EOTE-FSC: An efficient offloaded task execution for fog enabled smart cities

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Abstract: Smart cities provide ease in lifestyle to their community members with the help of Information and Communication Technology (ICT). It provides better water, waste and energy management, enhances the security and safety of its citizens and offers better health facilities. Most of these applications are based on IoT-based sensor networks, that are deployed in different areas of applications according to their demand. Due to limited processing capabilities, sensor nodes cannot process multiple tasks simultaneously and need to offload some of their tasks to remotely placed cloud servers, which may cause delays. To reduce the delay, computing nodes are placed in different vicinitys acting as fog-computing nodes are used, to execute the offloaded tasks. It has been observed that the offloaded tasks are not uniformly received by fog computing nodes and some fog nodes may receive more tasks as some may receive less number of tasks. This may cause an increase in overall task execution time. Furthermore, these tasks comprise different priority levels and must be executed before their deadline. In this work, an Efficient Offloaded Task Execution for Fog enabled Smart cities (EOTE − FSC) is proposed. EOTE − FSC proposes a load balancing mechanism by modifying the greedy algorithm to efficiently distribute the offloaded tasks to its attached fog nodes to reduce the overall task execution time. This results in the successful execution of most of the tasks within their deadline. In addition, EOTE − FSC modifies the task sequencing with a deadline algorithm for the fog node to optimally execute the offloaded tasks in such a way that most of the high-priority tasks are entertained. The load balancing results of EOTE − FSC are compared with stateof-the-art well-known Round Robin, Greedy, Round Robin with longest job first, and Round Robin with shortest job first algorithms. However, fog computing results of EOTE − FSC are compared with the First Come First Serve algorithm. The results show that the EOTE − FSC effectively offloaded the tasks on fog nodes and the maximum load on the fog computing nodes is reduced up to 29%, 27.3%, 23%, and 24.4% as compared to Round Robin, Greedy, Round Robin with LJF and Round Robin with SJF algorithms respectively. However, task execution in the proposed EOTE − FSC executes a maximum number of offloaded high-priority tasks as compared to the FCFS algorithm within the same computing capacity of fog nodes.