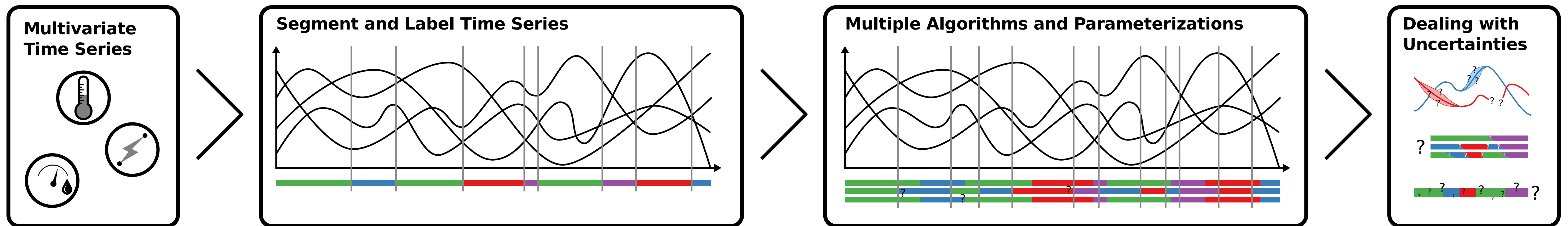


Categorizing Uncertainties in the Process of Segmenting and Labeling Time Series Data

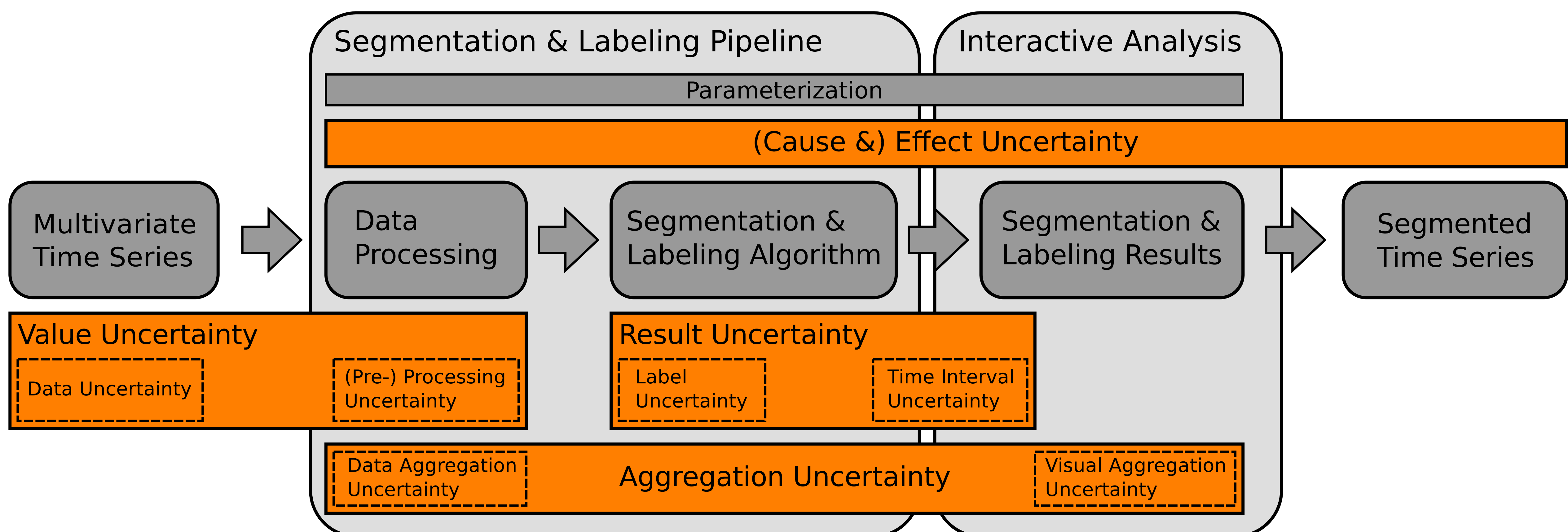
M. Bögl¹, C. Bors¹, T. Gschwandtner¹, and S. Miksch¹

Segmenting and Labeling of Time Series



The segmenting and labeling of multivariate time series data is applied in different domains, e.g., activity recognition or sensor states. This involves several steps of (pre-) processing, segmenting, and labeling of time intervals, and visually exploring the results as well as iteratively refining the parameters for all the processing steps. Within these processes different uncertainties are involved and relevant.

