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An AI-Based Dynamical Resource Allocation Calculation Algorithm for Unmanned Aerial Vehicle

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Abstract : As the scale of the network becomes larger and more complex than before, the density of user devices is also increasing. The development of Unmanned Aerial Vehicle (UAV) networks is able to collect and transform data in an efficient way by using software-defined networks (SDN) technology. This paper proposed a three-layer distributed and dynamic cluster architecture to manage UAVs by using an AI-based resource allocation calculation algorithm to address the overloading network problem. Through separating services of each UAV, the UAV hierarchical cluster system performs the main function of reducing the network load and transferring user requests, with three sub-tasks including data collection, communication channel organization, and data relaying. In this cluster, a head node and a vice head node UAV are selected considering the Central Processing Unit (CPU), operational (RAM), and permanent (ROM) memory of devices, battery charge, and capacity. The vice head node acts as a backup that stores all the data in the head node. The k-means clustering algorithm is used in order to detect high load regions and form the UAV layered clusters. The whole process of detecting high load areas, forming and selecting UAV clusters, and moving the selected UAV cluster to that area is proposed as offloading traffic algorithm.

Keywords : k-means, resource allocation, SDN, UAV network, unmanned aerial vehicles
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