

# Aspects of time series

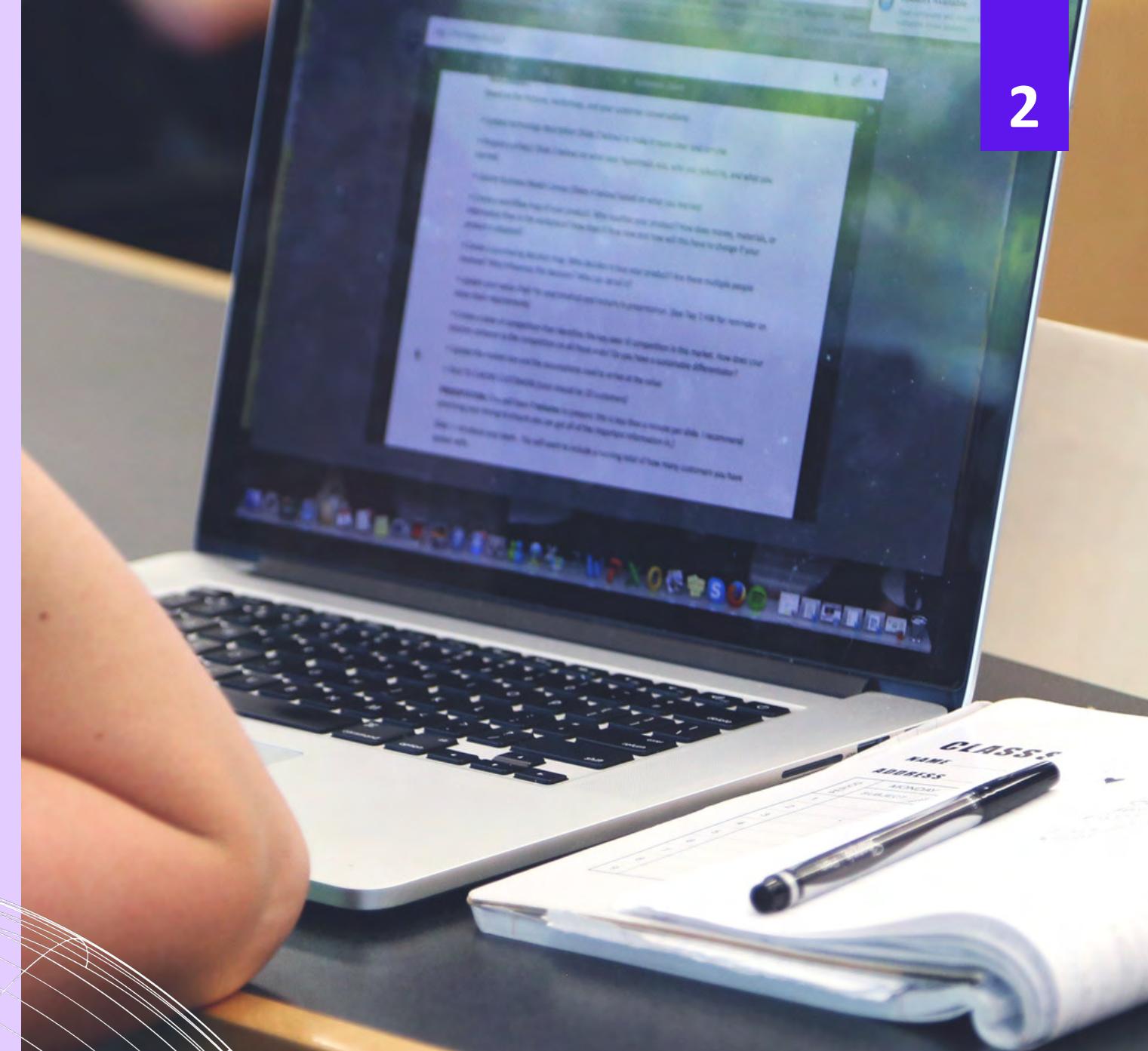