Uncertainty Categories

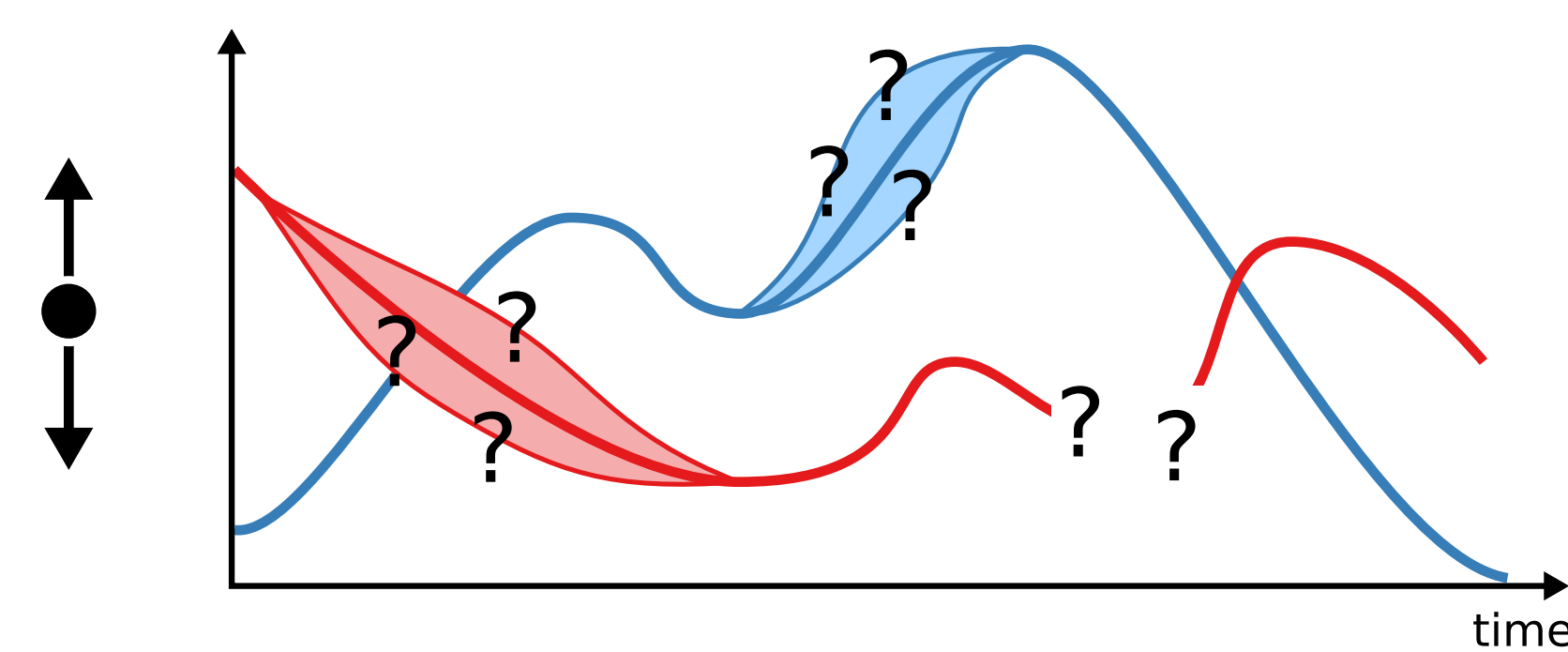


Uncertainty types involved in the process of segmenting and labeling multivariate time series data [1]. The figure shows the relation between uncertainties and process steps. The vicinity of the uncertainties to the corresponding steps imply where they are generated in and which they influence, e.g., value uncertainties are coming from the input time series or generated by data processing.

