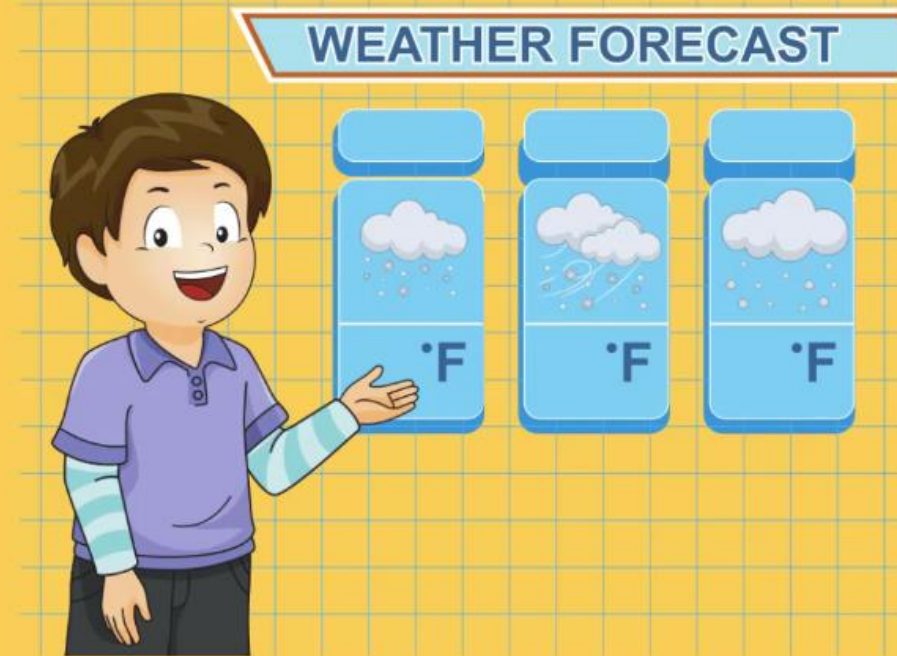


Time Series Analysis

Renato R. Maaliw III, *DIT*
College of Engineering
Southern Luzon State University
Lucban, Quezon, Philippines