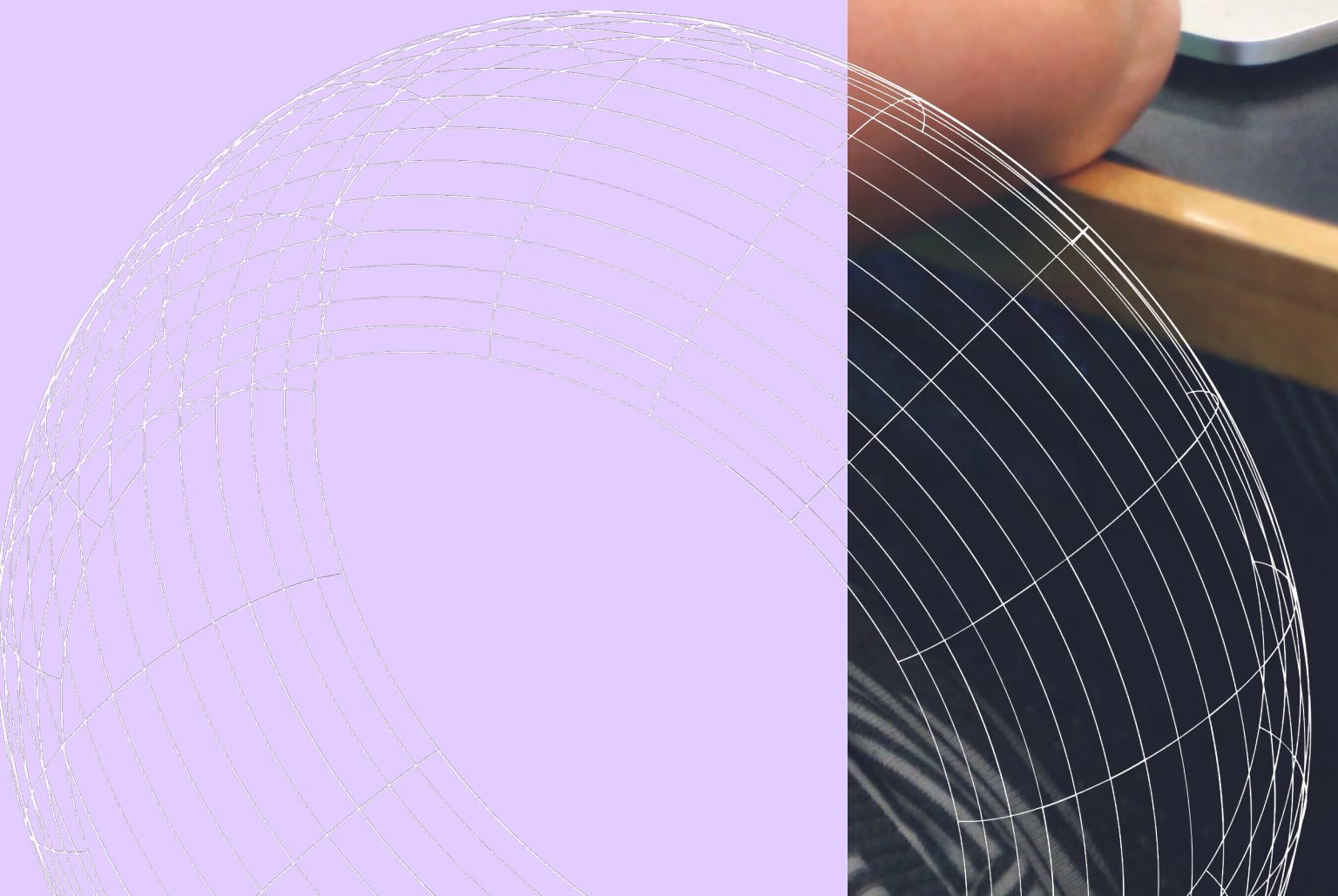
# Intro

