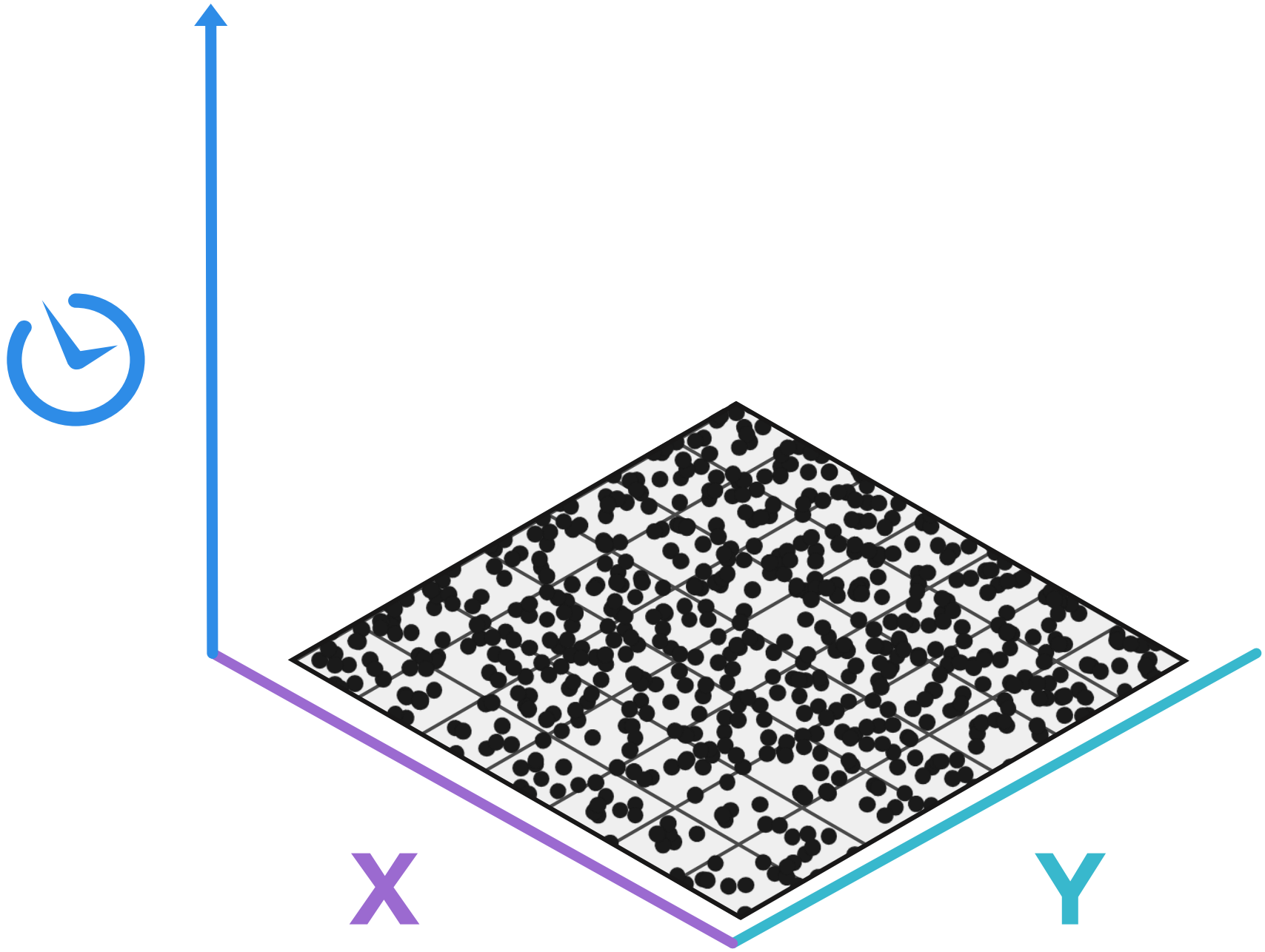
2021 ESRI FEDERAL GIS CONFERENCE

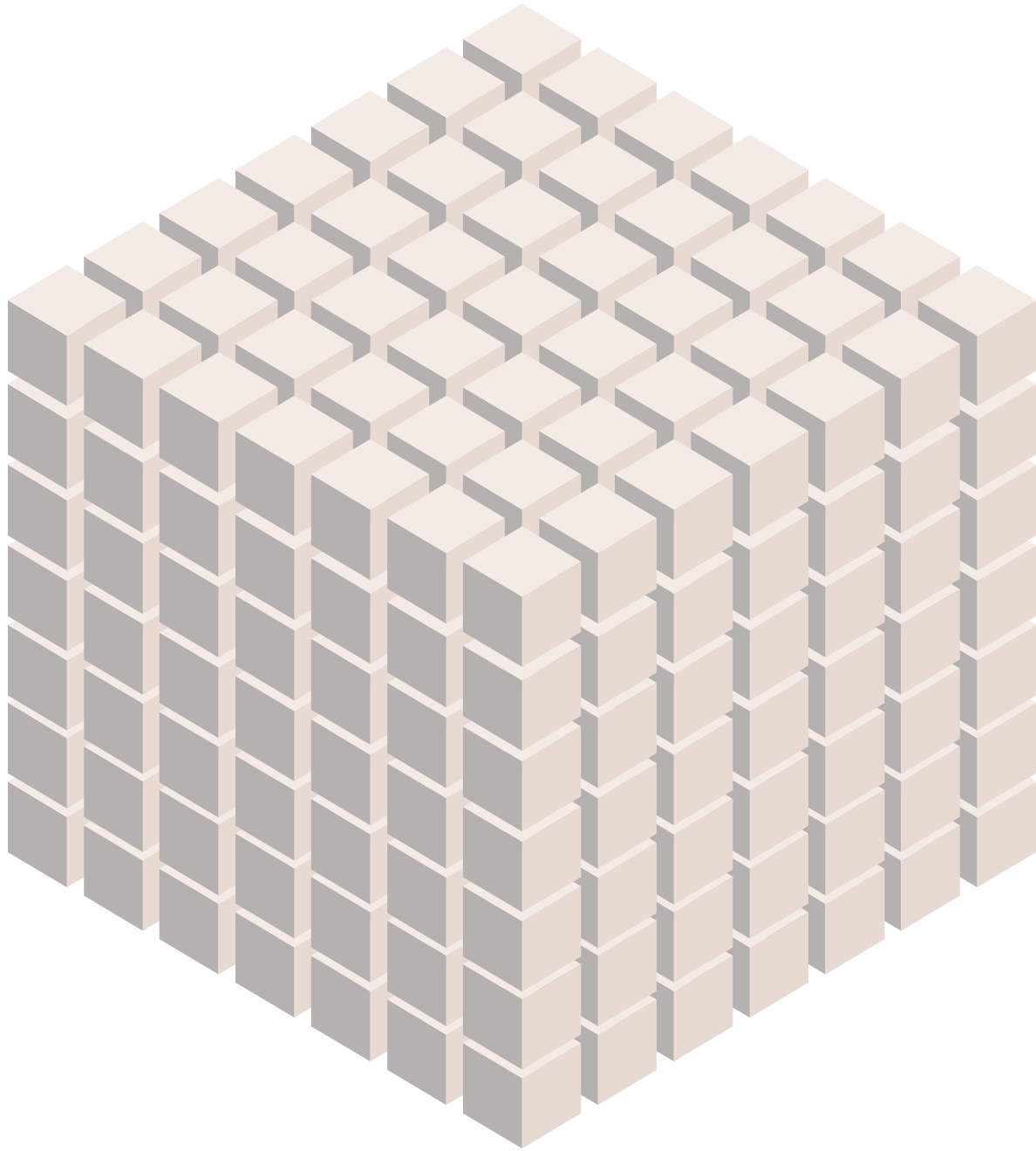
Space Time Pattern Mining

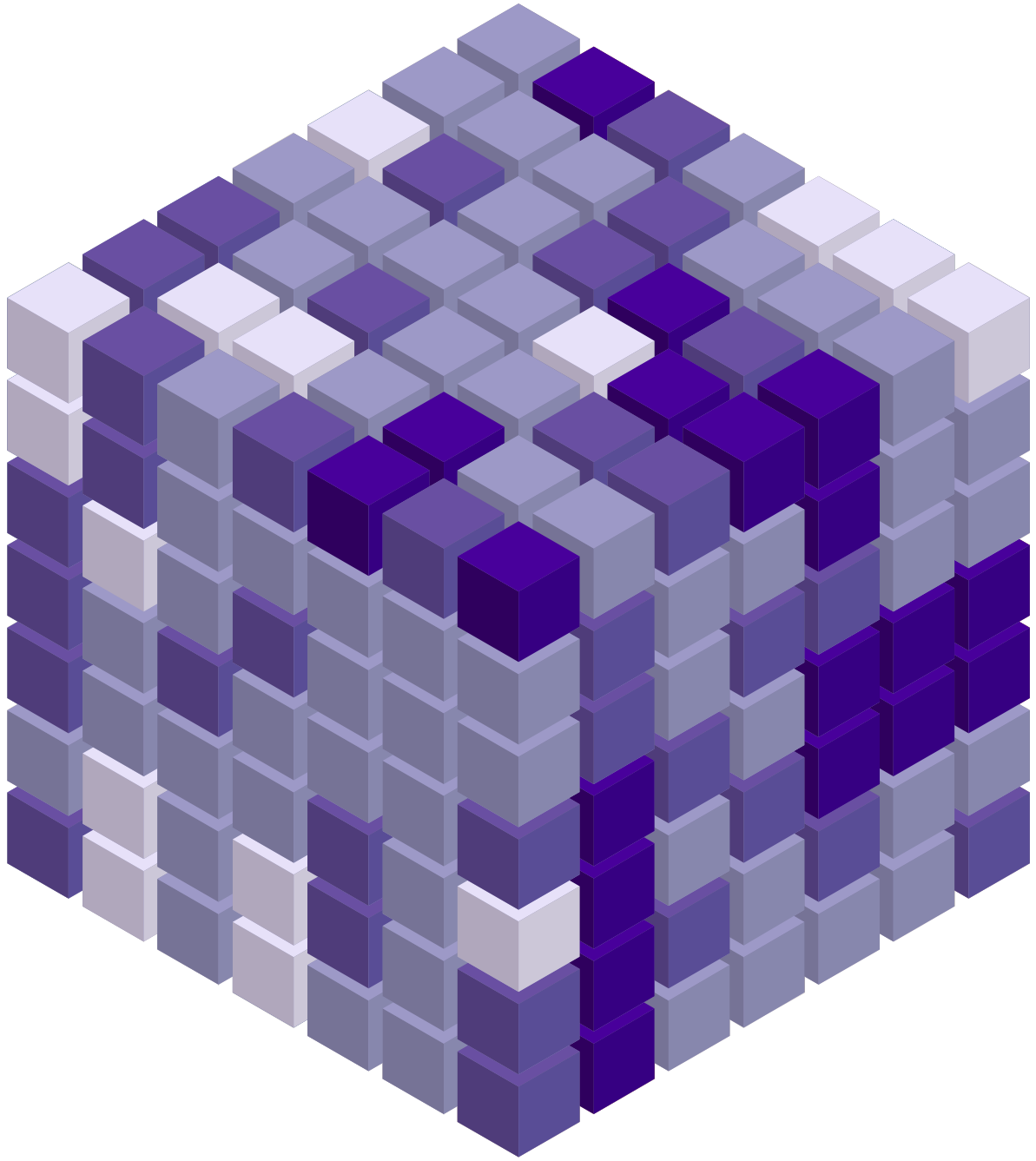