Game plan for Introduction to Time Series Forecasting



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TIME SERIES ANALYSIS

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Time series data

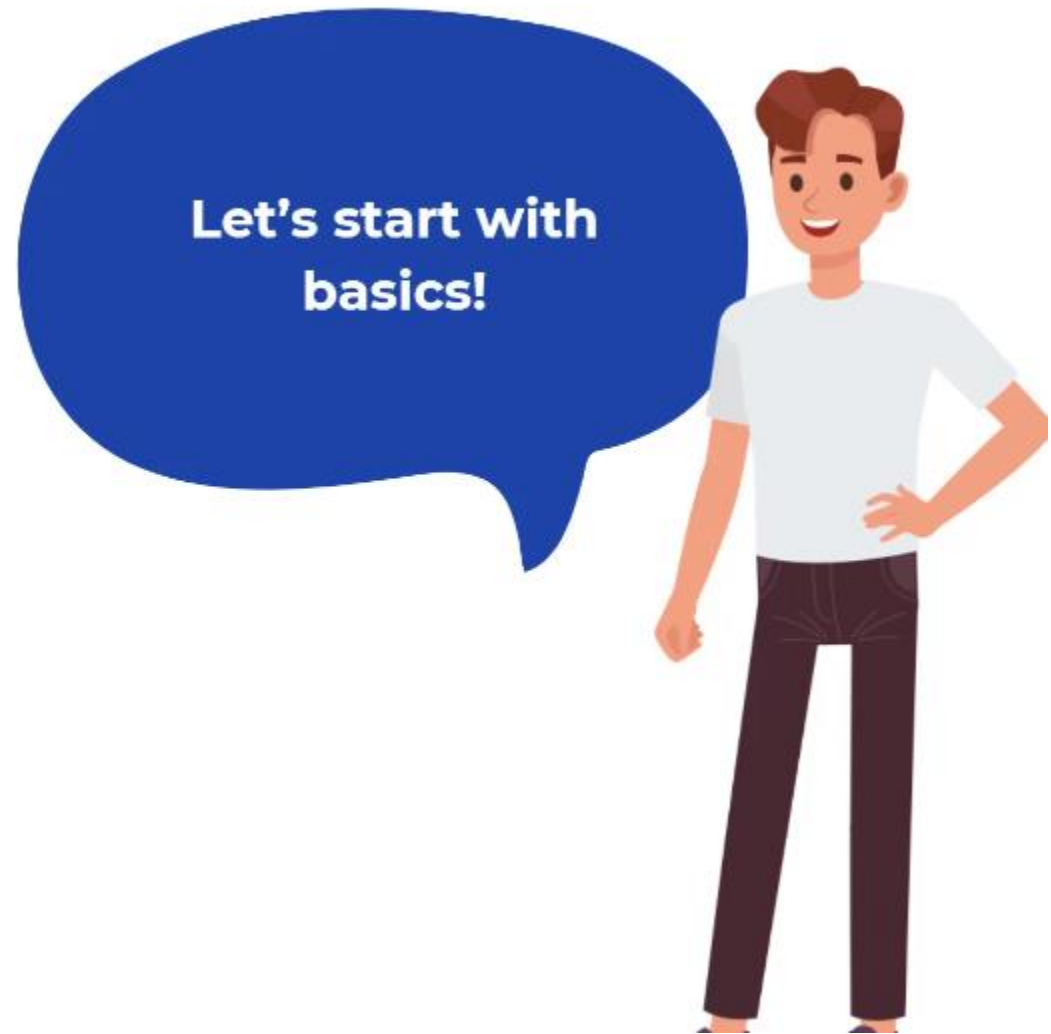


Recording changes day by day, month by month.