## Components of time series

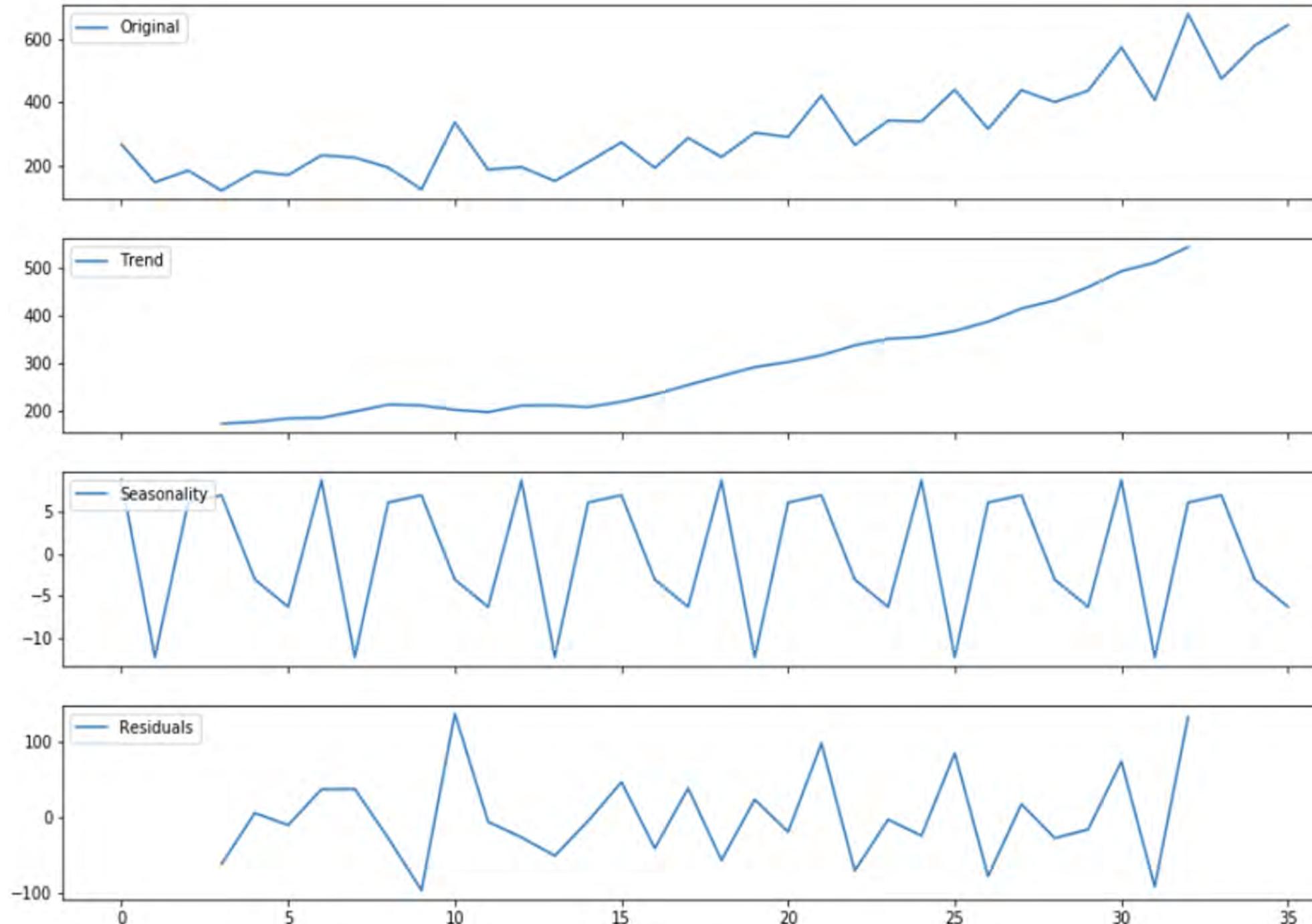
- Trend
- Seasonality
- Residual

## How to separate and analyze

- Decomposing TS data
