

应用

采用Rao-Blackwellised粒子滤波的时变多用户检测

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摘要:

传统多用户检测中通常假定接收方已知活跃用户数,一般为这个系统所能容纳的最大用户个数。在此前提下,传统多用户检测方法能够获得较好的估计性能。然而在实际的多址移动通信系统中活跃用户个数及其参数往往都是时变的,此时传统的多用户检测方法性能恶化。针对这个问题,本文首先采用随机集理论(Random Set Theory, RST)建立多用户动态模型,基于此模型将信道分解为离散部分和连续部分,并通过分析两者的关系得到它们的状态转移概率;然后提出了采用Rao-Blackwellised粒子滤波(RBPF)算法的时变多用户检测器,实现了对活跃用户数目地跟踪以及用户发送数据地估计;最后给出了算法在抗噪声能力、抗远近效应和系统容量等方面的仿真结果。仿真结果表明本文算法的性能要明显优于传统的多用户检测方法。

关键词: 多用户检测 时变 随机集 粒子滤波

(Annual Symposium)Time-varying Multi-user Detection Based on Rao-Blackwellised Particle Filtering

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Abstract:

Abstract : Traditional multi-user detection methods often assume that the number of active users which is usually considered to be the maximum number of users that the system can contain, is known at the receiver. Under this assumption, conventional methods for multi-user detection can achieve good performance. However, the number of active users as well as their parameters are always unknown and time-varying in practical multi-access communication systems. In this case, the performance of traditional methods is deteriorated. In accordance with this problem, in our paper, a dynamic model of multi-user is established by using random set theory (RST) , after that we can decompose the channel into two parts, one is the discrete part and the other is the continuous part. Through analysing the relationship between the two parts, we can get the state transition probability. And then a time-varying multi-user detector based on Rao-Blackwellised particle filtering (RBPF) algorithm is proposed. Our scheme can sufficiently trace the number of active users and estimate the users' transmitted datas. The simulation results in anti-noise, near-far resistance and system capacity of this algorithm are presented at the end of this paper. Simulating results show that the performance of proposed method is better than that of conventional methods.

Keywords: multiuser detection time-varying random set theory particle filtering

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