Practical Focus



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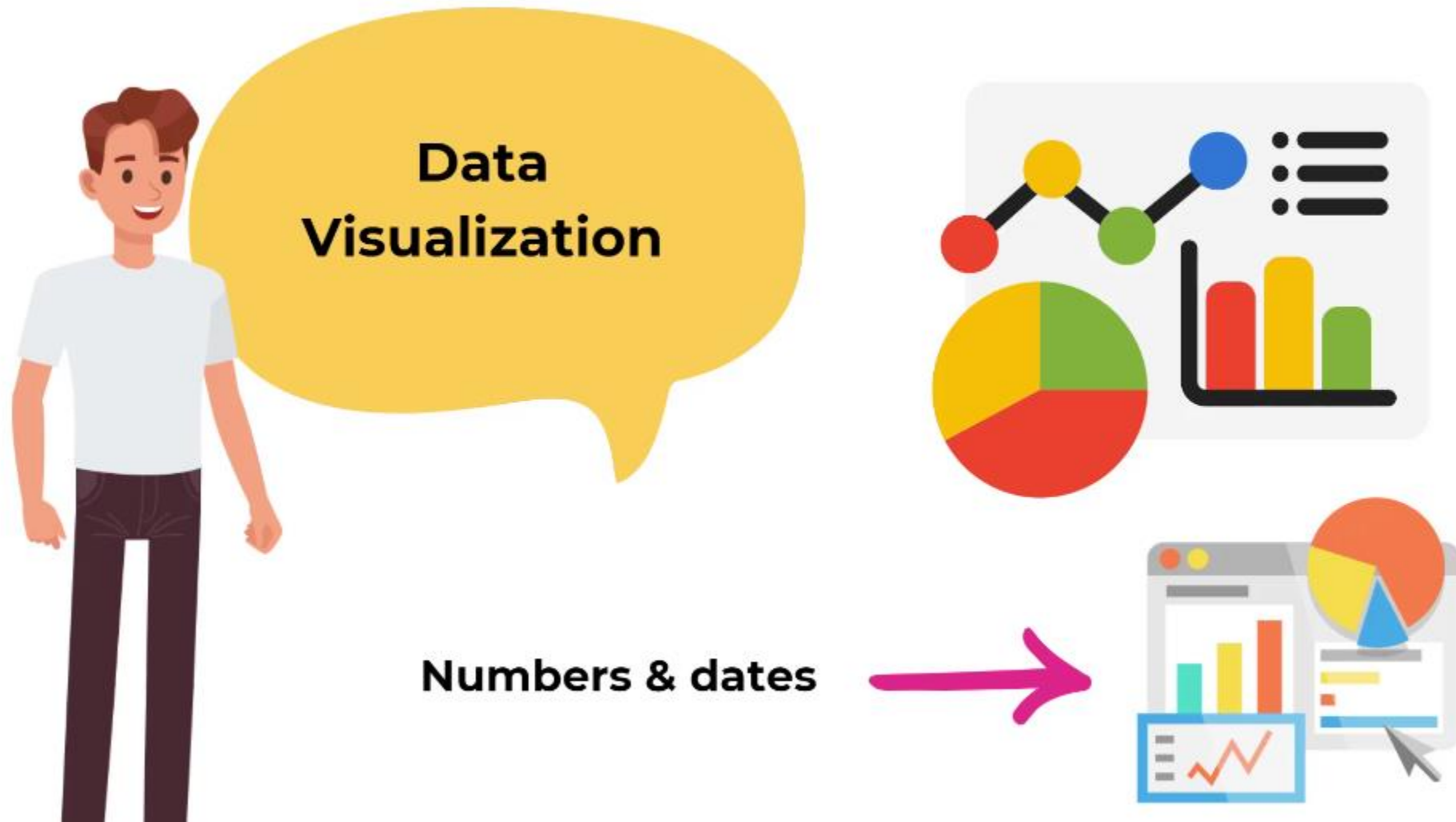
Sorting data is just like putting together a puzzle.



