Intro

- Time series analysis often comes down to the question of causality: How did the past influence the future?
    1. *Recalibrate the resolution of our data* to suit our question. Often data comes with more specific time information than we need.
    2. Understand how we can *avoid lookahead* by not using data for timestamps that produce the data's availability.
    3. Record *all relevant time periods* even if "nothing happened." A zero count is just as informative as any other count.
    4. *Avoid lookahead* by not using data for timestamps that produce information we shouldn't yet know about.
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Timestamp troubles

- what process generated the timestamp, how and when
- Time zone information
- Record your own actions and see how they are captured
- Local or universal time

Filling missing values

- Forward fill
- Moving average of past values - use only the data that occurred before the missing data point

- Interpolation - Determining the values of missing points based on geometric constraints regarding how we want the overall data to behave

Upsampling and downsampling

- To match the frequency of different time series data
- We either increase or decrease the timestamp frequency

Downsampling the data

- The original resolution of the data isn't sensible
- Match against data at a lower frequency - we can either downsample, take average, weighted mean etc.
- Selecting out every nth element

Upsampling the data

- convert irregularly sampled time series to a regularly timed one
- Inputs sampled at different frequencies
- Knowledge of time series dynamics - Treat as a missing data problem and missing data