Statistical Inference for Fault Detection: A Complete Algorithm Based on Kernel Estimators.

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Abstract: This article presents a new concept for a statistical fault detection system, including the detection, diagnosis, and prediction of faults. Theoretical material has been collected to provide a complete algorithm making possible the design of a usable system for statistical inference on the basis of the current value of a symptom vector. The use of elements of artificial intelligence enables self-correction and adaptation to changing conditions. The mathematical apparatus is founded on the methodology of testing statistical hypotheses, and on kernel estimators; the theoretical aspects have been documented by mathematical theorems. The work is oriented towards the problem of fault detection in dynamic systems under automatic control, but the basic formula is of a universal nature and can be used in a broad range of applications, including those outside the scope of engineering.