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Efficient Game Theory Based Resource Allocation and Cluster Based ANT Optimization for IoT based Cognitive Ratio Networks

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Abstract:
In recent times, many real time applications are developed using IoT based mobile wireless communication which increased the demand. Cognitive radio technology supplies a platform for channel sharing between licensed and unlicensed users. To improve the sensing of users, spectral diversity cooperative channel sensing is used. In this research, a newer model is introduced to improve spectrum utilization and efficiency which is Game theory-based resource allocation and Cluster based Ant Optimization (GTR-CAO). This method is sub-divided into three sections namely game theory for resource allocation, clustering with data aggregation and multi-objective ant optimization for best path finding. Simulation experiments are handled using MATLAB. GTR-CAO is compared with three state such as distributed sequential coalition formation (DSCF), Stochastic Stackelberg Game Theory (SSGT), and fair multichannel assignment scheme (FMCA) in terms of throughput, resource utilization, and energy consumption. As a result, the proposed GTR-CAO achieves better performance compared with the earlier works.

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Contents

I. Introduction

Cognitive radio networks (CRNs) [1] has evolved to solve issues related to channel scarcity for the effective use of the electromagnetic channel to the licensed user. Those licensed users are denoted as primary users (PU), and secondary users (SU) rely on the cognitive radio network [2]. In this cognitive radio network, channel sensing is considered as crucial task for detection of available channels from distributed spectra of primary user and drops vast range of interference between primary and secondary users. To improve the reliability of channel detection, cooperative channel sensing [3] is identified as an effective approach. The existing sensing-based channel discovery mechanism leads to error and causes false information transmission between SU and PU based on channel occupancy. Those found errors are in the form of false alarm, which means that free channels are sensed erroneously for occupancy. On the other hand, misdetection also occurred because of sensing that the occupied channel was erroneously free. Herewith, it is seen that effective choice of operating point with sensing mechanism implies effective trade-off between false alarm and misdetection. As said, minimal misdetection is achieved with increase in false alarm. On the contrary, a low false alarm is achieved with an inflated cost of misdetection [4]. Based on the consideration of above factors, a misdetection error is created, and this changes interference between PU and SUs. In terms of terms, it shows whether the channel is occupied by PU when SUs need access. Subsequently, for both PUs and SUs, the resulting operation degrades effectively for channel choice. On the other hand, channel utilization of SUs is affected by false-alarm error for non-utilized channel, and this leads to user performance reduction. Based on this scenario, common techniques are developed with provision of low values for the probability of missed protection for effective utilization of PUs with reduced performance of SU. Furthermore, PUs has efficient channel resource access policies that guarantee Quality of Service (QoS) for PUs and not for SUs [5].

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References

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