  - Additive
  - Multiplicative
  - Pseudo-Additive



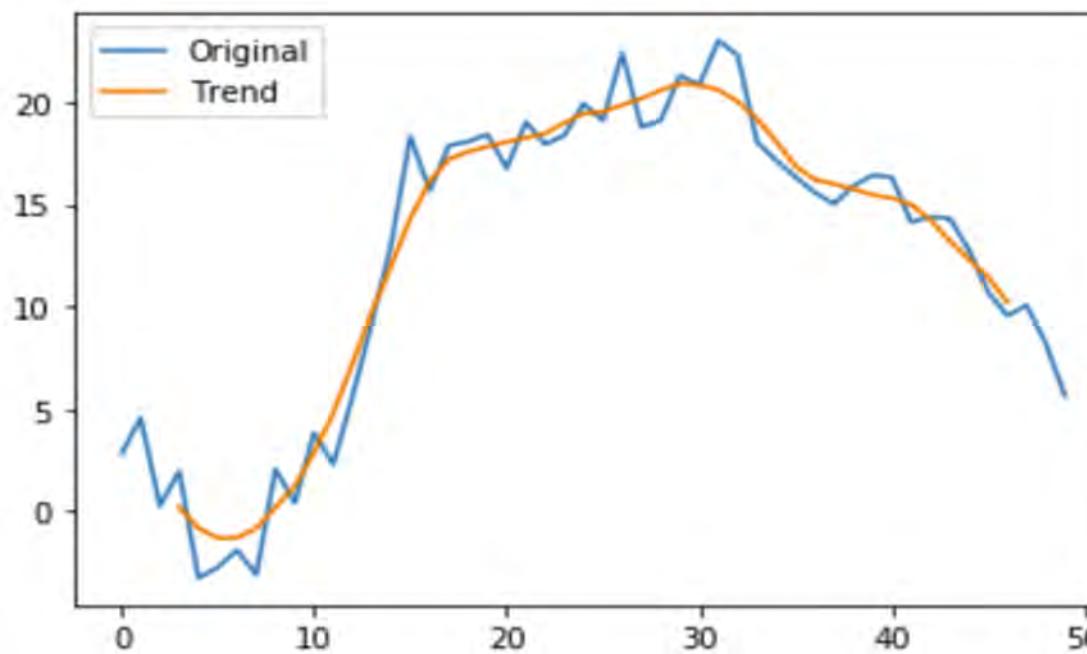
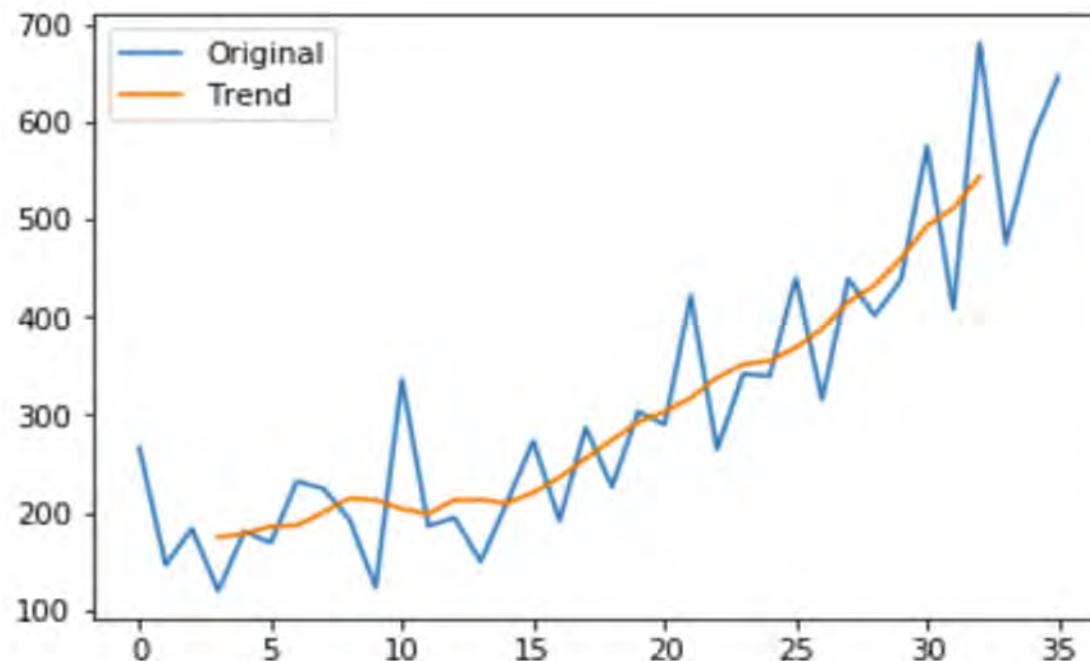
# Components



