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## On-line change detection using incremental learning systems.

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The most widely used methods for online change detection have been developed within the Statistical Process Control framework. These methods are typically used for controlling the quality during a manufacturing process. In general, the problem concerns detecting whether or not a change has occurred and identifying the times of any such changes. In the last decade, some new approaches based on methods of machine learning systems have been developed. The concept is based on the detection of the unusual learning effort of an incremental learning system, which is caused by a change of underlying process behaviour. Then the process change detection can be transferred to the process of weight increments, which reflects the learning efforts of the learning system. The important assumption for such an approach is the stability of weights increments of such a learning system.

This contribution deals with conditions for the stability of a broad family of in-parameter-linear nonlinear neural architectures with learning. Especially, the bounded-input bounded-state stability concept (BIBS) is recently popular in neural networks. There can be shown that for gradient-based weight-update learning scheme we are able to monitor and accordingly maintain weight-update stability conditions to avoid instability in real-time learning systems.

### Keywords

change point detection, anomaly detection, neural network, stability

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