Artificial Intelligent-Based Approaches for Task Offloading, Resource Allocation and Service Placement of Internet of Things Applications: State of the Art

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Abstract : In order to support the continued growth, critical latency of IoT applications, and various obstacles of traditional data centers, mobile edge computing (MEC) has emerged as a promising solution that extends cloud data-processing and decision-making to edge devices. By adopting a MEC structure, IoT applications could be executed locally, on an edge server, different fog nodes, or distant cloud data centers. However, we are often faced with wanting to optimize conflicting criteria such as minimizing energy consumption of limited local capabilities (in terms of CPU, RAM, storage, bandwidth) of mobile edge devices and trying to keep high performance (reducing response time, increasing throughput and service availability) at the same time. Achieving one goal may affect the other, making task offloading (TO), resource allocation (RA), and service placement (SP) complex processes. It is a nontrivial multi-objective optimization problem to study the trade-off between conflicting criteria. The paper provides a survey on different TO, SP, and RA recent multi-objective optimization (MOO) approaches used in edge computing environments, particularly artificial intelligent (AI) ones, to satisfy various objectives, constraints, and dynamic conditions related to IoT applications.

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