- Trend → long term
- Seasonal → periodic
- Residual → other

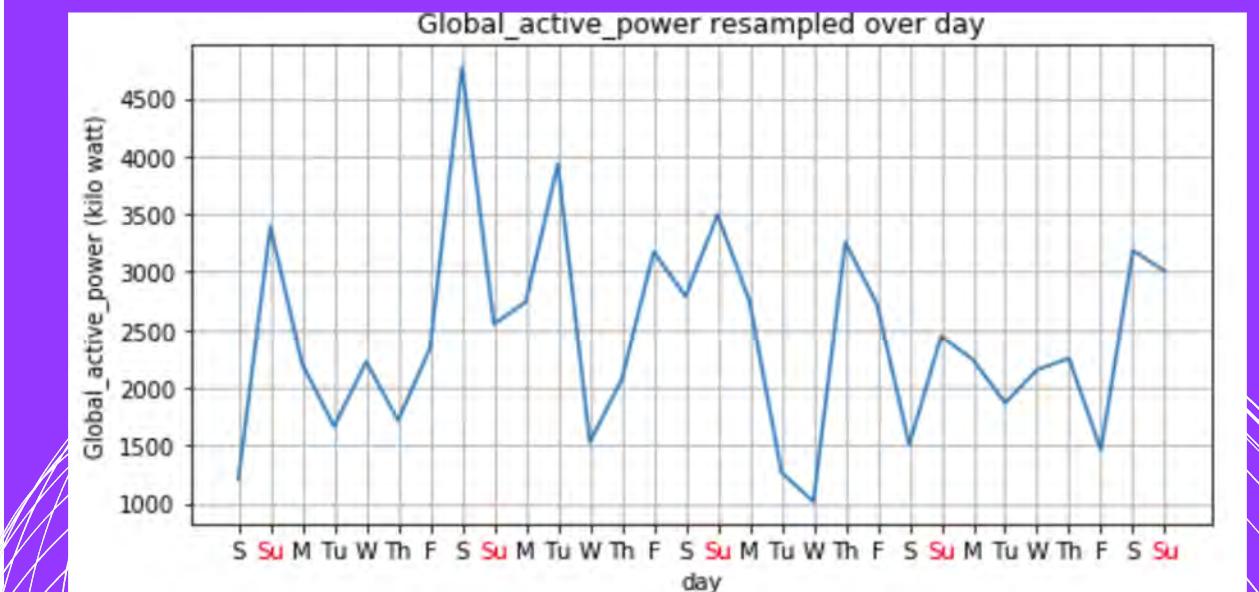