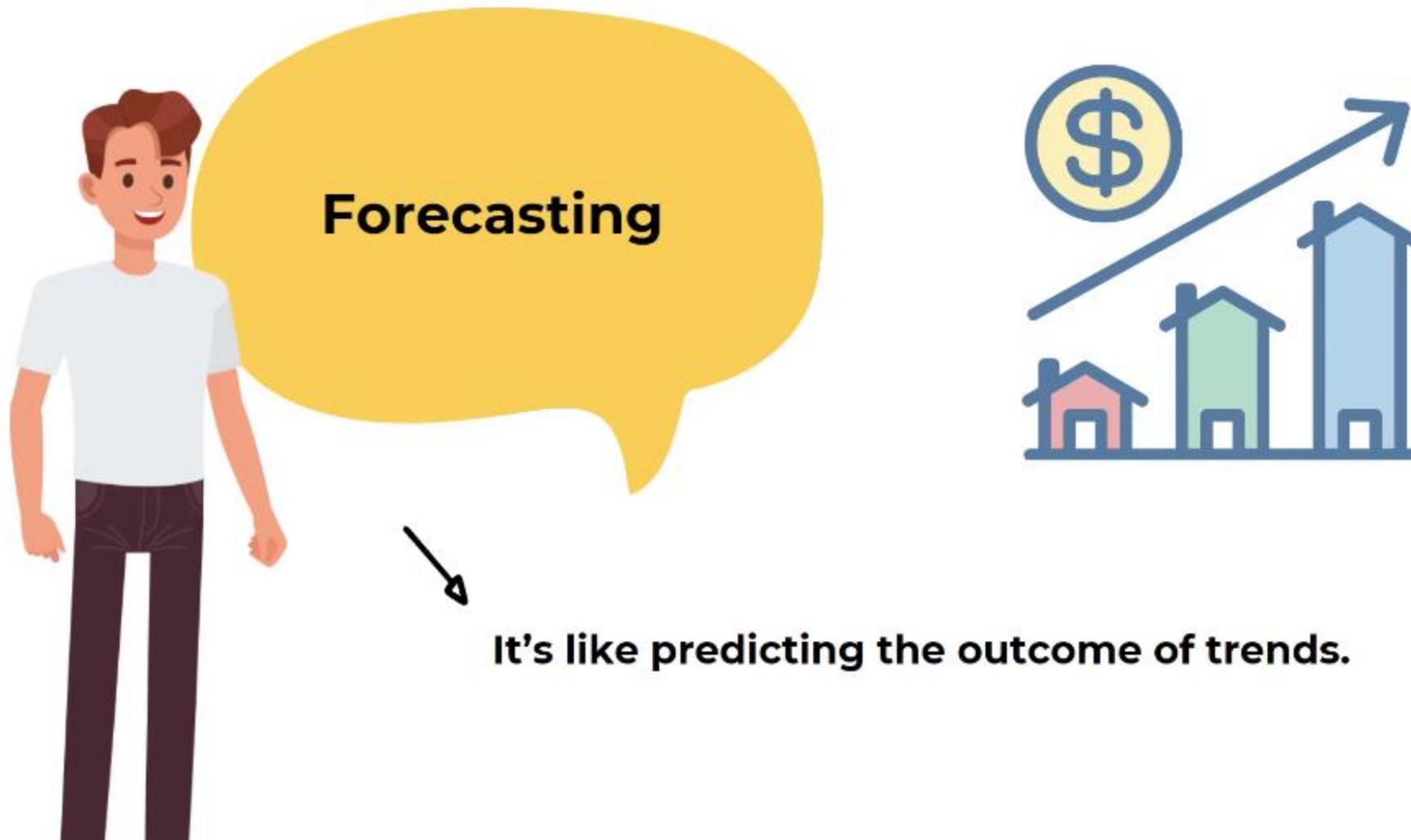
Patterns and trends



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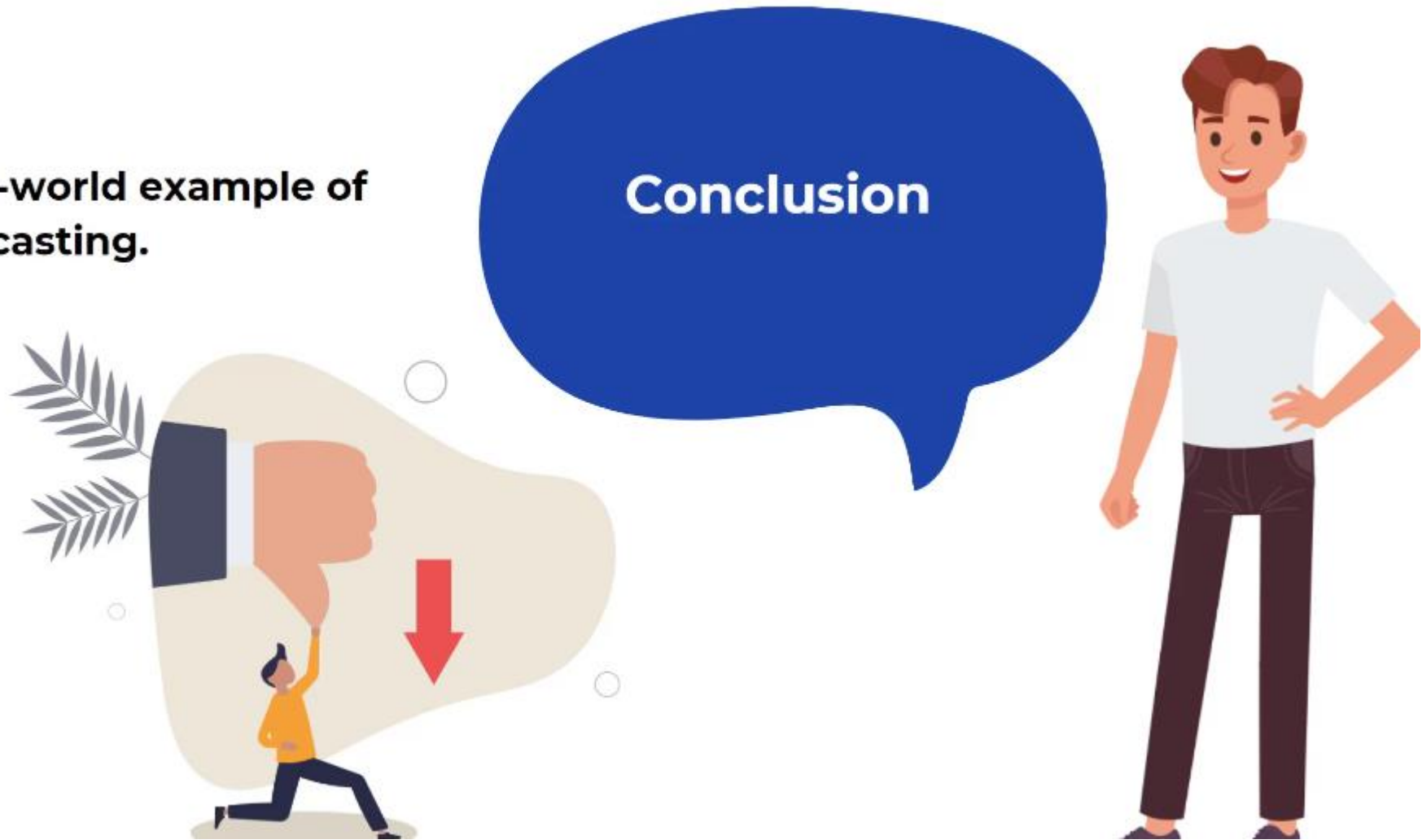


