



MicroFaaS: Adaptive serverless computing for Internet of Things

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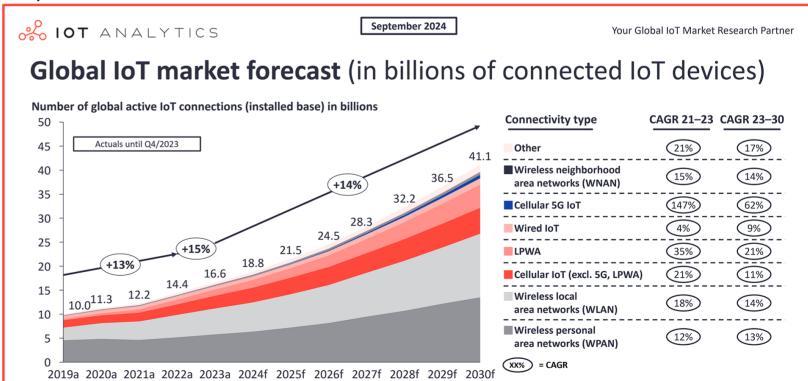




Motivation

- IoT growth projected to exceed 40B devices by 2030
 - Need for intelligence provided by ML models
 - Data processing, fraud detection, etc.
 - Major constraints
 - limited CPU, memory, energy





Note: IoT connections do not include any computers, laptops, fixed phones, cellphones, or consumers tablets. Counted are active nodes/devices or gateways that concentrate the end-sensors, not every sensor/actuator. Simple one-directional communications technology not considered (e.g. RFID, NFC). Wired includes ethernet and fieldbuses (e.g., connected industrial PLCs or I/O modules); Cellular includes 2G, 3G, 4G, 5G; LPWA includes unlicensed and licensed low-power networks; WPAN includes Bluetooth, Zigbee, Z-Wave or similar; WLAN includes Wi-Fi and related protocols;

WNAN includes non-short-range mesh, such as Wi-SUN; Other includes satellite and unclassified proprietary networks with any range

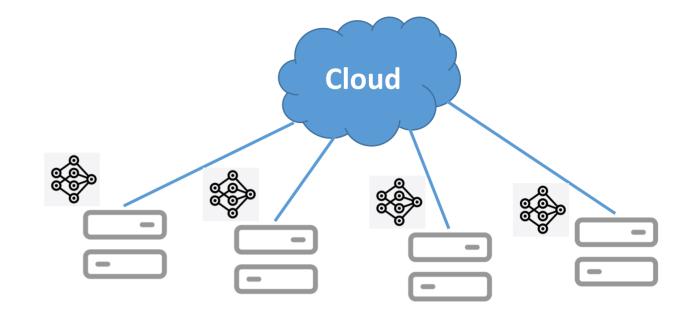
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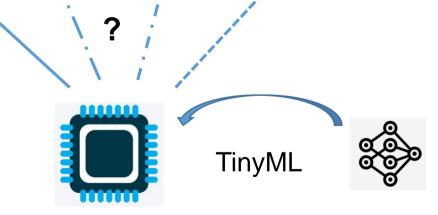


Research problem

- ML models can be optimised and deployed on IoT devices
 - Microntrollers
 - Linux based IoT devices
- ML models on the edge
 - Various possibilities for ML serving
 - 6G MEC
 - On-Prem servers
 - Home Gateways
 - Drones
- Which edge instance should be selected for invocation?



Network conditions (congestion, throughput, etc.)



https://github.com/tszydlo/FogML





MicroFaaS

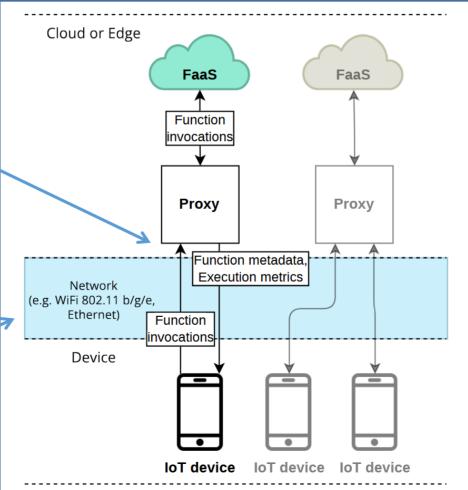
MicroFaaS is an intelligent and adaptive offloading framework for IoT devices

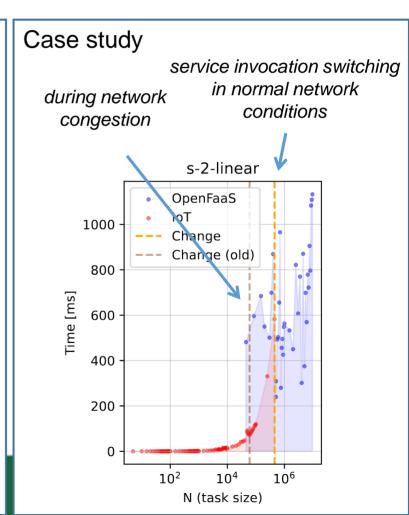
Incorporates prior benchmarking

and regression models for execution cost estimation

 MicroFaaS proxies store these regression models and share them across IoT clients, enabling a knowledge base about remote FaaS functions

 MicroFaaS monitors network connectivity and updates communication cost models dynamically.









Summary

- MicroFaaS is an intelligent and adaptive offloading framework for IoT devices
 - Approach analysed in MicroFaaS reduces calibration time for the offloading algorithm
 - **68.75**% of the time taken by a naive strategy that offloads all tasks to FaaS.
 - 5.23% of the time required when all tasks are executed locally on the IoT device.
- The framework is cloud-agnostic, allowing seamless integration with multiple FaaS providers.

T Szydlo, O Krolik, "MicroFaaS: Adaptive serverless computing for Internet of Things", FGCS accepted





