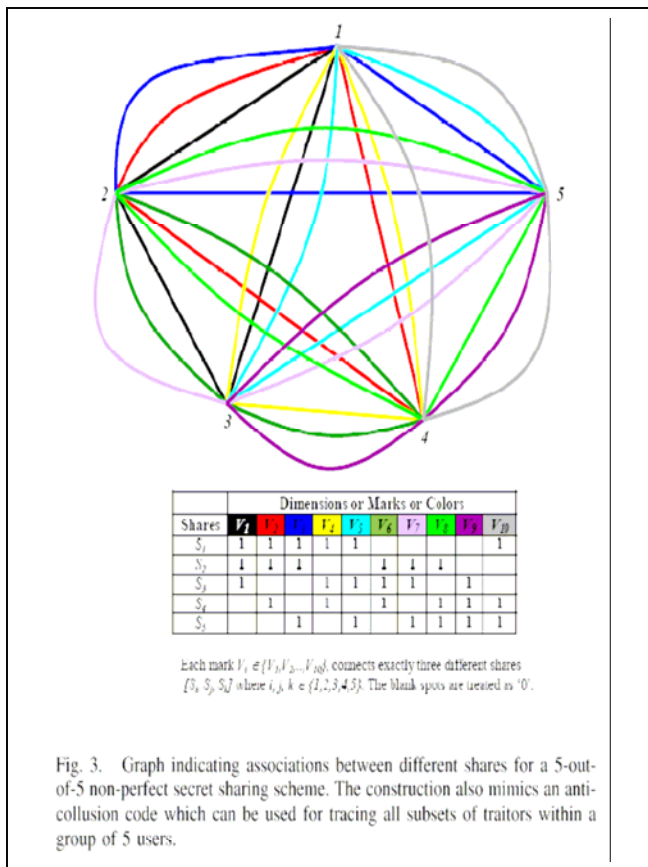
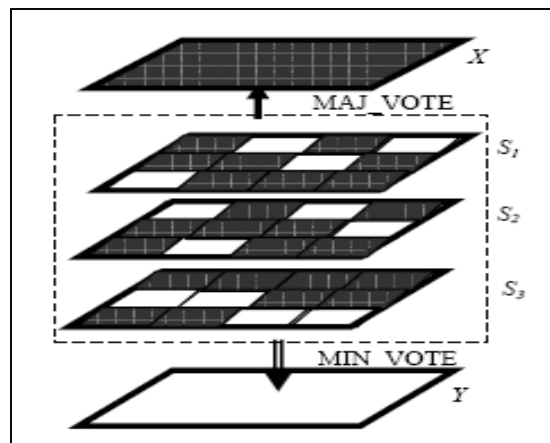
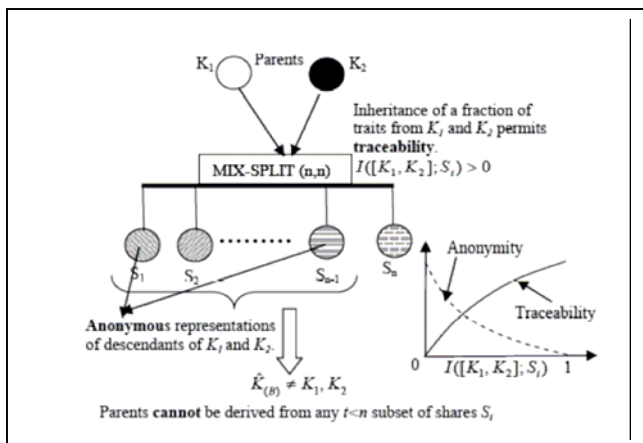


Research in the field of Multimedia Security includes, (a) Exploring the properties of a non-perfect secret sharing scheme based on controlled mixing, (b) constructing anti-collusion codes with modulation schemes for traitor tracing (c) study of joint fingerprinting and decryption (d) multiple transform domain based semi-fragile watermark constructions, (e) robust and fragile watermarking and (f) applications to copyright protection, access control and electronic transactions.



