

## Secret Image Sharing Based Cheque Truncation System with Cheating Detection

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Cheque Truncation System(CTS) is an automatic cheque clearance system implemented by Reserve Bank of India (RBI). CTS uses cheque image, instead of the physical cheque itself, for cheque clearance thus reducing the turn around time drastically. This approach holds back the physical movement of cheque from presenting bank to the drawee bank. In CTS, digital image of the cheque is protected using standard public key and symmetric key encryptions like RSA, triple DES *etc.*,. This involves a lot of computation overhead and key management. The security also depends on the hard mathematical problem and is only computationally secure. Information theoretically secure, secret image sharing techniques can be used in the CTS for the secure and efficient processing of cheque image. In this paper, we propose two simple and efficient secret image sharing schemes and a Cheque Truncation System based on these algorithms. In the proposed scheme, the presenting bank is acting as the dealer and the participants are the customer and the drawee bank. The dealer should generate the shares of cheque and distributes it to customer and drawee bank. The validity of the shares are important during the reconstruction process. The proposed scheme also suggests a method for cheating detection which identify any invalid shares submitted by the customers, using the hashing technique. The experimental results show that the proposed scheme is efficient and secure compared with the existing scheme.

**Keywords :** Cheque Truncation System, Pixel Expansion, PKI, Secret Image Sharing, Visual Cryptography.

### 1. INTRODUCTION

Cheques represent a significant segment of payment instruments in India. Cheque Truncation System (CTS) or ICS(Image Based Clearing System) in India is a project undertaken by Reserve Bank of India (RBI) for faster clearing of cheques. CTS is basically an on-line image-based cheque clearing system where cheque images and Magnetic Ink Character Recognition (MICR) data are captured at the collecting bank branch and transmitted electronically. Manual clearing of cheque needs human intervention and is a time consuming task. Cheque truncation [1] involves stopping the flow of the physical cheques issued by a drawer to the drawee branch. An electronic image of the cheque is sent to the drawee branch along with the relevant information like the

MICR fields, date of presentation, presenting banks *etc.*,.

The point of truncation is left to the discretion of the presenting bank. Thus, Cheque truncation, would eliminate the need to move the physical instruments across branches and hence result in effective reduction in the time required for payment of cheques, the associated cost of transit and delays in processing, *etc.*,. This will speed up the process of collection or realization of cheques and thus reduce the turn around time.

The system offers following benefits to the bank and customers. Banks can expect multiple benefits through the implementation of CTS, like faster clearing cycle, better reconciliation/verification process. Besides, it reduces operational risk by securing the transmission

proved cheque processing using advanced image processing technique which helps in automatic cheque processing. The operational efficiency, speed accuracy, security and authentication are the major design objectives.

