Subsequence Clustering
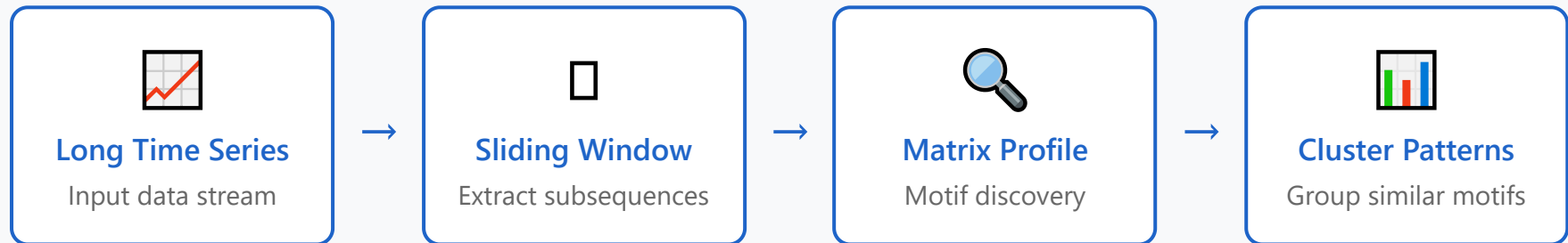
Finding Recurring Patterns in Long Time Series

Subsequence Extraction & Clustering Pipeline

Long Time Series
Input data stream

→

Sliding Window
Extract subsequences

→

Matrix Profile
Motif discovery

→

Cluster Patterns
Group similar motifs

Sliding Window Example:

Key Challenges

⚠️ **Trivial Matches**
Self-matches and near-duplicates

⚠️ **Overlapping Patterns**
Adjacent subsequences too similar

Applications & Use Cases

🎯 **Key Applications**

Solutions

Matrix Profile
Efficient motif discovery technique

STOMP Algorithm
Scalable Time series Ordered-search Matrix Profile

Anomaly Detection	Pattern Mining
Motif Discovery	Sensor Analysis

💡 Example Use Case

Identify repeated behaviors in IoT sensor data: recurring activity patterns, operational cycles, or anomalous sequences in manufacturing or healthcare monitoring systems.