Towards Scalable, Efficient and Privacy Preserving Machine Learning
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Context and Motivation

- **C₁**: Company i
- **C₂**: Company j
- **B**: Central Supervision Authority
- **M**: Data Mining for fraud detection

**Objective**

- Minimize the computational costs incurred by privacy preservation.
- Provide an end-to-end privacy preserving outsourced data classification service.
- Enable a set of mutually untrusted data owners to have a global vision on the union of their data without breaching the privacy of each one of them.
- Enable dynamic data model updates when new training data samples are available.

**Preliminary results**

- This dataset contains 1000 bank transactions with 9 attributes each.
- We compare our work to the Ciphered framework [8].

**Related work**

**Different ML algorithms**

- Clustering [1]
- Classification [2]
- Association Rule Mining [3]

**Different Privacy-preservation objectives**

- ML output protection [P]
- Original data protection [O]
- Distributed [D]
- Outsourced [O]

**Design principles**

- Cryptographic based protection (data model, training data, classification queries and responses)
- Partial homomorphic encryption (PHE) based building blocks
- Combine PHE with cryptographic blinding (DTPKC cryptosystem) [6]
- We implemented the VDFT incremental decision tree learning algorithm [7]

**References**