

## 智能工厂中风险敏感的边缘计算任务卸载策略研究

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**摘 要:** 本文围绕智能工厂中关键性任务的边缘计算开展研究.考虑边缘计算中由于信道的不确定性及计算资源受限可能出现的高时延风险, 首先通过使用条件风险价值 (Conditional Value at Risk, CVaR) 完成时延分布尾部信息的刻画, 通过利用 CVaR 的凸性和平移等价性, 给出了时延 CVaR 的上界.进一步, 通过对边缘服务器的选择与计算资源分配, 完成了机器设备处理计算任务的平均时延与 CVaR 上界的联合优化.通过仿真实验, 验证了算法模型对高时延分布刻画的有效性.从仿真结果可知, 所提策略不仅提高了计算的可靠性, 同时降低了时延的高风险值.

**关键词:** 边缘计算; 智能工厂; 关键性任务; 风险敏感; CVaR

## Risk sensitive task offloading research for smart factories in edge computing

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**Abstract:** This paper focuses on the edge computing of critical tasks in smart factories. Considering the high latency risk that may occur due to the uncertainty of the channel and the limitation of computing resources in the edge computing, the conditional value at risk (CVaR) is used to capture the tail of the delay distribution. By using the convexity and translational equivariance of CVaR, we introduce the upper bound of CVaR for the delay. Furthermore, we provide an optimal framework design including server selection and computing resource allocation, aiming at jointly optimizing the average delay and the upper bound of CVaR. Simulation results validate the effectiveness of the algorithm for high-latency distribution characterization. From the simulation results, the proposed strategy not only improves the reliability of the computing, but also reduces the high risk value of the delay.

**Key words:** edge computing; smart factory; mission-critical; risk-sensitive; CVaR

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