Toolbox to analyze spatiotemporal data

Creating a Space Time Cube

Aggregating in space and time


X
Y

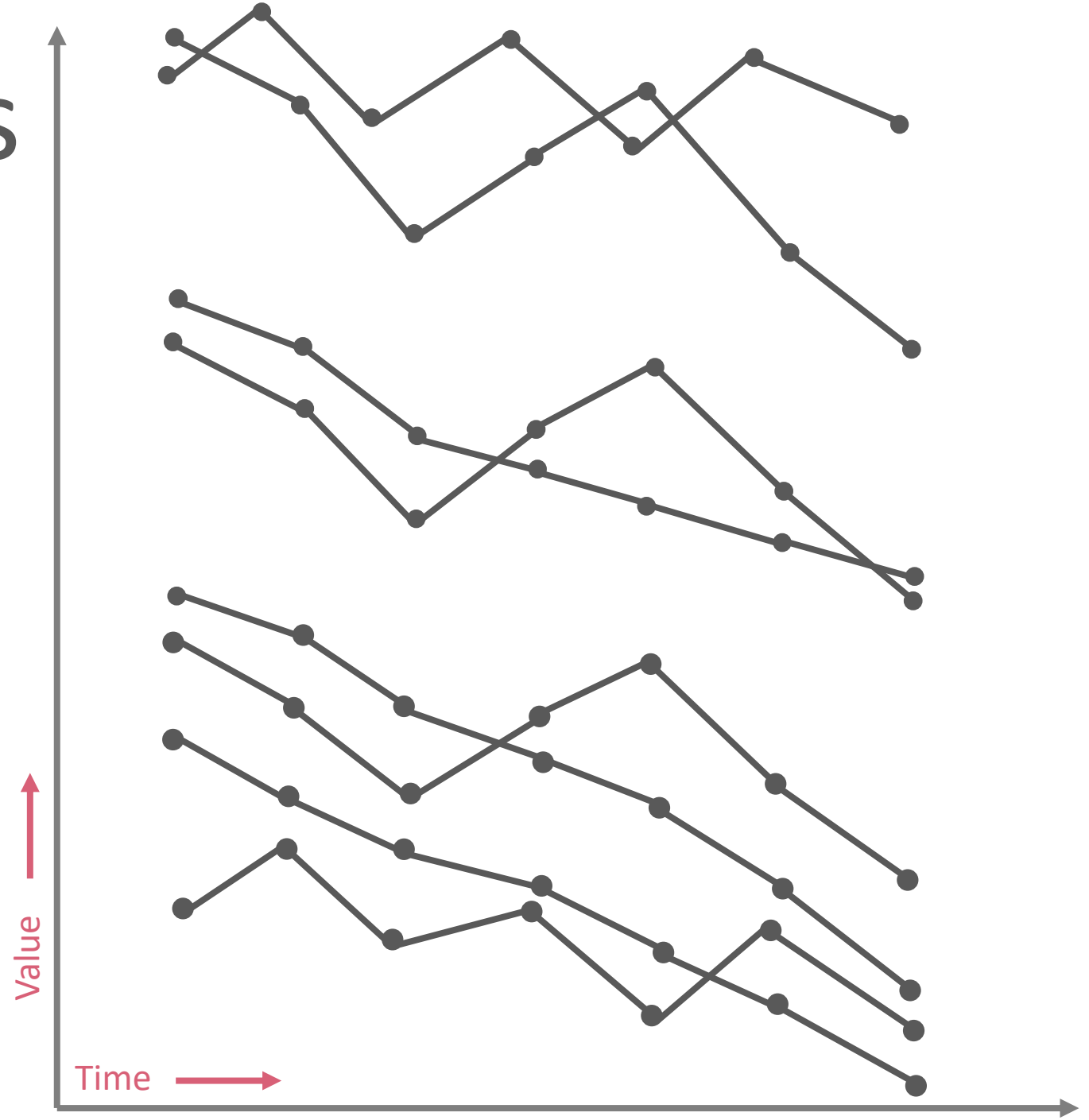




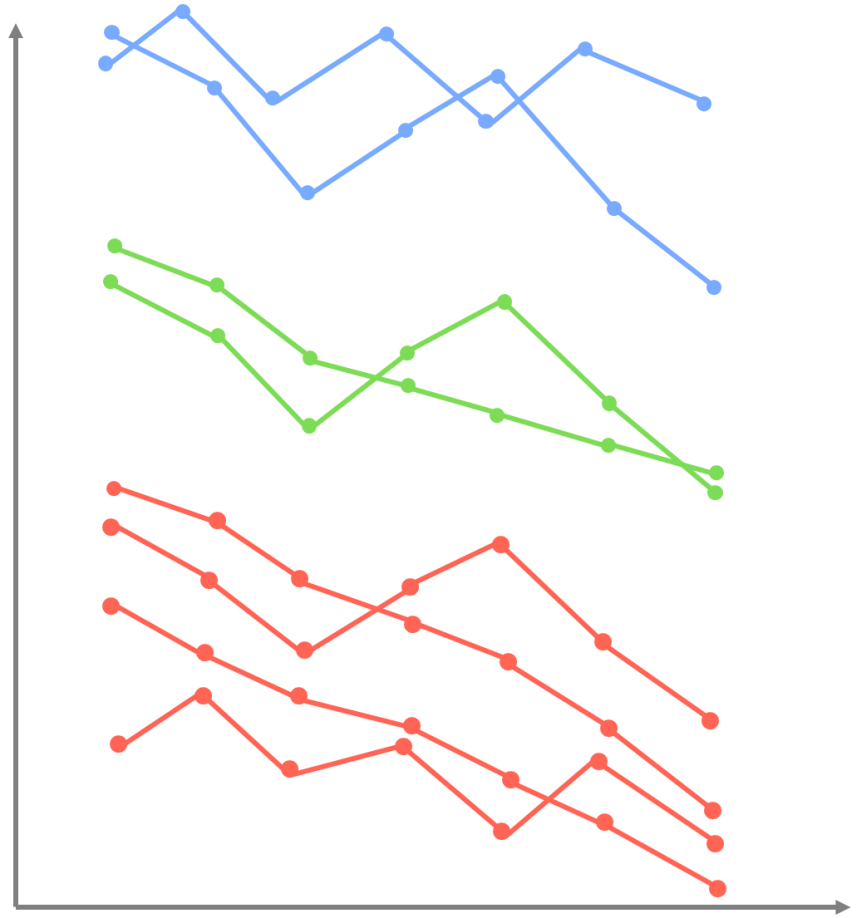