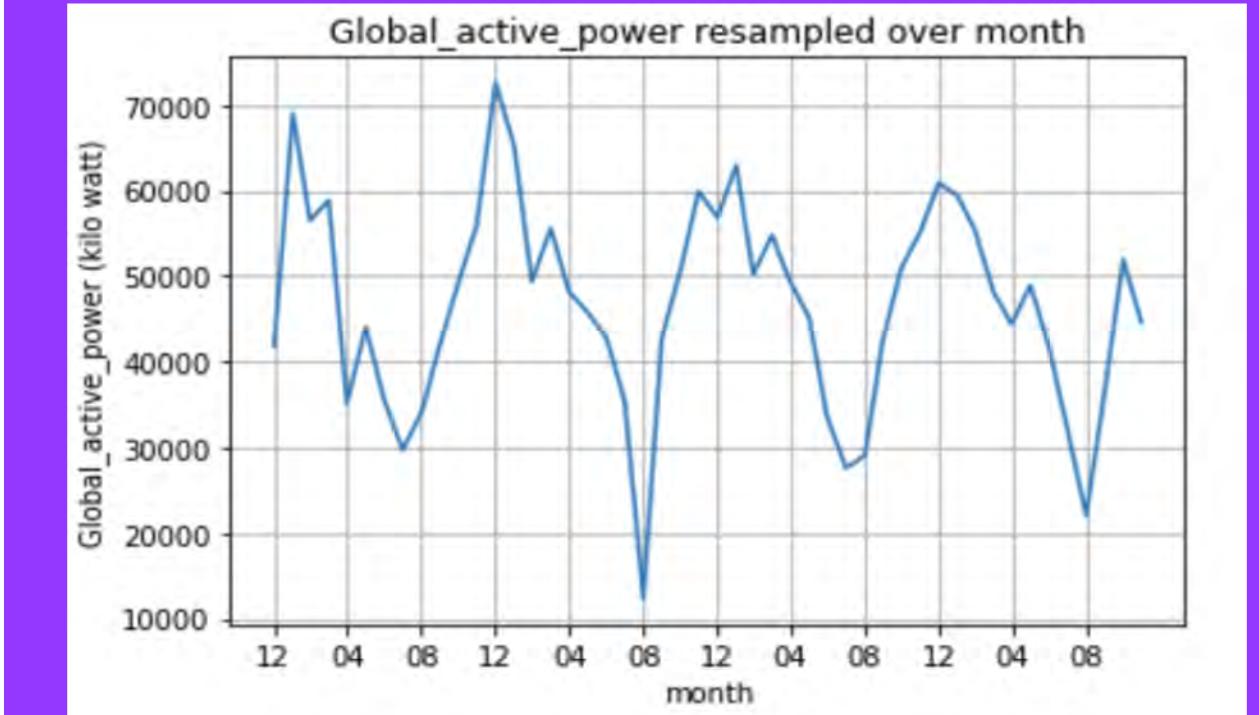
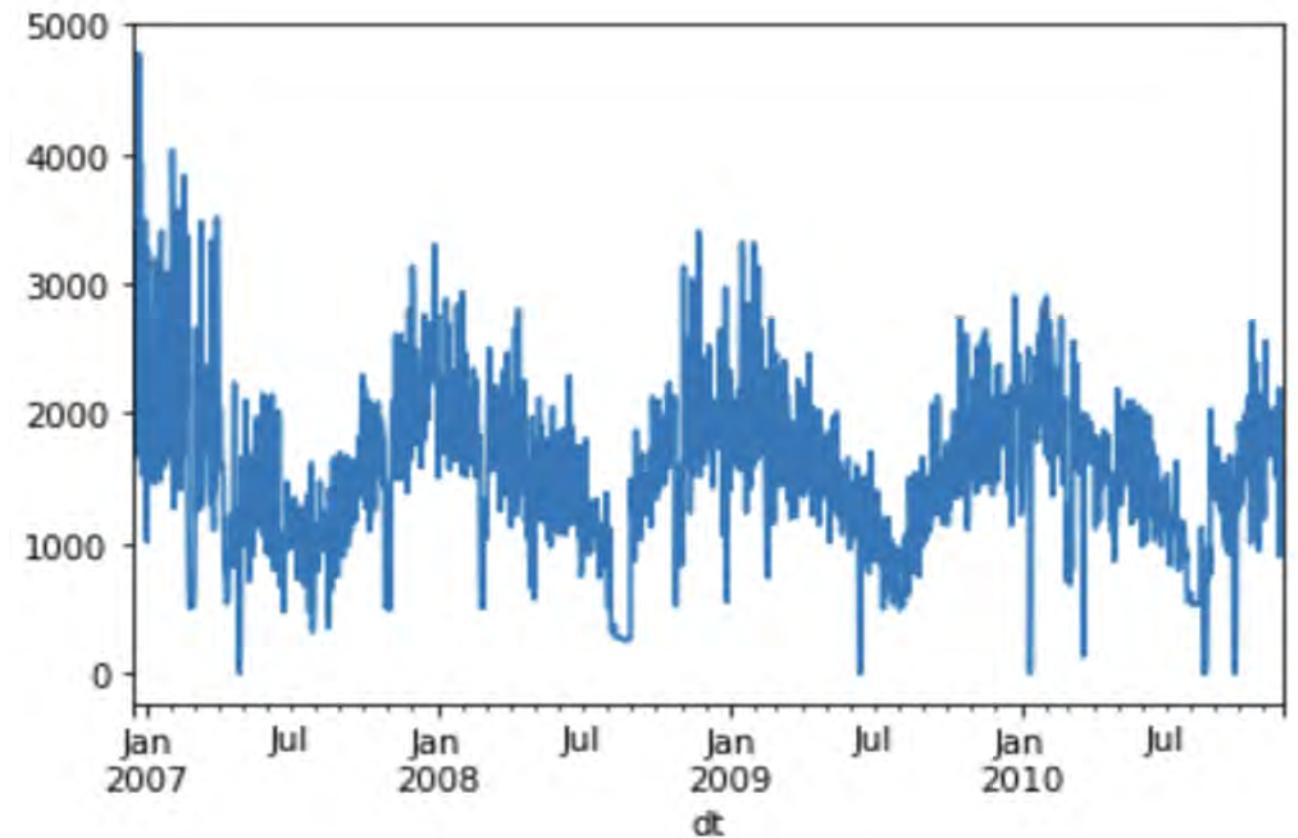
# Trend

