SEPIDEH PASHAMI received her BSc and MSc degrees in Computer Science from University of Tehran, Iran, in 2007 and 2009, respectively. During 2010 to 2014, she was enrolled as a PhD student at the Centre for Applied Autonomous Sensor Systems (AASS) in Örebro University, Sweden. After the PhD studies, she has been employed at the Intelligent Systems lab (IS-lab) in Halmstad University, Sweden. Her main research interests include machine learning, artificial olfaction and change detection on streaming data.

Detecting changes from the response of an array of metal oxide (MOX) gas sensors deployed in an Open Sampling System (OSS) can be beneficial for applications such as gas-leak detection in mines or large-scale pollution monitoring, especially where it is impractical to continuously store or transfer sensor readings, or where reliable calibration is difficult to achieve. Changes can occur due to the activity of a distant gas source such as a sudden alteration in concentration or due to exposure to a different compound.

The contributions of this thesis are centred around developing change detection methods using MOX sensor responses. First, we apply the Generalized Likelihood Ratio algorithm (GLR). GLR is a commonly used method because it does not make any a priori assumption about change events. Next, we introduce TREFEX, a novel change point detection algorithm, which models the response of MOX sensors as a piecewise exponential signal and considers the junctions between consecutive exponentials as change points. We also propose the rTREFEX algorithm as an extension of TREFEX. The core idea behind rTREFEX is an attempt to improve the fitted exponentials of TREFEX by minimizing the number of exponentials even further.

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