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Development of Enhanced Chimp Optimization Algorithm (OFCOA) in Cognitive Radio Networks for Energy Management and Resource Allocation

Dilip Kumar Jang Bahadur Saini, Pimpri Chindward University, India

Anupama Mishra, Swami Rama Himalayan University, India, India*

Dhirendra Siddharth, G.L. Bajaj Institute of Technology and Management, India

Pooja Joshi, Swami Rama Himalayan University, India

Ritika Bansal, Insights2Techinfo, India, & Center for Interdisciplinary Research, University of Petroleum and Energy Studies (UPES), Dehradun, India, & Department of Electrical and Computer Engineering, Lebanese American University, Beirut, Lebanon

Shavi Bansal, Insights2Techinfo, India

Kwok Tai Chui, Hong Kong Metropolitan University, Hong Kong

ABSTRACT

Transmit time and power optimisation increase secondary network energy efficiency (EE). The optimum resource allocation strategy in cognitive radio networks is the enhanced chimp optimisation algorithm (OFCOA) since the EE maximising problem is a nonlinear fractional programming problem. To control resources and energy, this research offers an energy-efficient CRN opposition function-based chimpanzee optimisation algorithm (OFCOA) solution. Combining the opposition function (OF) with the chimpanzee optimisation technique is recommended. OF in COAs improves decision-making. Spectrum measurements in energy management provide energy-efficient CRN operation. The suggested technique was evaluated using channel occupancy, CRN data, and four major and secondary user scenarios. CPU power, network life, transmission rate, latency, flush, power consumption, and overhead are utilized to evaluate the proposed approach in MATLAB. The proposed method is compared to existing approaches like Particle Swarm Optimisation (PSO), Chimpanzee Optimisation Algorithm (COA), and Whale Optimisation Algorithm.

KEYWORDS

Average Energy, Cognitive Radio Networks, Energy Efficient, Energy Utilization, Resources, Spectrum Sensing

1. INTRODUCTION

Since the launch of mobile networks many years later and the development of small correspondence, research has focused on improving resilient networks, less complexity, and less fatigue while increasing the speed of corporate governance. The main boundary rules of the project, spectral

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*Corresponding Author

characteristic features (SE) (Salma Benazzouza et al., 2021); Energy Efficiency (EE) (Kalpana Devi. M and Umamaheswari. K, 2021); And Energy Harvest (EH) seem to have a huge interest in future telecommunications systems for 5G Smart Radio Systems (5G-CRN) by 2021. While many different regions of the country face serious limit shortages, there are still limit deficits, in addition, that is, in many places, there are definitely problems with the use of limits (Manish Kumar Giri and Saikat Majumder, 2021). Therefore, a large amount of work is required to modernize marginal productivity methods. Like global climate issues, energy efficiency is another potential project area for sophisticated telecommunications companies due to limited access and wasteful use of mobile phone battery power (Rohit. B, Chaurasiya and Rahul Shrestha, 2021). Other things being equal, strategies that increase spectrum efficiency lead to a decrease in energy efficiency (Chih-Lin Chuang et al., 2021).

The Enhanced Chimp Optimisation Algorithm (OFCOA) is a significant development in Cognitive Radio Networks (CRNs) Energy Management and Resource Allocation. It boosts network performance and addresses increased bandwidth demand by improving spectrum utilisation through dynamic resource allocation. OFCOA is also concerned with energy management, aiming to reduce power consumption and transmission costs while also contributing to environmentally friendly communication networks. Its impact extends beyond network advantages to encompass broader environmental and economic advantages. The OFCOA algorithm improves network performance by appropriately distributing resources based on real-time demands and circumstances. This adaptability is crucial in dynamic wireless scenarios. OFCOA allows networks to self-adjust to changing conditions, resulting in smarter and more efficient communication systems. This approach is an important step towards the development of long-term, high-performance cognitive radio systems.

The development of the Enhanced Chimp Optimization Algorithm (OFCOA) in Cognitive Radio Networks (CRNs) shows promise for Energy Management and Resource Allocation. However, further research is needed to validate its performance in real-world CRN scenarios and compare it with existing optimization algorithms. Additionally, the scalability and computational complexity of OFCOA in large-scale CRNs need to be assessed to ensure practical deployment. The Enhanced Chimp Optimization Algorithm (OFCOA) in Cognitive Radio Networks (CRN) needs to be thoroughly examined for its security implications and practical implementation in real-world scenarios. Addressing these gaps is crucial for establishing the algorithm's credibility, efficiency, and applicability in communication systems, contributing to advancements in energy management and resource allocation in wireless networks.

The main test of the 5G architecture is to achieve high spectrum efficiency while using very low cell phone power levels. This problem is solved by offering better interchange between SE and EE by providing Quality of Service (QoS) (Monisha Devi et al., 2021) in 5G-CRN. Limit detection is the main part of the CRN, which takes into account the main part of the CRN, which is the blank validation range. Traditional range detection consists of sophisticated techniques such as filter matching (MF), cyclic detectors, and the most complex eigenvalue indicator i.e. energy detectors. However, energy detection strategies are more complex methods. The low signal has a horrible display at the first noise level (Surya Narayana Sanka et al., 2021). Efficient detection methods such as loop lock detectors are suitable for detecting gaps in range efficiently, although this requires a longer detection time. With a fixed advantage, as the collection time increases, the delivery time decreases. Pilot performance is usually reduced, which does not attract CRN (Rodney Martinez Alonso et al., 2021). MF plots are also very reliable but require prior knowledge of site PU signals. Without previous PU signal data, the representation of the MF system would be dramatically reduced. In addition, the MF strategy requires a separate user for each type of qualification, making it more complex in this way (Nehal M. El Azaly et al., 2021).

Energy efficiency is a top goal in CRN networks since it increases the lifespan of the network design, which improves the spectrum characterization process (Jaya Lakshmi Arikatla et al., 2021). This CRN power is used during spectrum noise and data transmission and reception transactions. This power consumption is increased by unwanted activity on the CRN. Therefore, reducing power