1. IQR in the Context of the Book

Relation to the Book:

- In the chapter on personal analytics, IQR is often applied to clean data by removing outliers from sources like wearable sensors or health logs.
- Example: Data on heart rate or activity levels from wearable devices often contain outliers caused by sensor errors or incorrect user activity.

Application from the Book:

- The book discusses cleaning heart rate data by removing values that fall outside a reasonable range. IQR can help identify extremely high heart rates (e.g., above 200 bpm) or very low rates (e.g., below 40 bpm).

2. Schauvenet's Criterion in the Context of the Book

Relation to the Book:

- This method is implicitly referenced in sections about detecting anomalies in continuous monitoring devices.
- It works well with data that approximates a normal distribution, such as body temperature or sleep metrics.

Application from the Book:

- The book provides an example of detecting anomalies in sleep duration tracked by sleep monitoring devices:
  - Adults typically sleep 7–9 hours per night. Schauvenet's criterion can identify abnormal nights (e.g., less than 2 hours or more than 15 hours of sleep) based on Z-scores and probabilities.

3. LOF in the Context of the Book

Relation to the Book:

- LOF is suitable for applications involving multidimensional data, as described in chapters on multivariate behavioral analysis.
- Example: Combining heart rate, activity level, and sleep duration analysis to detect unusual behaviors.

Application from the Book:

- One example is detecting abnormal activity days:
  - If a person typically takes 8,000 steps/day, maintains a heart rate between 60–120 bpm, and sleeps around 8 hours, a day with fewer than 2,000 steps but abnormally high heart rate could be flagged as an anomaly by LOF.
  - LOF calculates that this day has a significantly lower density compared to the average density of other days.

Comparison of the Three Methods in the Context of the Book

Method	Context of Use	Example from the Book
IQR	Removing global outliers in univariate numerical data	Heart rate data from wearables: removing values <40 bpm or >200 bpm.
Schauvenet's Criterion	Detecting anomalies based on probability in normally distributed data	Sleep duration data: identifying nights with <2 hours or >15 hours of sleep based on rare probabilities.
LOF	Multivariate behavioral analysis and detecting local anomalies	Combining steps, heart rate, and sleep duration to detect abnormal activity days.