Time Series Clustering

Identifying similarities in values and changes

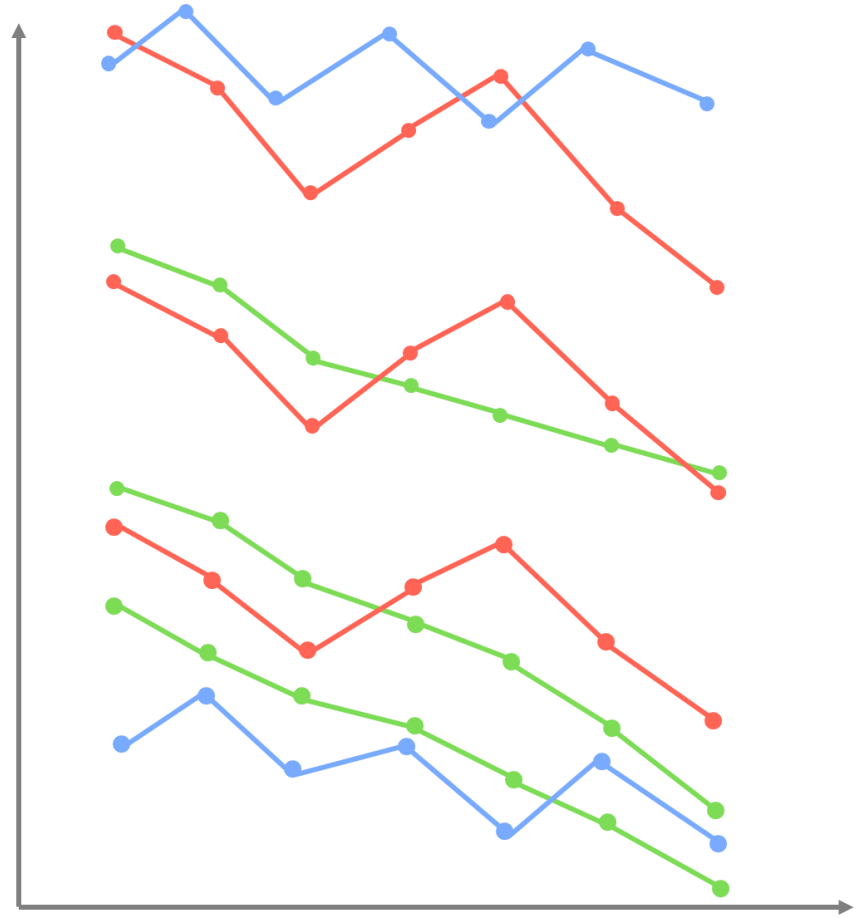
time series



cluster by value



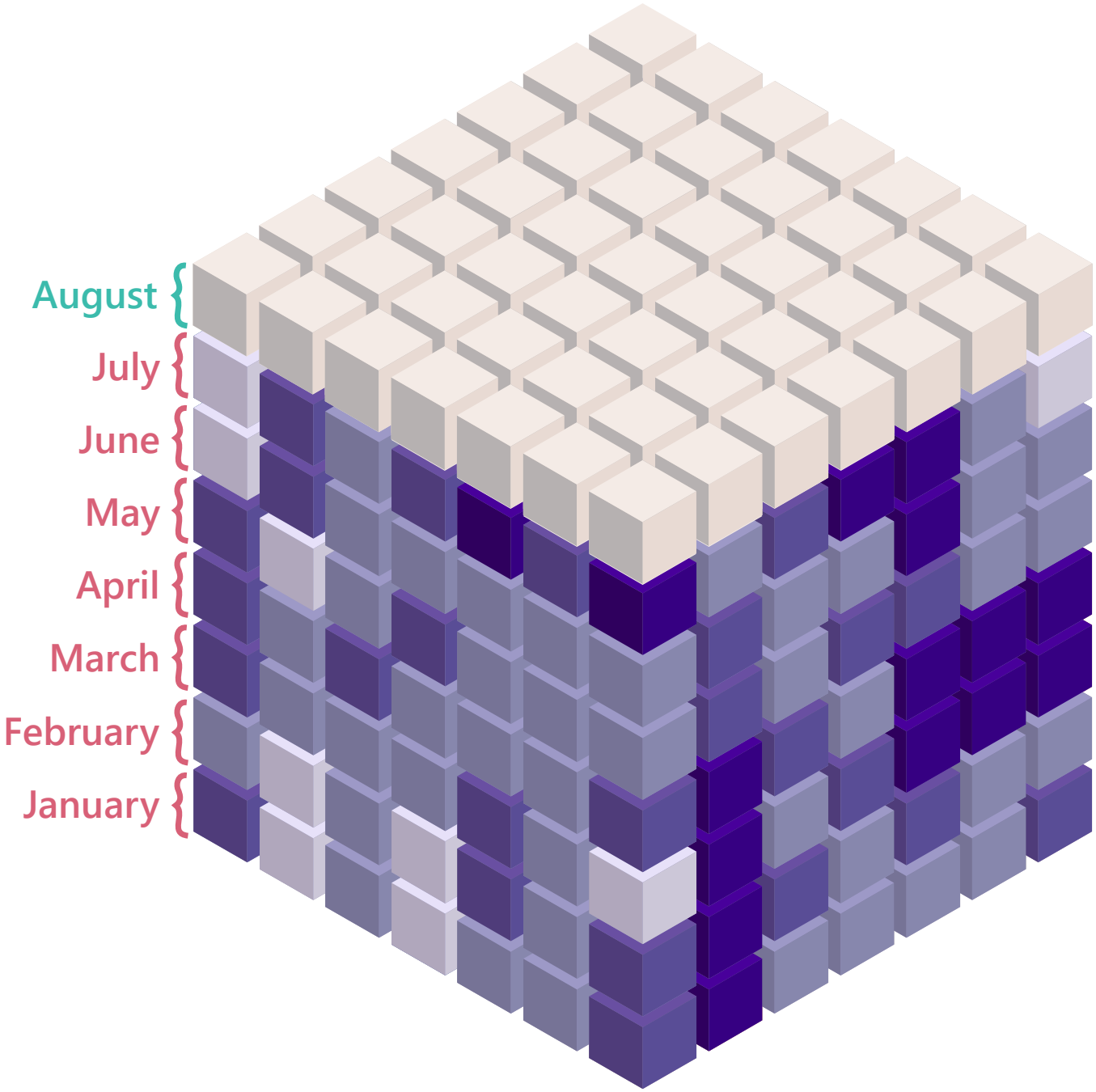