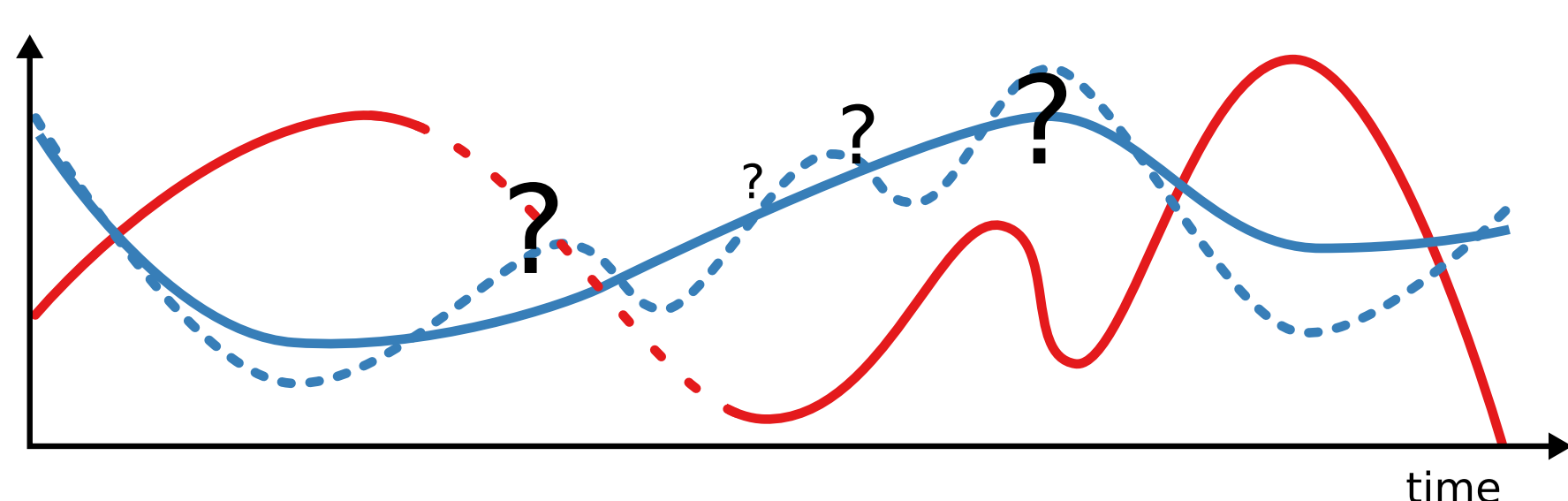
Categories in Detail

Value Uncertainty

Data Uncertainty

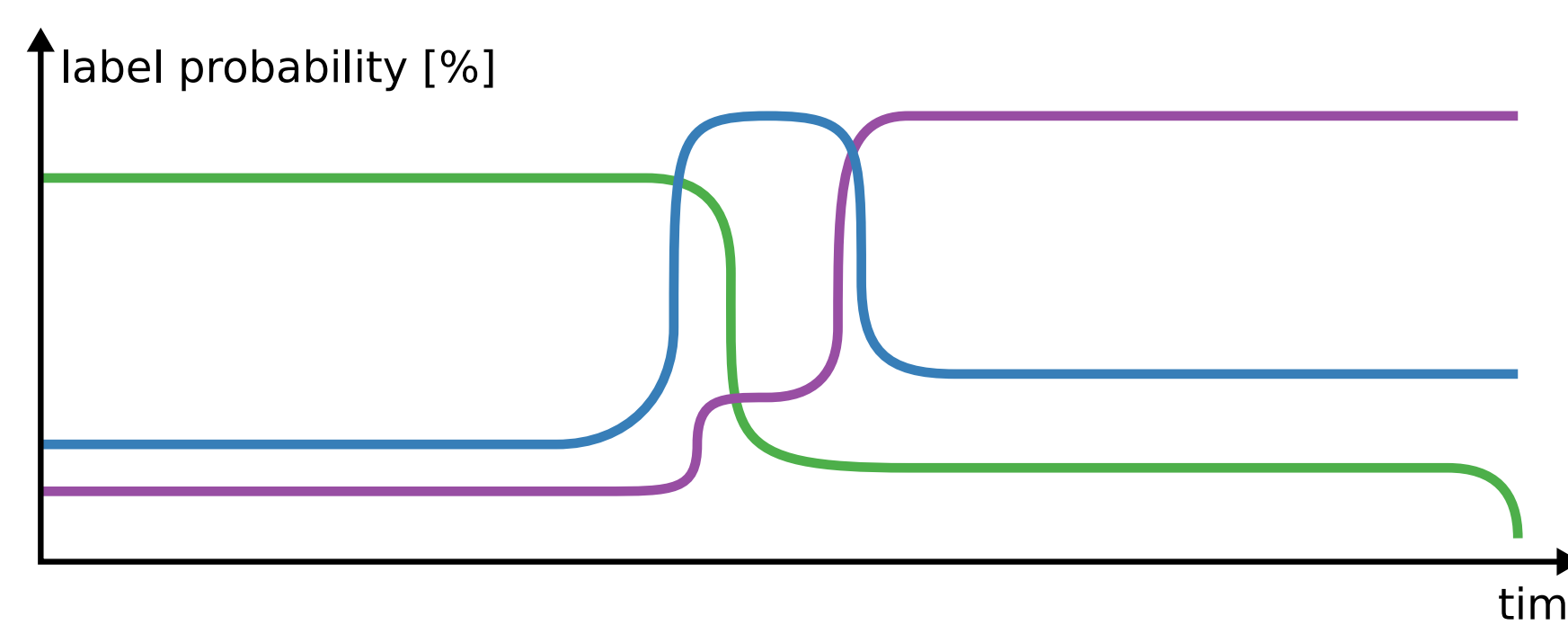


(Pre-) Processing Uncertainty



Result Uncertainty

Label Uncertainty

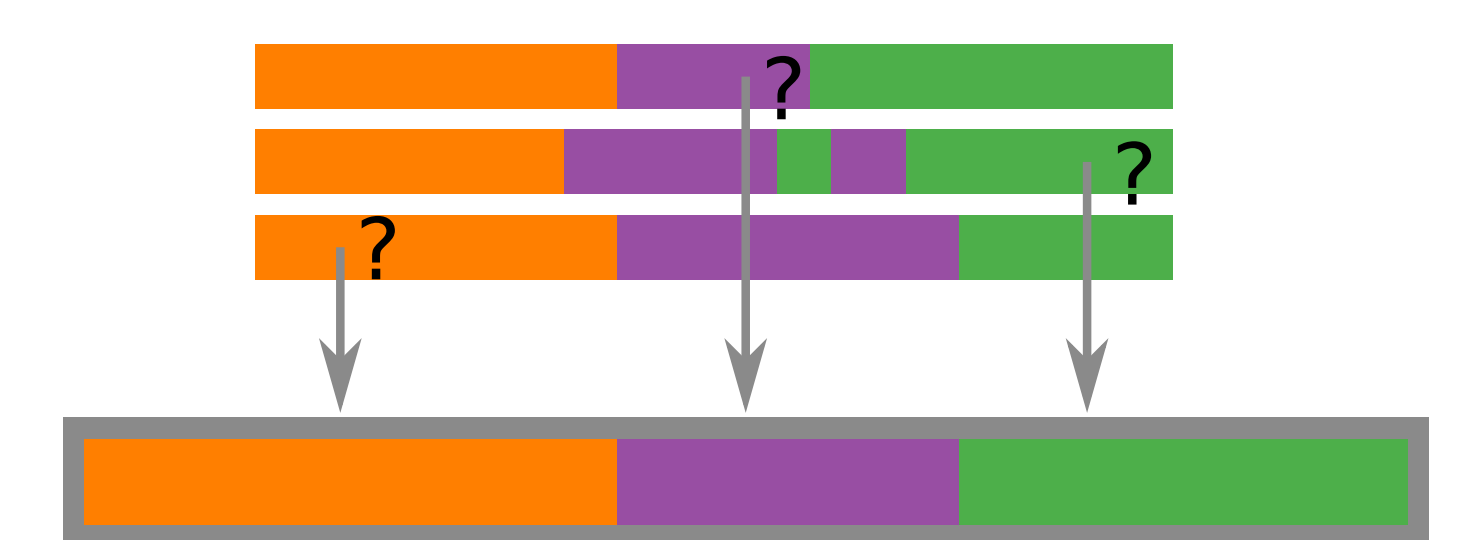


Time Interval Uncertainty

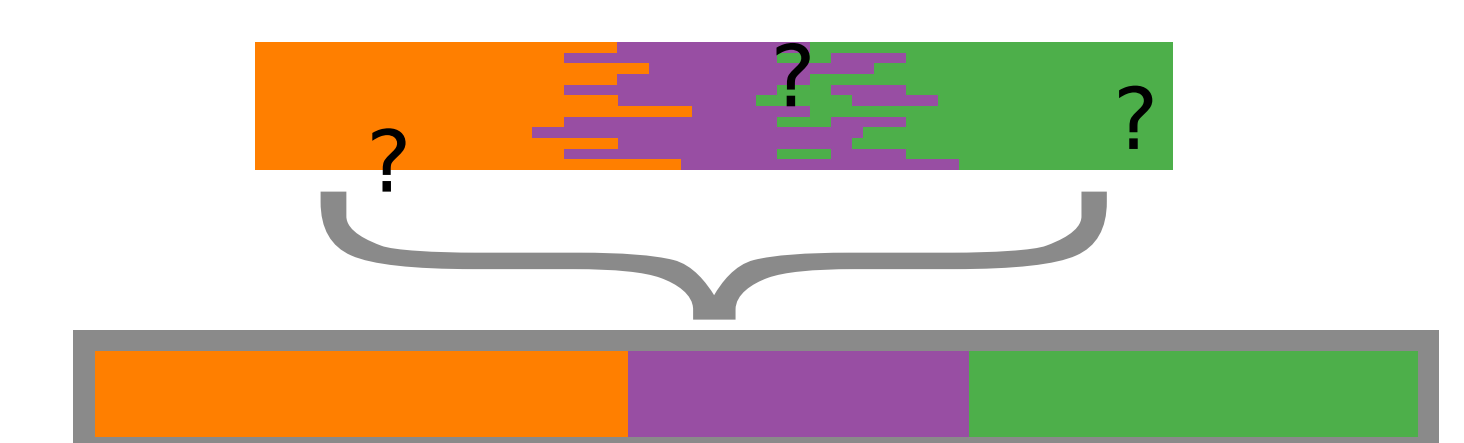


Aggregation Uncertainty

