

DATA COMPRESSION - PACKAGE ABSTRACT

PRIVACY PRESERVING COMPRESSION

TEAM MEMBERS:

23PW25 -Samantha W

23PW33 - Sruthi K

The rapid growth of digital data across healthcare, surveillance, and cloud applications has created an urgent need for efficient storage and transmission mechanisms that simultaneously ensure privacy. Privacy-preserving compression (PPC) provides a promising solution by combining data reduction techniques with mechanisms to safeguard sensitive information.

This work presents two distinct implementations of PPC. The first employs **Privacy-preserving Matrix Compression (PMC)**, which leverages matrix factorization and encoding techniques to compress data while embedding privacy constraints within the transformation process. This method reduces redundancy and ensures that reconstructed data preserves utility without exposing private content.

The second implementation applies **Region of Interest (ROI)-based privacy masking/encryption**, where only sensitive portions of multimedia data—such as faces in images, patient identifiers in medical records, or confidential areas of documents—are encrypted or masked before compression. This selective approach ensures high compression efficiency for non-sensitive regions while maintaining strict protection over privacy-critical segments.

Both approaches highlight the versatility of PPC in balancing **data efficiency** and **privacy assurance**. While PMC focuses on mathematical transformations for overall data protection, ROI-based methods provide targeted privacy for specific regions. Together, these methods demonstrate the broader potential of PPC in addressing real-world challenges of secure data sharing, transmission, and storage.