# Types of trend

1. Motivation

* Time series can be modeled by different types of trend
* Different types of trend require different features

1. Linear trend
2. Changepoints

* Abrupt change in the property of a time series (e.g., trend, seasonality, autoregressive properties)

A graph showing the growth of retail sales

Description automatically generated

* Piecewise linear trend

1. Non-linear trends

A graph of a patient

Description automatically generated with medium confidence

* Can try transforming time series to make more linear

A graph of a line graph

Description automatically generated with medium confidence

1. Different types of trend need different features

A screenshot of a computer

Description automatically generated

# Linear trend: using time as a feature

1. Linear trend

* Let’s consider a linear model:
* Model linear trend using time passed since a reference time, , as feature
* We typically set to the start time of the time series:

1. Creating the feature for training and prediction

A screenshot of a calendar

Description automatically generated

1. Forecasting with just the time feature

* Out of sample prediction

A screenshot of a computer

Description automatically generated

1. Tree based models with time feature

A graph of growth and growth of trees

Description automatically generated with medium confidence

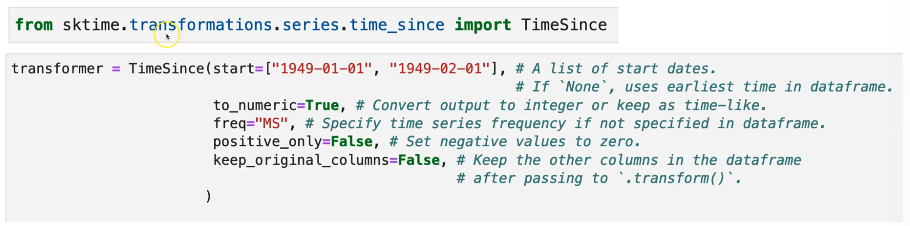
1. Implementation

* Pandas & numpy

A screen shot of a computer

Description automatically generated

* Sktime



1. Summary

* For standard tree-based models, will not be able to use this feature to extrapolate