Common Data and Intelligence Layer

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April 2020

Centralized vs. Distributed Computing Architectures

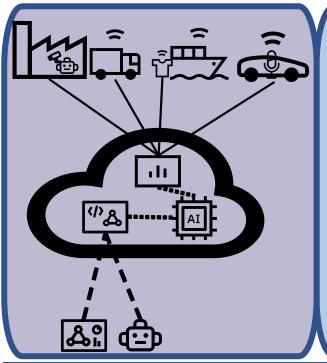
Centralized Decentralized Distributed

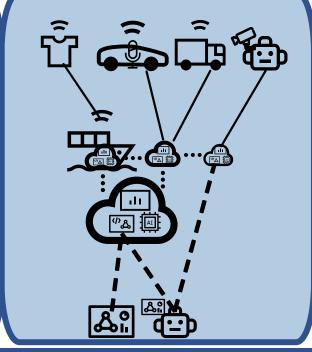
Data sources

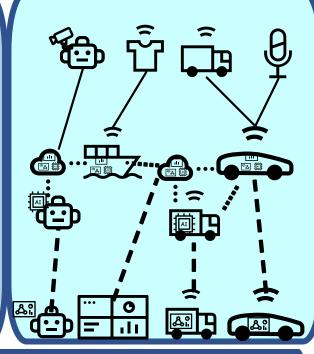
Execution environment

Applications

From centralized to distributed

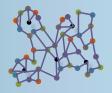




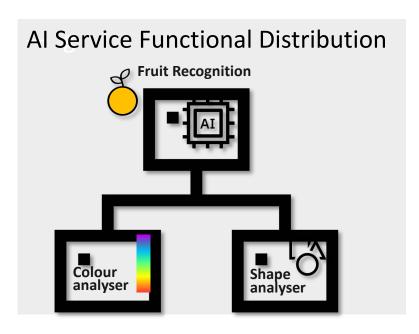


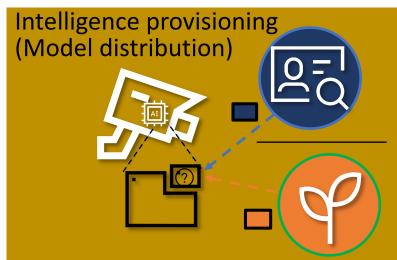


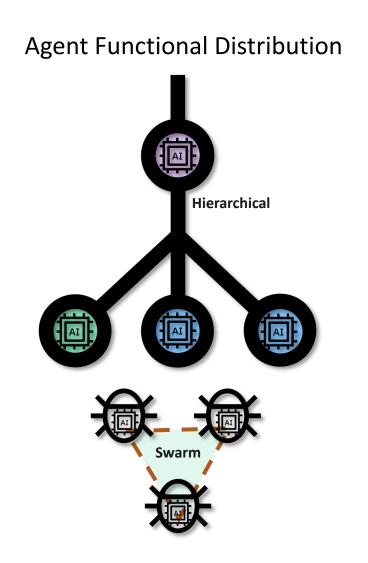


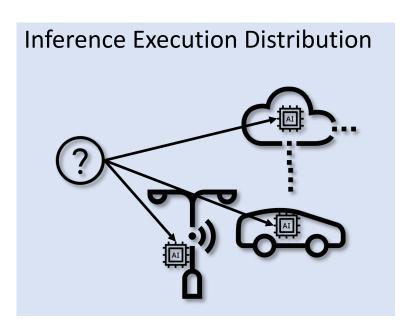


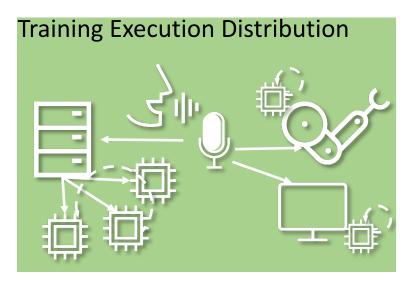
Computational Intelligence Distribution Aspects











Edge-Computing Fabric Stacks Mapping

Applications General and domain specific vocabularies and ontologies that can interoperate Orchestration Policies LCM Agent Interaction and negotiation process Handling Interaction cooperate, compete, persuade, block) Services Exposure Intend & What to do or what does it need from others and how is Services & Functions configured or directed about what to do (or orchestrated) purpose Peering Exchange of processed information according to Common Data/Intelligence interaction Knowledge (filtering, searching, contextualizing, negotiating, etc.) Layer Measurement, reports, identifiers, digital representations, etc. Considerations such as data nomadism Orchestration Data Local Data (data moving with physical entities) Sources/Repository Multiple topologies and communication modes **Local Processing** Communication (D2D, D2Nw, Nw2Nw) HW/SW Platform

Functional stack

Semantics

ctuation

Edge architecture stack

Data Capture

- Temperature (
- Moisture
- Ph
- CO₂

Cameras

Operator(s)

Application services

- Phone
- PC/Mac

Local ML/AI

Operator(s)

Data

Interpretation

Cyberphysical security Middleware Data Communications Edge Computing Cloud Computing ayer Monitoring LAN Farm management Environmental WSN Climate Application/API Irrigation/ management ta Zigbee nutriment LORA O RFID **IoT Broker** O Local image processing/sensor Common WAN fusion Event databases/logs •Cellular •Fiber +WIFI IoT broker •HFC+WIFI Local databases Cloud-based image •xDSL+WIFI Local decision processing/training **IP Protocols Formatting Datasets** Match/action TCP Query/response HTTPS Remote decision Store/process QUIC IoT IoT specific **Data Formats &** Alerts/critical Alerts/critical events events semantics Status and diagnostics CADM •LWM2M •WoT PLC/Automation •JSON-LD

Summary

- One of the main challenges in computational intelligence is the lack of interoperability between AI components
- Such issue is clearly accentuated at the data layer (e.g., incompatible data types and formats, heterogeneous APIs and platforms required to execute the AI models, inconsistent life-cycle management and policies)
- A Common Intelligence-Data Layer is needed.

Next Steps

- Interoperability requirements analysis (according to different scenarios)
- Common Data Layer taxonomy
- "Common Data Layer for COIN" draft
 - Possible legacy with the "Edge Data Discovery for COIN" draft