

New application of process mining to identify abnormality in statistical process control process

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Abstract

Mining an event-based process to conform its running behavior to other ones has been getting a growing attention over past decades. The event precedence diagram representing the trend of a process is one of very important references used for mining or comparing the behaviors of various processes running. Certain R&D works, such as product configuration management, business running process design, software development process planning, working process flow control, etc., have ever been done with the process conformance in terms of the difference degree between those conforming processes in the form of their individualized event precedence diagram. In this paper, a process mining approach will be applied to perform the process conformance of a trend (a windowed process) run in a simulated manufacturing process to those trends of the several regulated abnormal SPC (statistical process control) patterns through examining whether it patterns upon one of those regulated abnormal SPC trends; if yes, the simulated manufacturing process will be conformed as an abnormal one, which implies that in practice such a manufacturing process is out of control, thereby its running has to be stopped and checked for locating its faults, hence the faults are corrected for continuously improving the running quality of the process. Or, the simulated manufacturing process can be claimed in control where no-defected products can be kept on being produced throughout the process. The distance-based similarity measures used in the proposed process mining technique will achieve the above process conformance. The results of the initial experiment showed that the diagrammed precedence of the abnormal SPC patterns existed in the simulated manufacturing process can be effectively identified for demonstrating the high potentiality of the proposed process mining technique applied to real manufacturing process. Of course, it is well known that a good manufacturing process quality improvement approach not only can decrease the costs of producing products, but increase the quality of the products produced. The proposed approach is just like such one.

Keywords

Statistical process control (SPC), quality control, continuous process improvement, process mining, process conformance.