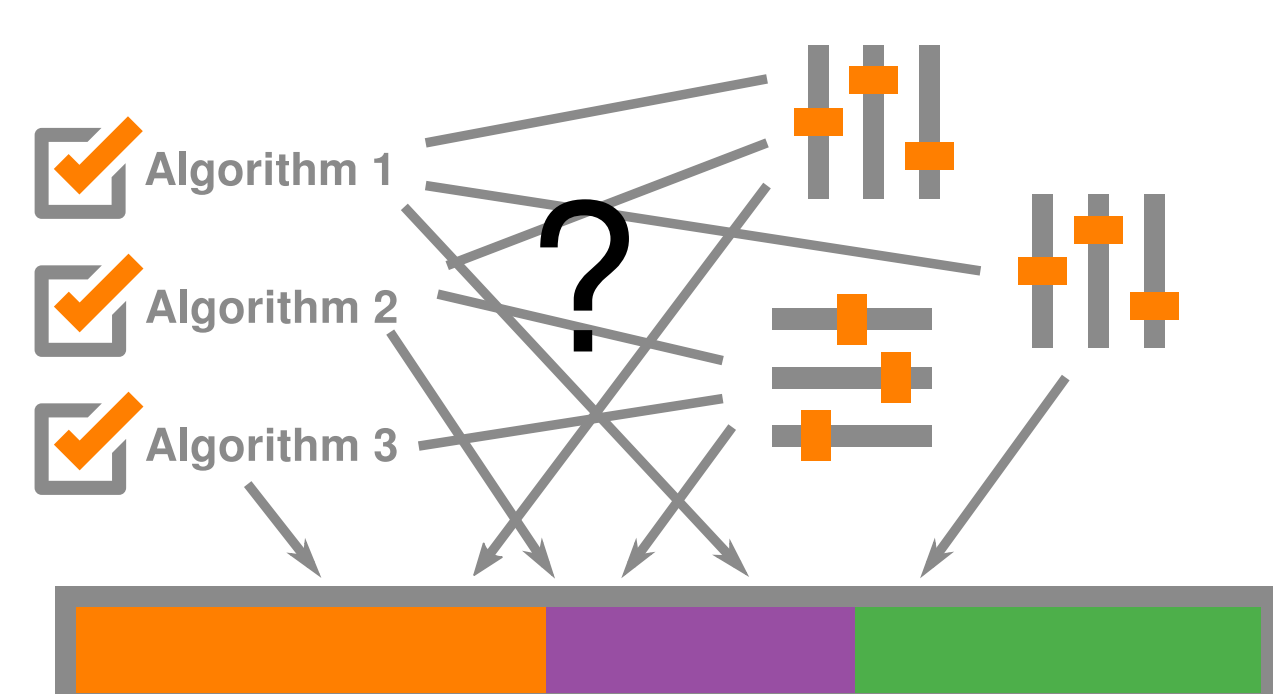
Data Aggregation Uncertainty



Visual Aggregation Uncertainty



(Cause &) Effect Uncertainty



Summary

- Allow identification of involved uncertainties in the process
- Support specification of metrics to communicate uncertainties
- Help designing uncertainty representations within the process and adapt visualizations reflecting the user's tasks adequately

References:
[1] Bernard J., Bors C., Bögl M., Eichner C., Gschwandtner T., Miksch S., Schumann H., Kohlhammer J.: Combining the Automated Segmentation and Visual Analysis of Multivariate Time Series. In EuroVis Workshop on Visual Analytics, EuroVA (2018), Eurographics. In-press..

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