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P4.159 Deep feature based detection and location of the damaged first wall for EAST Tokamak

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EAST Tokamak is a complex fusion device which requires high-quality first wall condition for the long pulse and H-mode plasma operation. During plasma phases, some of the first wall components are damaged due to high thermal stress and electromagnetic force and control is necessary in case of doubt about their condition. Detection and locating the damaged PFCs are the precondition to determine whether to continue the experiment or shut down the machine to maintain components. This paper presents a process to detect and locate the damaged first wall automatically based on the visual features learned by deep learning. Compared to classic object recognition and detection methods based on low-level geometric features, the proposed method is able to extract high-level features which are more robust to disturbances and accomplish higher recognition and detection accuracy. The proposed method is validated in the simulation environment consisting of models of EAST Tokamak and EAMA (EAST articulated maintenance arm) robot.

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