cluster by profile



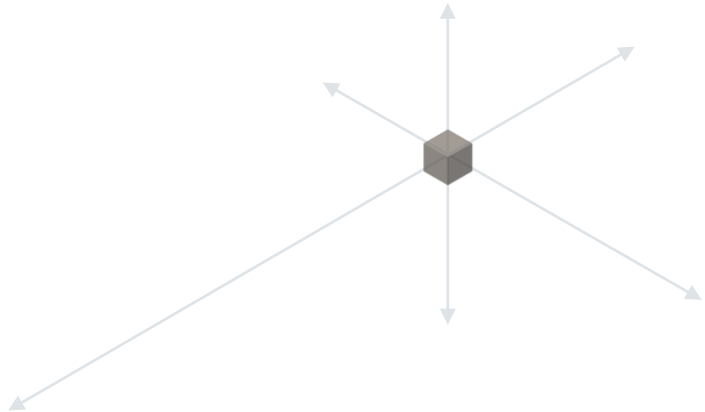
Time Series Forecasting

Predicting using time series

how do we estimate values for the next time step?



Three tools to do time series forecasting



Curve Fit Forecast

Exponential Smoothing

Forest-based Forecast

Curve Fit Forecast

- Simplest method to run and interpret
- Auto-detect option
- Not for seasonal or complex patterns

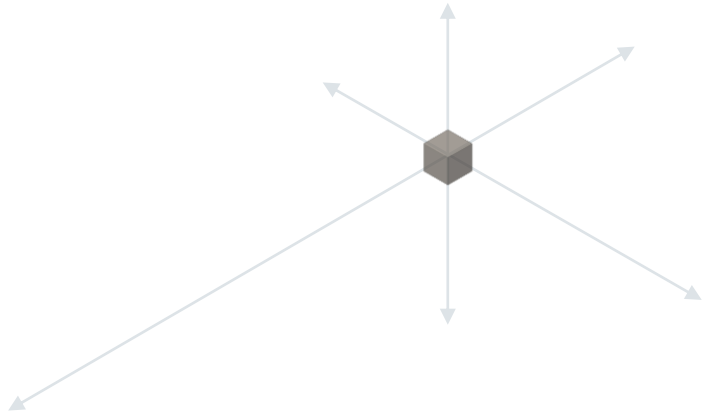
Exponential Smoothing

- Detects trends and seasons
- Tried and true method in academia
- Creates confidence intervals

Forest-based Forecast

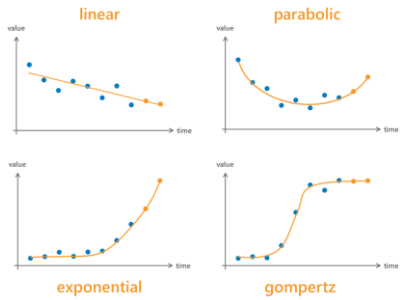
- No assumptions about data structure
- Can capture more complicated shapes and trends
- Forecast result is difficult to interpret

