

Inria

About the challenges of Opportunistic Federated Learning

(what's needed, what's missing, and what's coming)

Rémy Raes

What is federated learning?

- Machine learning with several participants
- Keeping their training data...
- ...while sharing model improvements!

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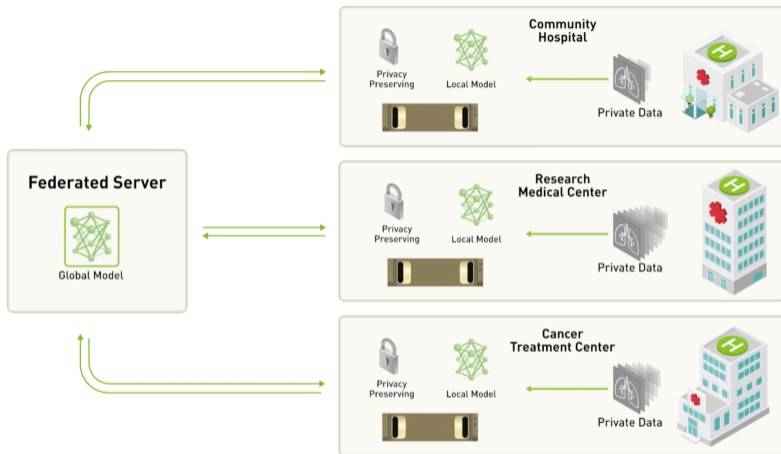


Figure: Federated learning model in a medical context.

- Moving participants
- Local (temporary) interactions

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- Mobile sensors
- Decentralized configuration
- Lots of data...
 - > ...including location data!



Figure: PAMELA sensor and associated Apolline app.

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Contents

01. Storage
02. Communications
03. Energy

01

Storage

- How to store unbounded data streams on constrained mobile devices?

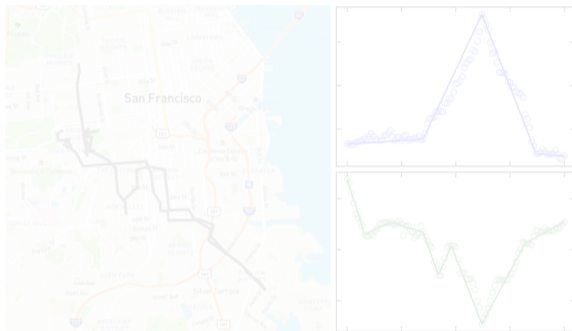


Figure: Modelling latitude and longitude of a user in San Francisco.

O.Ruas, R.Raes, A.Luxey-Bitri, R.Rouvoy, FLI: Increasing the Storage of Data Streams in Ubiquitous Devices, under submission to IMWUT 2024

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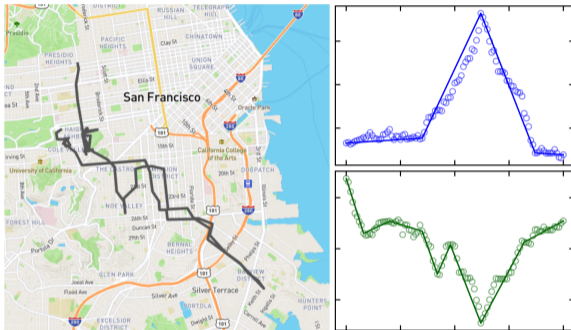


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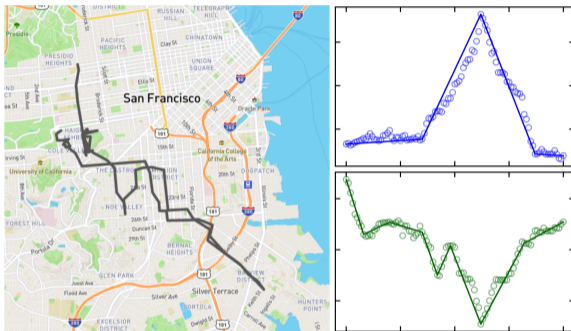


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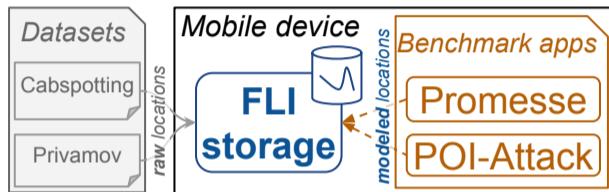


Figure: Overview of *in situ* FLI experiments

O.Ruas, R.Raes, A.Luxey-Bitri, R.Rouvoy, FLI: Increasing the Storage of Data Streams in Ubiquitous Devices, under submission to IMWUT 2024

02

Communications

- How to exchange relevant model data among nearby devices?



