4.1.15. A STATISTICAL APPROACH TO INDUSTRIAL ANOMALY DETECTION

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In this paper, we study a statistical approach to anomaly detection and monitoring through image analysis, and its applications in non-destructive evaluation. A non-parametric statistical model is created by Parzen window density estimation at each pixel location, based on the observations of a number of defect-free images and the derived low level features. A test image is compared against the learned statistics, and anomaly not fitting the model is called out, including the material changes and manufacturing defects. Image normalization and registration are carried out to factor out the image-to-image variations of appearance change and spatial misalignment, and anomaly detection on multiple views are combined for overall detection. The assisted defection recognition and monitoring can dramatically increase the screening efficiency and consistency, thus enhancing quality control.