model validation

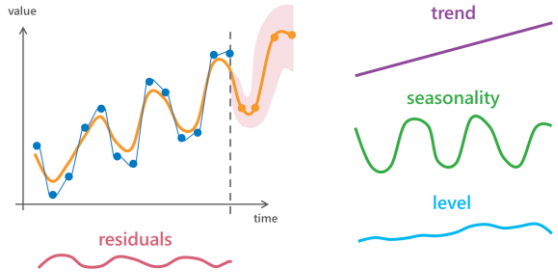


Time Series Forecasting

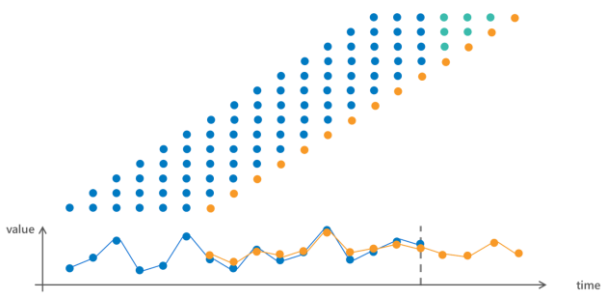
Curve Fit Forecast

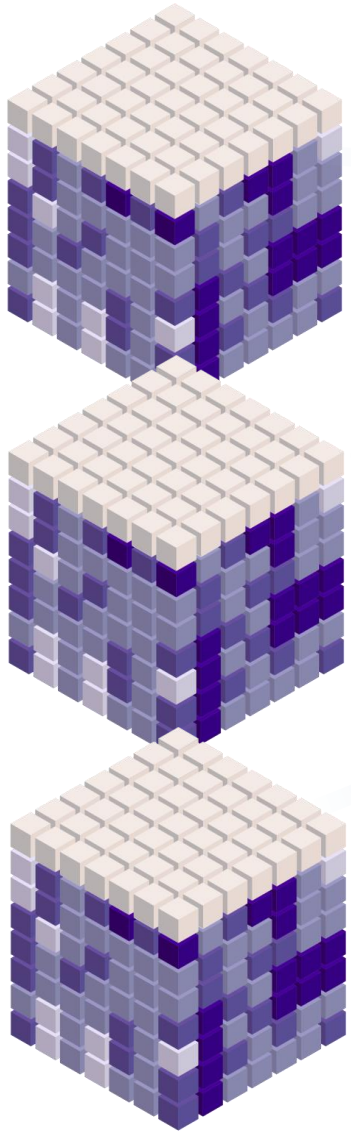


Exponential Smoothing Forecast

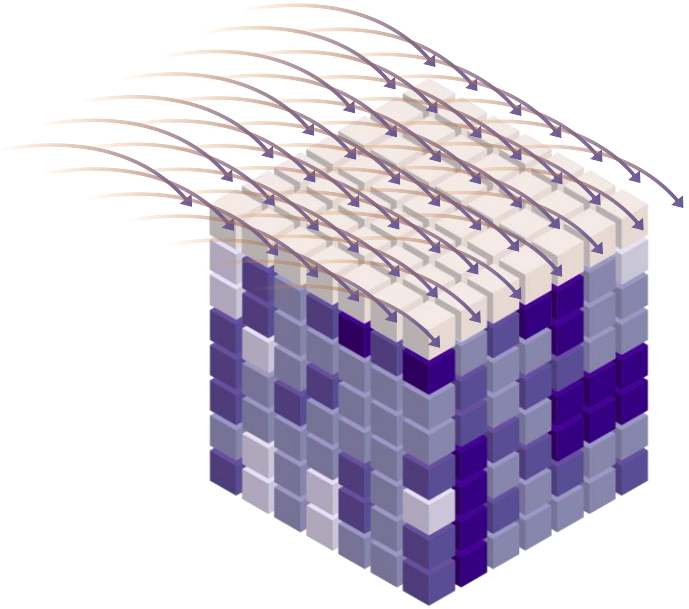


Forest-based Forecast





Evaluate Forecasts by Location



Copyright © 2020 Esri. All rights reserved.