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

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.

Related work

Different ML algorithms

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

Different privacy-preservation objectives

- ML output protection
- Privacy preservation techniques
- Non-cryptographic techniques (PP-Data Publishing techniques)

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 VFDT incremental decision tree learning algorithm [7]

Naive approach: a combination of low level PP-building blocks

1st optimization: use inline building blocks

2nd optimization: Parallel computing

References