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
- Data protection

Privacy preservation techniques

Cryptographic techniques (SMC/HE, GC, OT)

Design principles

- Decent privacy and utility levels
- Efficient runtime
- Entirely outsourced ML computations over encrypted data

We implemented the VFDT incremental decision tree learning algorithm [7]

Naive approach: a combination of low level PPML computations

1st optimization: use online building blocks

2nd optimization: Parallel computing

References