A Dynamic Graph Approach Towards Efficient Drone-based Delivery System

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ABSTRACT
Drones can be very promising for delivering goods efficiently in hard-to-reach places. Due to limited battery power, a drone-based delivery system always try to minimize the energy usage to successfully complete a route from the warehouse to customer and then customer to warehouse. However, a shortest delivery route can be affected by various factors like the global wind and this shortest path varies with time. All previous works discuss about single-drone deliver and use computing resources inside the drone to compute the shortest path on the fly. However, the consideration of computing resources inside a drone makes a drone costly. In this paper, we develop a centralized system for computing time-varying shortest path in multi-warehouse multi-drone delivery system, where cheap drones with minimal computation power can be used. Specifically, we propose a parallel algorithm, which updates the shortest delivery paths for multiple drones from time to time depending on the various time varying factors related to the paths. The experimental results demonstrate that our shortest delivery path update approach is up to 4.5X faster than the state-of-the-art shortest path computing implementation.

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