## REFERENCES

1. RBI. *RBI CTS*. <http://www.rbi.org.in>.
2. Cheque Truncation System. <http://www.banknetindia.com/banking/chttruncation.htm>.
3. Sreekumar A. Secret Sharing Schemes using Visual Cryptography, In *Dissertation, Cochin University of Science and Technology*, 2009.
4. Pasupathinathan, Vijayakrishnan, Josef Pieprzyk and Huaxiong Wang. Privacy Enhanced Electronic Cheque System, *CEC*. 2005.
5. Rigel Gjomemo, Ha z Malik, Nilesh Sumb, V N Venkatakrisnan and Rashid Ansari. Digital Check Forgery Attacks on Client Check Truncation Systems, *Signal Processing 91.1*, pages 90–97, 2011.
6. Kota, Saranya and Rajarshi Pal. Detecting Tampered Cheque Images in Cheque Truncation System using Difference Expansion Based Watermarking, *IEEE International Advance Computing Conference (IACC)*, IEEE, 2014.
7. Binu V P and A Sreekumar. Lossless Secret Image Sharing Schemes, *International Journal of Computational Intelligence and Information Security*, 2013.
8. Xuehu Yan, Shen Wang, Ahmed A Abd El-Latif and Xiamu Niu. New Approaches for Efficient Information Hiding-based Secret Image Sharing Schemes, *Signal, Image and Video Processing*, pages 1–12, 2013.
9. Chang-Chu Chen and Chin-Chen Chang. Secret Image Sharing using Quadratic Residues, *Intelligent Information Hiding and Multimedia Signal Processing*, 1:515–518, IEEE, 2007.
10. Wei-Kuei Chen and Hao-Kuan Tso. Visual Sharing Protection Method for Medical Images, *Journal of Medical Systems*, 37(1):1–8, 2013.
11. Adi Shamir. How to Share a Secret, *Communications of the ACM*, 22(11):612–613, 1979.
12. Adi Shamir Naor, Moni. Visual Cryptography, *Advances in Cryptology EUROCRYPT'94*, pages 1–12, 1995.
13. Ateniese, Giuseppe, et al. Extended Capabilities for Visual Cryptography, *Theoretical Computer Science*, pages 143–161, 2001.
14. Thien, Chih-Ching and Ja-Chen Lin. Secret Image Sharing, *Computers and Graphics 26.5*, pages 765–770, 2002.
15. Chen, Tzung-Her and Chang-Sian Wu. Efficient Multi-Secret Image Sharing Based on Boolean Operations, *Signal Processing 91.1*, pages 90–97, 2011.
16. Wu T C and T S Wu. Cheating Detection and Cheater Identification in Secret Sharing Schemes, *IEEE Proceedings on Computers and Digital Techniques*, 142(5): IET, 1995.
17. Larose, Daniel T. kNearest Neighbor Algorithm, *Discovering Knowledge in Data: An Introduction to Data Mining*, pages 90–106, 2005.
18. CTS Clearing House Interface Specification, NCR Corporation and RBI/NPCI, 24th August, 2010.
19. Calin A Sandru. 125 Neptune Drive, Suite 606, North York (CA), M6A 1X3 Apparatus and Method for Enhancing the Security of Negotiable Documents, Patent No.: US 6, 233, 340 B1, Date of Patent: May 15, 2001.
20. R Jayadevan, S R Kolhe, P M Patil, U Pal. Automatic Processing of Handwritten Bank Cheque Images: A Survey, *International Journal on Document Analysis and Recognition (IJ DAR)* 15(4):267–296, 2012.
21. Chen, Yu-Chi, Du-Shiau Tsai and Gwoboa Horng. Visual Secret Sharing with Cheating Prevention Revisited, *Digital Signal Processing*, 23(5):1496–1504, 2013.
22. Chen, Yu-Chi, Du-Shiau Tsai and Gwoboa Horng. "A New Authentication Based Cheating Prevention Scheme in Naor Shamir's Visual Cryptography, *Journal of Visual Communication and Image Representation*, 23(8):1225–1233, 2012.
23. Zhao, Rong, et al. A New Image Secret Sharing Scheme to Identify Cheaters, *Computer Standards and Interfaces*, 31(1):252–257, 2009.
24. Ahmed, Fawad, Mohammed Yakoob Siyal and Vali Uddin Abbas. A Secure and Robust Hash-based Scheme for Image Authentication, *Signal Processing*, 90(5):1456–1470, 2010.
25. Askari, Nazanin, Cecilia Moloney and Howard Heys. Application of Visual Cryptography to Biometric Authentication, 2011.
26. Fatma, E-ZA Elgamal, Noha A Hikal and F E Z Abou-Chadi. Secure Medical Images Sharing over Cloud Computing Environment, *International Journal ON Cloud Computing*, 2013.
27. Guo, Huiping and Nicolas D Georganas. A

Novel Approach to Digital Image Watermarking Based on a Generalized Secret Sharing Scheme, *Multimedia Systems* 9(3):249–260, 2003.

28. Horng, Gwoboa, Tzungher Chen and Du-Shiau Tsai. Cheating in Visual Cryptography, *Designs, Codes and Cryptography*, 38(2):219–236, 2006.
29. Lee, Yuchun. Handwritten Digit Recognition using  $k$  Nearest-Neighbor, Radial-Basis Function and Backpropagation Neural Networks, *Neural computation*, 3(3):440–449, 1991.
30. Guillevic, Didier and Ching Y Suen. HMM-KNN Word Recognition Engine for Bank Cheque Processing, in Proceedings of Fourteenth IEEE International Conference on Pattern Recognition, 2, 1998.



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