R.Raes, A.Luxey-Bitri, R.Rouvoy, F.Taïani, D.Frey, It's amazing what you'll find face-to-face!, future submission to ICT4S 2024

L.Desauw, A.Luxey-Bitri, R.Raes, R.Rouvoy, O.Ruas, W.Rudametkin, A critical review of mobile device-to-device communication, <https://arxiv.org/abs/2309.11871>

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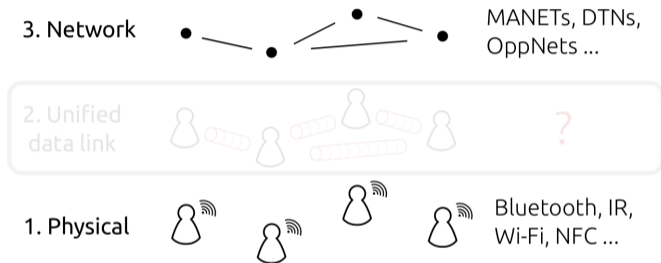
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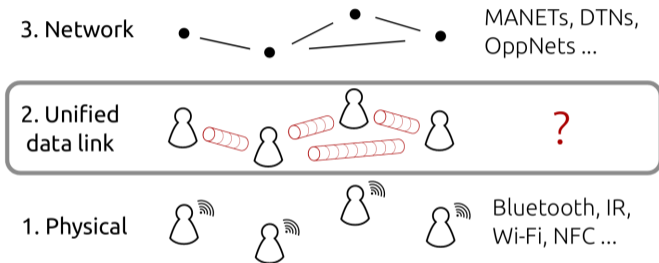
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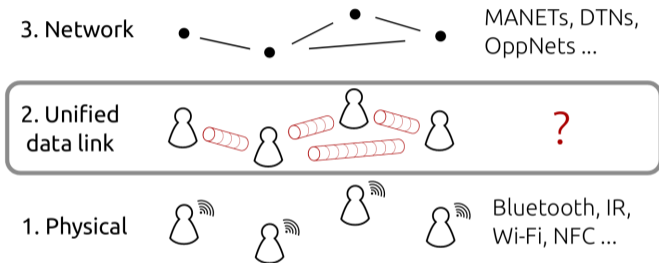
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03

Energy

- Comparison to centralized approach
- Privacy VS energy?

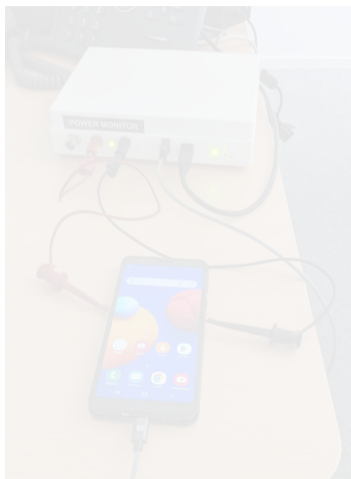


Figure: Smartphone energy measurement set-up.

- Comparison to centralized approach
- Privacy VS energy?

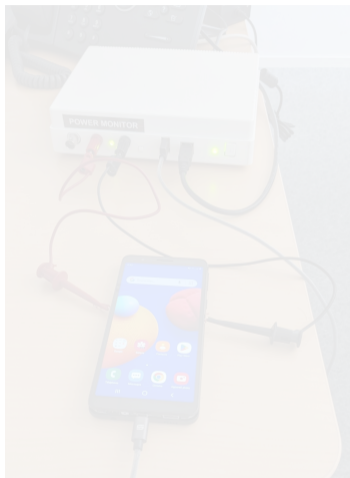


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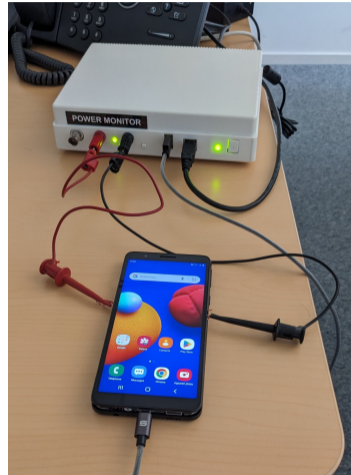


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