- long-term increasing or decreasing
- might not be linear
- indicate correlation between current and past values
- some underlying aspect of the data. Ex inflation



# Seasonal

- exhibit rises and falls that are of fixed period
- might have more than one seasonal pattern



# Decomposition

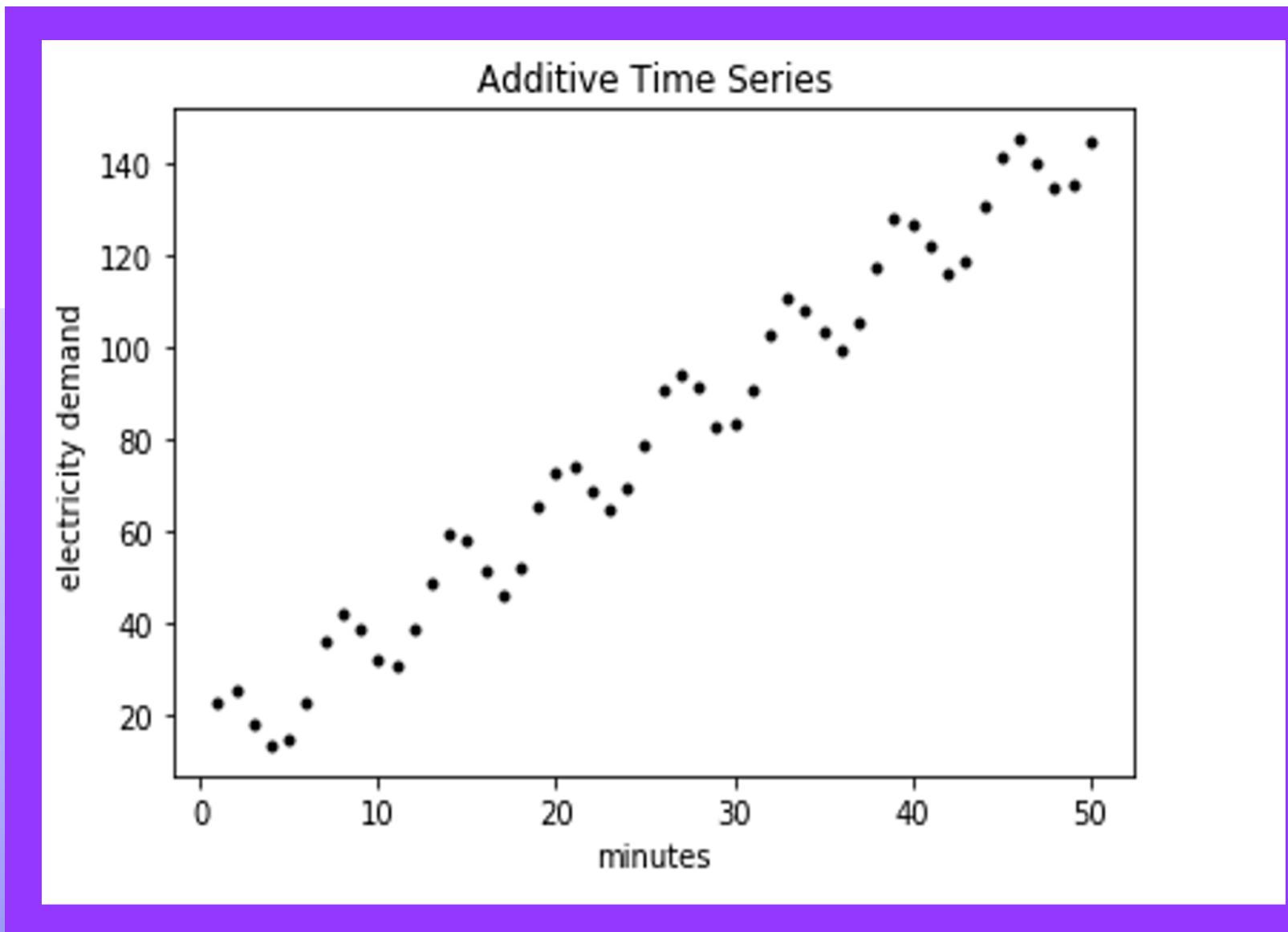
Time series can be decomposed according to the type of the underlying time series

