

8 THE FUTURE

In this dissertation we defended our thesis that Information Hiding can be successfully deployed as a tool for Rights Assessment for discrete digital Works. We defined and explored a foundational model and used it to discover associated principles and challenges of watermarking. We proposed and analyzed solutions for resilient Information Hiding for different discrete data types, including numeric and categorical in a relational framework, streaming sensors, and semi-structured aggregates.

This work yielded real-world impact results, including a industry-level software package for relational data watermarking and an associated pending patent application. We believe it to be of significant additional potential, for example in the deployment in an industry standard database management system.

A multitude of associated research avenues present themselves, including: a deeper understanding of limits of watermarking for a broader class of algorithms, the ability to defeat additive watermark attacks, an exploration of oracle attacks, zero-knowledge watermarking, deploying the solutions introduced here for fingerprinting, a solution for categorical sensor streams, handling scenarios at the intersection of numeric and categorical data types in a relational framework.

Additionally, of particular interest for future research exploration, we envision cross-domain applications of Information Hiding in distributed environments such as sensor networks, with applications ranging from resilient content annotation to runtime authentication and data integrity proofs.

As increasing amounts of valuable discrete information is transferred through and processed within distributed inter-connected environments, the technological ability to assert and prove associated rights (and possibly propagate integrity proofs) becomes essential. Our work is to constitute a step toward an unified rights protection framework for arbitrary digital Works.