The Mix-Split algorithm:

In non-perfect secret sharing schemes, sets which do not belong to the access structure have partial information about the secret. Our research opens up the possibility of utilizing the information leaking from these sets for traitor tracing. We have proposed a non-perfect secret sharing scheme called MIX-SPLIT for (n, n) access control and for tracking invalid coalitions. Contrary to perfect schemes, by construction, there is an association between every $t < n$ subset of shares. Each share inherits a fraction of traits from two parent secrets and is one of n unique manifestations with a distinct signature. The information contained in any t -subset is insufficient to accurately reconstruct both secrets, hence, can be treated as traceable anonymous representations of the parents. Traces of the properties of inheritance, anonymity, association and closure can be seen in many applications such as (i) Controlling and tracking e-Prescriptions (ii) Secure storage of biometric PINs and (iii) Joint access and tracking of sensitive records.



Selected Publications:

1. K. Karthik and D. Hatzinakos, "Multimedia encoding for access control with Traitor Tracing: Balancing Secrecy, Privacy and Traceability", VDM Verlag Dr. Muller, 2008.
2. Xin C. Guo and D. Hatzinakos, "Content based Image Hashing via the wavelet and the Radon Transform", Pacific-Rim Conference on Multimedia (PCM), Hong Kong, Dec. 11-14, 2007.
3. Xin C. Guo and D. Hatzinakos, "Image Authentication Using Added Signal-Dependent Noise", Elsevier Signal Processing Letters, to appear.
4. Xin C. Guo and D. Hatzinakos, "A High Capacity Reversible Watermarking Technique for Medical Images", IEEE Transactions on Signal Processing in Biomedicine, submitted November 2007.
5. K. Karthik, D. Hatzinakos, "Decryption Key Design for Joint Fingerprinting and Decryption in the Sign Bit plane for Multicast Content Protection", accepted Nov 17, 2005 in the International Journal of Network Security (IJNS), published May 2007, Vol. 4, no. 3, pp. 254–265. <http://ijns.nchu.edu.tw/contents/ijns-v4-n3/ijns-2007-v4-n3-p254-265.pdf>
6. K. Karthik, D. Hatzinakos, "MIX-SPLIT: An Algorithm for Shared Access Control with Traitor Tracing", EURASIP Journal on Information Security, Revised and re-submitted May 29, 2007.
7. K. Karthik, D. Hatzinakos, "A Unified approach to construct Non-perfect Secret Sharing and Traitor Tracing schemes", in Proceedings of International Conference on Security and Management (SAM'07), Las Vegas, Nevada, June 25-28, 2007.
8. K. Karthik, D. Hatzinakos, "A novel anti-collusion coding scheme tailored to track linear collusions", Accepted in International Workshop on Data Hiding for Information and Multimedia Security (DHIMS'07), Manchester, UK, Aug 29-31, 2007.
9. K. Karthik, D. Kundur, D. Hatzinakos, "Joint fingerprinting and decryption for multimedia content tracing in wireless networks", Proceedings of the SPIE, Florida, USA, April 12-16, Vol 5403, pp. 360-370, 2004.
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11. K. Su, D. Kundur and D. Hatzinakos, "Statistical Invisibility for Collusion-resistant Digital Video Watermarking," IEEE Transactions on Multimedia, Vol. 7(1), pp. 43-51, February, 2005.
12. K. Su, D. Kundur and D. Hatzinakos, "Spatially Localized Image-dependent Watermarking for Statistical Invisibility and Collusion Resistance," IEEE Transactions on Multimedia, Vol. 7(1), pp. 52-66, February, 2005 .
13. D. Kundur and D. Hatzinakos, "Towards Robust Logo Watermarking using Multiresolution Image Fusion," IEEE Transactions on Multimedia}, vol. 6, no. 1, pp. 185-198, February 2004.
14. P. Campisi, D. Kundur, D. Hatzinakos and A. Neri, "Compressive Data
15. Hiding: An unconventional Approach for Improved Color Image Processing," Journ. Of Applied Signal Processing, Special issue on Emerging Applications of Data Hiding, vol 2002(2), pp. 152-163, Feb. 2002.
16. D. Kundur and D. Hatzinakos, "Diversity and Attack Characterization for Improved Robust Watermarking," IEEE Trans. on Signal Processing, Vol. 49(9), pp. 2383-2396, October 2001.
17. D. Kundur and D. Hatzinakos, "Digital Watermarking for Telltale Tamper-Proofing and Authentication", Proceedings of IEEE - Special issue on Identification and Protection of Multimedia Information, Vol. 87(7), pp. 1167-1180, July 1999.
18. D. Kundur and D. Hatzinakos, "Improved robust watermarking through attack characterization," Optics Express - <http://epubs.osa.org/opticsexpress>}, Vol. 3(12), pp. 485-491, Dec. 1998.