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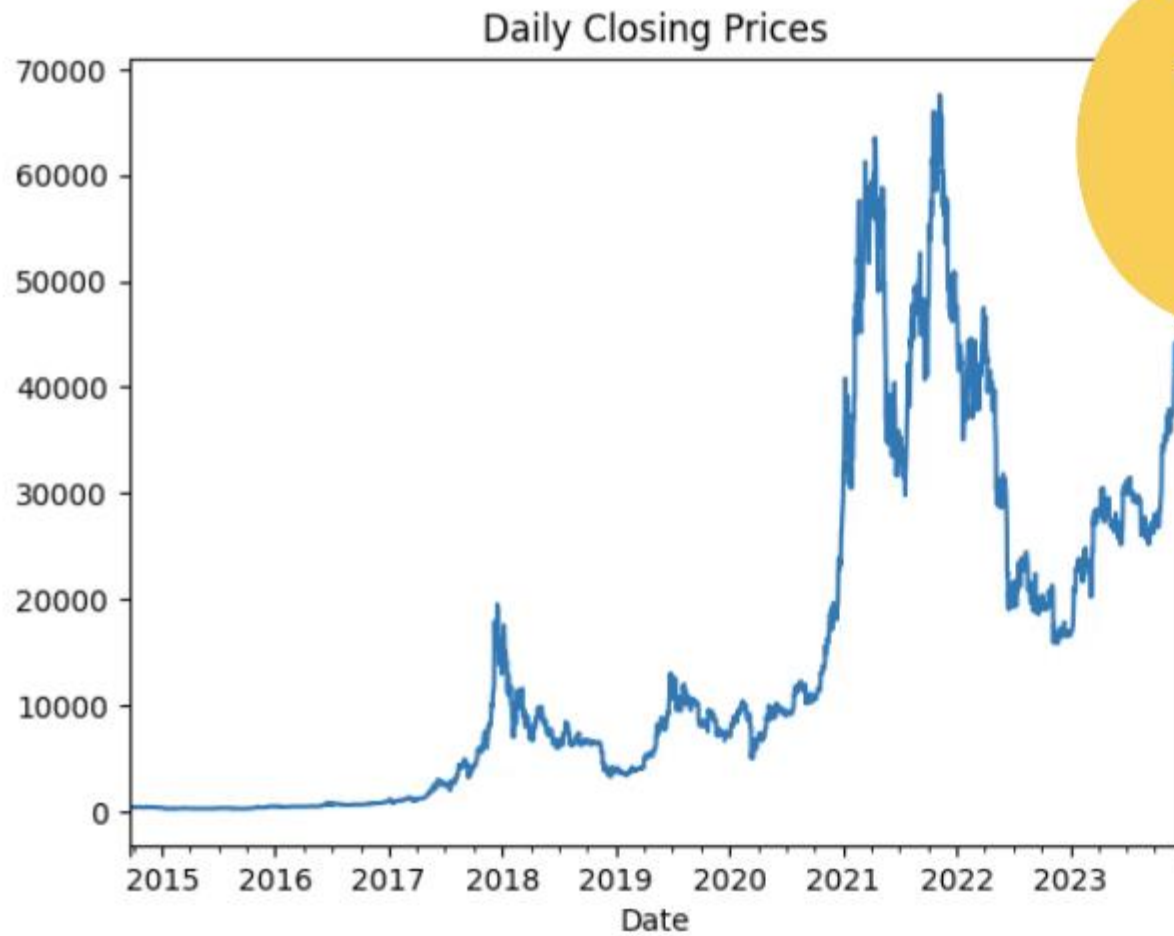
Real-world example of forecasting.



