

基于半参数化概率密度估计的雷达目标识别

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Radar Target Recognition Based on Semiparametric Density Estimation

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摘要

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摘要 该文针对雷达目标高分辨距离像(High-Resolution Range Profile, HRRP)识别中距离单元回波幅值统计建模所面临的概率密度模型选择问题,提出一种基于半参数化概率密度估计的雷达目标识别方法。半参数化概率密度估计从参数化概率密度估计出发,有效利用了高分辨距离像各距离单元幅值近似服从Gamma分布的经验知识,并且通过非参数化修正因子对Gamma模型进行修正,达到参数化方法和非参数化方法优势互补的目的。基于5种飞机模型高分辨距离像数据的仿真实验证明了该文方法的有效性。

关键词: 雷达自动目标识别 高分辨距离像 概率密度估计

Abstract: Due to the density model selection problem of amplitudes in each range cells for radar target recognition using High-Resolution Range Profile (HRRP), a radar target recognition approach based on the semiparametric density estimation is proposed in this paper. Starting with the parametric density estimation, semiparametric method has the ability to make use of empirical knowledge which is known as the approximate Gamma distribution of amplitudes in each HRRP range cells, and the Gamma density estimate is then corrected by multiplying with a nonparametric estimation of a correction factor. Obviously, both advantages of parametric method and nonparametric method are merged in the semiparametric density estimation. Simulation results based on the HRRP dataset of five aircraft models demonstrate the effectiveness of the proposed approach.

Keywords: Radar automatic target recognition High-Resolution Range Profile (HRRP) Density estimation

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