- Additive decomposition  $\rightarrow T + S + R$
- Multiplicative  $\rightarrow T \times S \times R$
- Pseudo - Additive decomposition



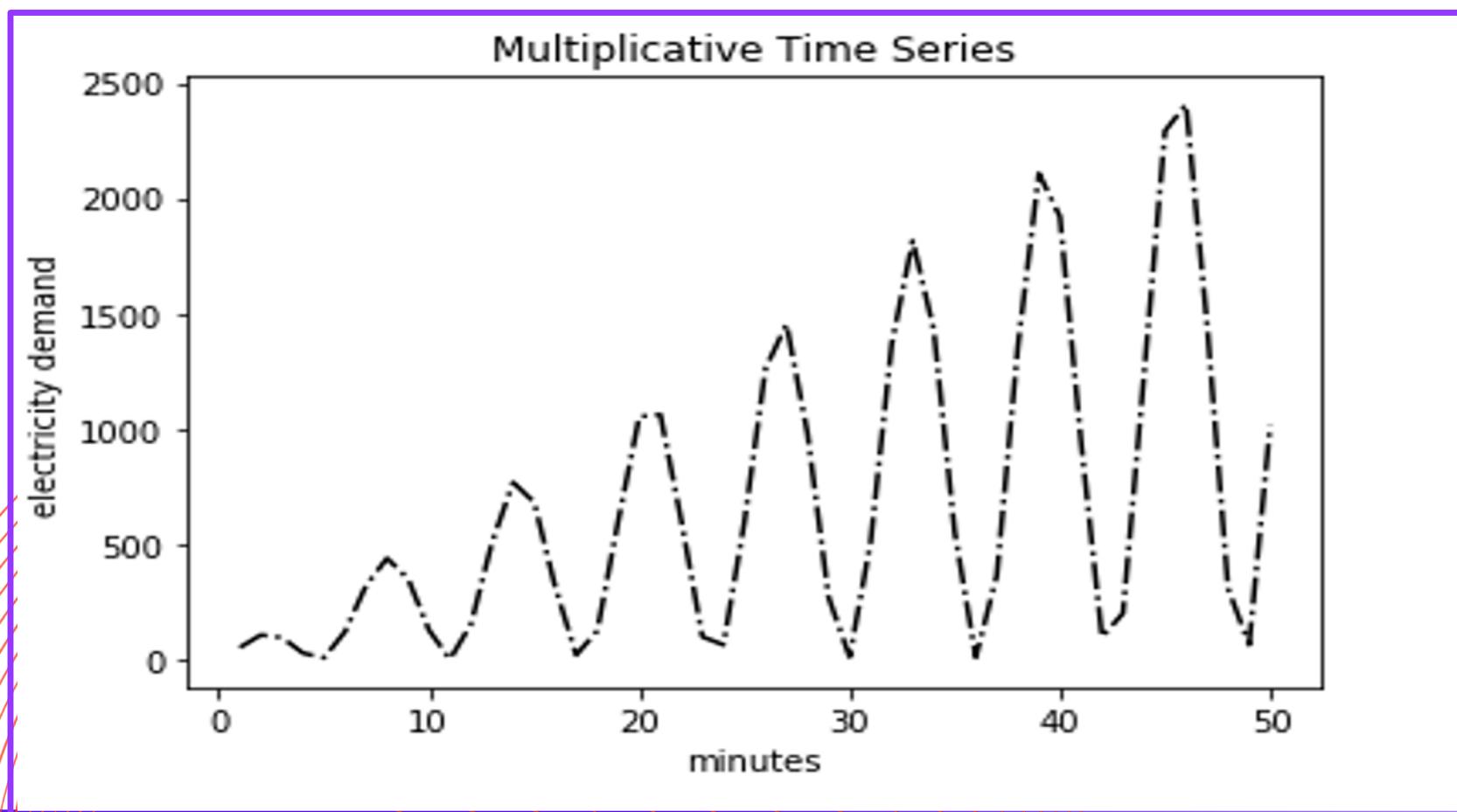
# Additive decomposition

- The amplitude of the seasonal component does not change according to the trend.



# Multiplicative decomposition

- The amplitude of the seasonal component changes according to the trend.
- can transform to additive by taking the log
  - $\log(T \times S \times R) = \log(T) + \log(S) + \log(R)$

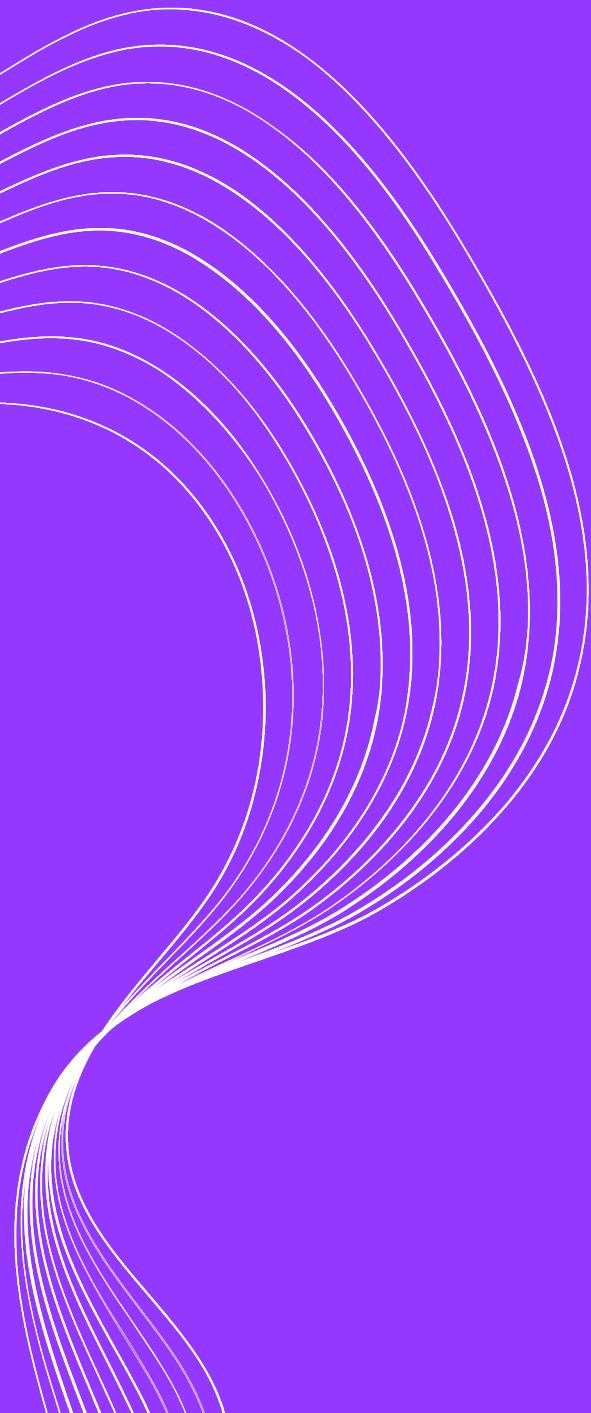


# Pseudo-Additive Decomposition

- a combination of additive and multiplicative
- the multiplicative model cannot be used when the original time series contains very small or zero values
  - it is not possible to divide a number by zero

$$O_t = T_t + T_t * (S_t - 1) + T_t * (R_t - 1) = T_t * (S_t + R_t - 1)$$

# Conclusion



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avascript_include_tag "https://  
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d> margin-top-lg">  
key, msg |
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