What is Time Series Data?



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**This is daily price
of Bitcoin from
2014 to 2023**



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Its market is very unpredictable, and has amazing trends

Price changes, financial market dynamics and investor behavior.

Why Bitcoin Price Data?



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Essence of Time
Series Data

A timeline story with each data point representing a moment, arranged from oldest to newest.



This data is recorded at regular intervals

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It is used in weather forecasting



It is also used in economics and healthcare



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We'll explore
autocorrelation

→ **Seasonality - recognizing
recurring patterns**

Statistical Tools



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TIME SERIES ANALYSIS

01. What best defines “time series data”

- | |
|--|
| A. Observations collected across different entities at a single point in time |
| B. Observations collected without any inherent ordering |
| C. Observations recorded sequentially at fixed or irregular time intervals, where order and spacing carry information |
| D. Data that has been sorted alphabetically |

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02. Which statement correctly captures the idea of seasonality in a time series

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|--|
| A. A one-time jump caused by an exogenous shock |
| B. A pattern that repeats at a regular, known frequency (e.g. hourly, weekly, yearly) |
| C. Noise that has zero mean and no autocorrelation |
| D. A permanent upward or downward drift in the mean level |

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03. Which of the following is not a common application of time series analysis

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| A. Forecasting electricity demand for grid management |
| B. Detecting credit-card fraud by examining transaction sequences |
| C. Monitoring a patient's heart-rate signal in real-time |
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[Code Demo]

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04. Which string representation is the most widely adopted international standard for machine-readable dates in time series files?

A. MM/DD/YYYY

B. DD-MM-YYYY

C. YYYY-MM-DD

D. YY/MM/DD

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05. What is the main purpose of applying a rolling (moving) average to a time series?

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| A. To increase the sampling frequency of the data |
| B. To eliminate all seasonal effects |
| C. To smooth short-term fluctuations |
| D. To convert a non-stationary series into a stationary one via differencing |

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06. When you create a feature like `df['lag_1'] = df['Close'].shift(1)`, what does that variable represent, and how can it be interpreted in a business-forecasting context?

A. The day-to-day percentage change in price, useful only for volatility charts

B. The value of the series exactly one period earlier

C. A seasonal dummy that identifies weekends

D. A rolling average that smooths noise

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Thank you very much for listening.