Information Fusion for Autonomous Robotic Weeding

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Information fusion has a potential applicability to a multitude of different applications. Still, the JDL model is mostly used to describe defense applications. This paper describes the information fusion process for a robot removing weed in a field. We analyze the robotic system by relating it to the JDL model functions. The civilian application we consider here has some properties which differ from the typical defense applications: (1) indifferent environment and (2) a predictable and structured process to achieve its objectives. Nevertheless, the JDL model appears useful for describing the fusion activities of the weeding robot system. One difference from the defense use of the JDL model is that situation estimates tend to deal with internal properties of the robot and its mission progress rather than external entities and their relations. A finite state machine appears suitable to describe this type of application and provides a vocabulary for further analysis. We provide an example of how state transitions may be detected and exploited using information fusion and report on some initial results. An additional finding of applying a state machine is that process refinement for this type of application can be expressed in terms of state transitions.