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应用

基于类型辅助灰色关联度的红外传感器和ESM航迹关联算法

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摘要：

红外传感器与ESM是军事多传感器信息融合系统的重要组成部分。针对二者之间的航迹关联问题，提出了一种综合利用灰色关联度和类型信息的航迹关联算法。该算法将红外传感器和ESM的航迹序列看作离散时间函数，通过计算各航迹间的灰色B型关联度，形成灰色关联矩阵；通过归一化信息熵判断目标和辐射源类型信息的有效性，结合目标和辐射源的配属关系并利用VBS理论将不同框架下的证据转换到相同框架下，然后采用Jousselme距离度量证据的一致性，从而形成类型关联矩阵；最后，综合利用灰色关联矩阵和类型关联矩阵进行航迹关联判别。仿真结果表明，当可用数据点较多时，基于灰色关联度的航迹关联算法具有较高的关联正确率；当传感器分类效果较好时，基于类型辅助灰色关联度的航迹关联算法具有更好的关联性能。

关键词： 航迹关联　灰色关联度　类型辅助　VBS理论　Jousselme距离

Track-to-Track Association Algorithm for Infrared Sensor and ESM Based on Classification-aided Grey Relational Degree

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Abstract:

The infrared sensor and ESM are important parts of military multisensor information fusion system. A track-to-track association (T2TA) algorithm using grey relational degree and classification information is presented to solve the problem of T2TA between the infrared sensor and ESM. In this algorithm, track sequences from the infrared sensor and ESM are considered as functions of discrete time and the grey relational matrix is formed by calculating the B-mode grey relational degree between tracks. Second, the validity of classification information is evaluated through the unitary entropy. According to the affiliation between targets and radiant sources, evidences in different frames are transformed into the same frame by the theory of valuation-based system (VBS). Then the consistency of different evidences is weighed by Jousselme distance and the association matrix for classification information is formed. Finally, track-to-track association is performed by using the grey relational matrix and the association matrix for classification information jointly. The simulation results show that the T2TA algorithm based on grey relational degree has a higher rate of correct association when the usable data are sufficient, and the T2TA algorithm based on classification-aided grey relational degree has a better association performance if the classification effects of the sensors are well.

Keywords: track-to-track association　grey relational degree　classification-aided　VBS theory　Jousselme distance

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