

# **Auto-regressive processes explained by self-organized maps: application to the detection of abnormal behavior in industrial processes**

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## **Abstract-**

**This paper analyzes the expected time evolution of an auto-regressive (AR) process using self-organized maps (SOM). It investigates how a SOM captures the time information given by the AR input process and how the transitions from one neuron to another one can be understood under a probabilistic perspective. In particular, regions of the map into which the AR process is expected to move are identified. This characterization allows detecting anomalous changes in the AR process structure or parameters. On the basis of the theoretical results, an anomaly detection method is proposed and applied to a real industrial process.**

**Index Terms-** Anomaly detection, auto-regressive processes, process quantization, self-organizing maps

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