Title of research:

Topological Methods for Multivariate Time Series Characterization (TopMuSCat)

Objectives:

- To identify key insights gained by Topological Data Analysis (TDA) in the time series domain over more classical methods
- Developing a knowledge base in TDA in BMW.
- Developing a Python based library for TDA tasks.

Please give a brief justification of your proposed research project:

The aim of this research proposal is to develop and implement a robust method to describe the distinctive features of multivariate time series using topological data analysis methods that can be further used for pattern mining or anomaly detection purposes.

Indeed, day-to-day business operations and the activities our employees engage in on daily basis generates huge amounts of time series data that is without mentioning data generated by our machines and sensors in our cars. Mining these massive datasets for patterns and/or anomalies would help understand hidden dynamics within studied processes, find structural shifts and spot anomalies more easily.
Topological Anomaly detection (TAD) method have been shown to produce excellent results.

The hope of this research project would be:

- To develop a Library (in Python preferably) which BMW data scientist can use out of the box to apply TAD to different time series.
- To apply TAD methods to car generated network logs data analytics to prove usefulness.

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