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AI & Security

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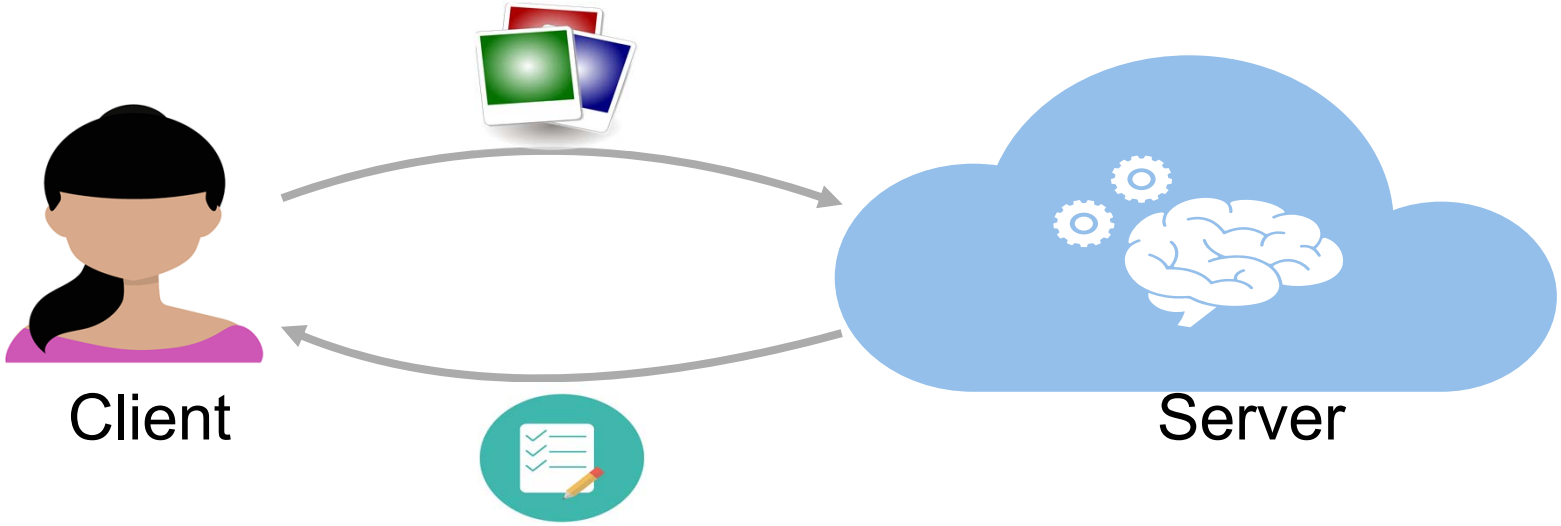
Machine Learning as a Service (MLaaS)



Performance

No need for ML knowledge

Cost reduction

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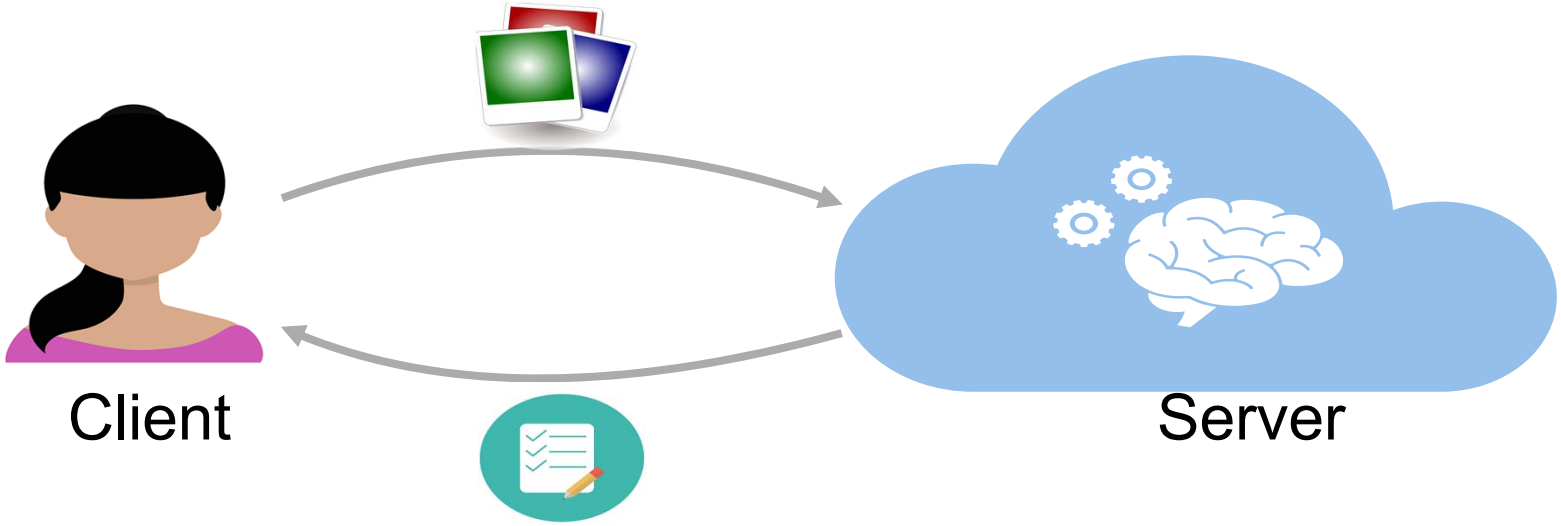
Sensitive and Confidential Data



