Preprocessing Time Series Data with MATLAB

This reference shows common use cases, but is by no means comprehensive. The >> icon provides links to relevant sections of the MATLAB® documentation to learn more.

### Timetable
MATLAB datatype designed to organize and work with time series data.

**Components of a Table**
- **Times** (or vector)
- **Double**, **char**, **logical**, **cell**, **string**, etc.
- **duration** (offset from a reference time)

**Create Timetables**
- `tt = timetable(times, var1, var2, ... ,varN);`
  - (All variables must have the same number of rows.)
- `tt = table2timetable(t);`
  - (The first datetime or duration variable in "t" becomes the row times.)

### Timetable Manipulation
- **Access Data**
  - These return the same array:
    - `tt.Temperature`
    - `tt(:, 'Temperature')`
    - `tt(:, 1)`

- **Add a New Variable**
  - `tt.newVar = zeros(height(tt), 1);`

- **Detect Outliers**
  - `TF = isoutlier(A, method);`

- **Detect Change Points**
  - `TF = ischange(A, method);`

### Data Cleaning
- **Smooth Data**
  - `B = smoothdata(A, method);`

- **Detect Outliers**
  - `TF = isoutlier(A, method);`

- **Detect Change Points**
  - `TF = ischange(A, method);`

### Big Data
- **Tall arrays** extend MATLAB functions to work on data too big to load into memory.

- **Synchronize multiple timetables to a common time vector.**
  - `tt = synchronize(tt1, tt2, ..., ttN);`

- **Find Missing Values**
  - `TF = ismissing(tt);`

- **Fill Missing Values**
  - `tt = fillmissing(tt, method);`

- **Remove Rows Containing Missing Values**
  - `tt = rmmissing(tt);`

### Missing Data
- **Fill Missing Values**
  - With nearby points with methods:
    - `'previous'`, `'next'`, `'nearest'`, `'linear'`, `'spline'`, `'pchip'`

- **Remove Rows Containing Missing Values**
  - `tt = rmmissing(tt);`

### Merge Timetables
- **Synchronize multiple timetables to a common time vector.**
  - `tt = synchronize(tt1, tt2, ..., ttN);`

- **Find Missing Values**
  - `TF = ismissing(tt);`

- **Fill Missing Values**
  - With nearby points with methods:
    - `'previous'`, `'next'`, `'nearest'`, `'linear'`, `'spline'`, `'pchip'`

- **Remove Rows Containing Missing Values**
  - `tt = rmmissing(tt);`