- Sensitive personal data
- Corporate data (IP)
- Intellectual property
- Legal restrictions

General Data Protection Regulation

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Data Protection Tools

- Traditional PETs  **not adapted**

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Data Protection Tools

- Traditional PETs  **not adapted**

- Advanced PETs
  - Homomorphic Encryption
  - Secure Multiparty Computation
  - Differential Privacy
  - Functional Encryption

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Advanced Cryptographic tools

- Homomorphic encryption

$$\boldsymbol{Encrypt(m_1)\ op1\ Encrypt(m_2) = Encrypt(m_1 op2\ m_2)}$$

  - Partially HE: one operation only
  - Somewhat HE: arbitrary number of +, limited number of x
  - Fully HE: any function

- Two party computation

leak no other information than what Ideal model leaks

  - Yao's Garbled Circuits
  - Boolean sharing
  - Arithmetic sharing

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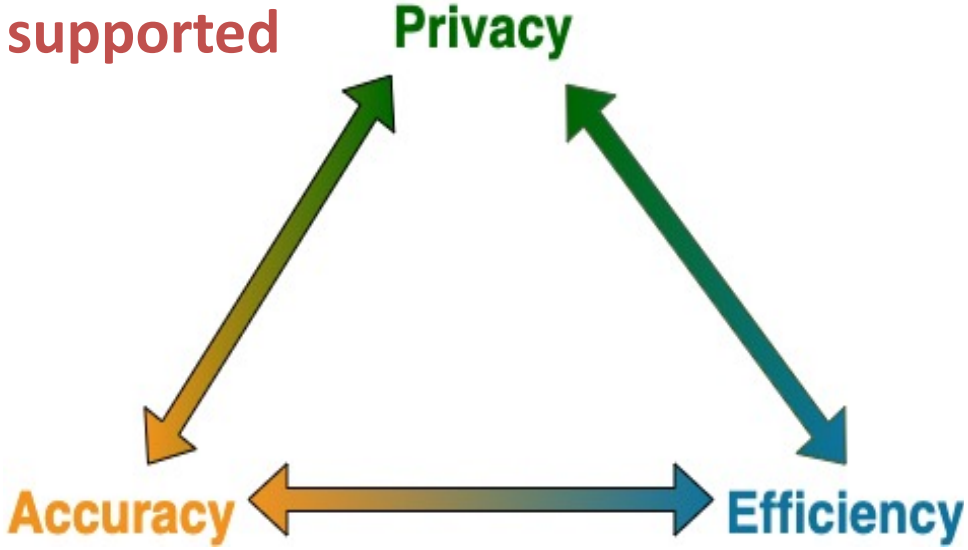
Data Protection Tools

- Traditional PETs → **not adapted**

- Advanced PETs
  - Homomorphic Encryption
  - Secure Multiparty Computation
  - Differential Privacy
  - Functional Encryption

- Additional overhead

- Only some operations are supported



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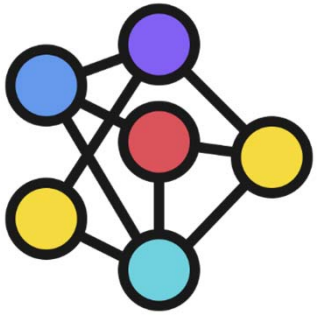
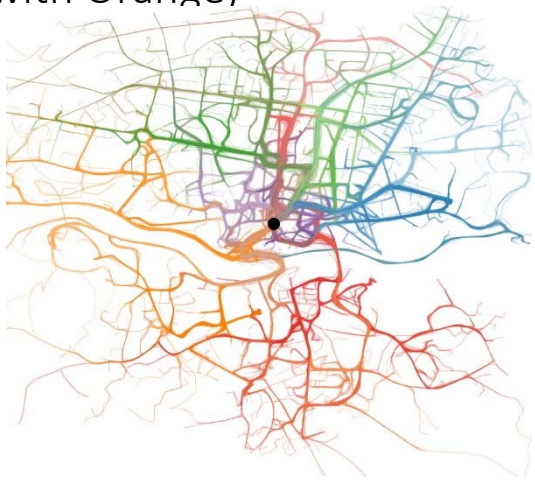
Privacy Preserving AI

- Neural Network classification (in collaboration with MediaClinics Italia)
  - With HE, with 2PC
  - Use Case: Arrhythmia detection



- Trajectory clustering (in collaboration with Orange)
  - With 2PC



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PAPAYA
PlAtform for PrivAcY preserving data Analytics

Other topics

- Model Security (in collaboration with SAP)
  - ML watermarking
  - Study of different attacks

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Other topics

- Model Security (in collaboration with SAP)
  - ML watermarking
  - Study of different attacks

- PETs as an attack tool (A. Ünsal)
  - Differential privacy vs. Adversarial learning

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Thank you!

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