

# Some Publications and Patents on Data Hiding, Steganalysis, Forensics and Security

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## Data hiding: strategy and robustness

### Book chapter

1. X. Kang, J. Huang and Y. Q. Shi, "DWT Based Digital Watermarking Robust to Geometric Distortion," in *Multimedia Security Handbook*, Chapter 15, pp. 467-492, Editors: B. Furht and D. Kirovski, Publisher: CRC Press, Boca Raton, FL, December 2004.

### Journal paper

1. J. Huang, Y. Q. Shi and Y. Shi, "Embedding image watermarks in DC component," *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 10, no. 6, pp. 974-979, September 2000.
2. J. Huang and Y. Q. Shi, "Reliability issue of information bits hiding," *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 12, no. 10, pp. 916-920, October 2002.
3. X. Kang, J. Huang, Y. Q. Shi and Y. Lin, "A DWT-DFT composite watermarking scheme robust to both affine transform and JPEG compression," *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 13, no. 8, pp. 776-786, August 2003.
4. J. Huang and Y. Q. Shi, "An adaptive image watermarking scheme based on visual masking," *IEE Electronic Letters*, vol. 34, no. 8, pp. 748-750, April 1998.
5. H. Liu, J. Huang, and Y. Q. Shi, "DWT-based video data hiding robust to MPEG compression and frame loss," *International Journal of Image and Graphics*, vol. 5, no. 1, pp. 111-133, January 2005.

### Conference paper

1. X. Kang, J. Huang, Y. Q. Shi, "Robust quantization-based image watermarking with adaptive receiving," *IEEE International Conference on Image Processing (ICIP04)*, October 2004.
2. X. Kang, J. Huang, Y. Q. Shi, J. Zhu, "Robust watermarking with adaptive receiving," *Proceedings of International Workshop on Digital Watermarking (IWDW03)*, 2003, T. Kalkar, J. Cox and Y. M. Ro Edited, Lecture Notes in Computer Science, vol. 2939, pp. 396-407, Heidelberg, Germany.
3. L. Gu, J. Huang and Y. Q. Shi, "Analysis of the role played by error correcting coding in robust watermarking," *IEEE International Symposium on Circuits and Systems (ISCAS03)*, Bangkok, Thailand, May 2003.
4. H. Liu, N. Chen, J. Huang, X. Huang and Y. Q. Shi, "A robust DWT-based video watermarking algorithm," *IEEE International Symposium on Circuits and Systems (ISCAS02)*, Scottsdale, AZ, May 02.
5. Z. Ni, Y. Q. Shi and E. Sung, "Enhancing robustness of digital watermarking against geometric attack based on fractal," *Proceedings of IEEE International Conference of Multimedia and Expo (ICME00)*, New York City, July 31 to August 2, 2000.
6. Y. Q. Shi, Z. Ni and N. Ansari, "StirMark attack resistant fractal transform-based information hiding," *The Seventh International Conference on Distributed Multimedia Systems*, Taipei, Taiwan, September 26-18, 2001.

7. J. Huang, G. Elmasry and Y. Q. Shi, "Power constrained multiple signaling in digital image watermarking," *Proceedings of 1998 IEEE Workshop on Multimedia Signal Processing (MMSP98)*, pp. 388-393, Los Angeles, CA, USA, December 1998.
8. S. Wu, J. Huang, D. Huang and Y. Q. Shi, "Self-synchronized audio watermarking in DWT domain," *IEEE International Symposium on Circuits and Systems*, vol. 5, pp. 23-26, Vancouver, Canada, May 2004.

## **Multidimensional interleaving and its application to combat bursts of errors**

### Book chapter

1. Y. Q. Shi, J. Huang and H. K. Lee, "Spread Spectrum Video Data Hiding, Interleaving and Synchronization," in *Intelligent Watermarking Techniques*, Chapter 18, pp. 515-558, Editors: J. S. Pan, H. C. Huang and L. Jain, Publisher: World Scientific Publishing Co., Singapore, 2004 (ISBN: 9-81238-757-9).

### Journal papers

1. Y. Q. Shi and X. M. Zhang, "A new two-dimensional interleaving technique using successive packing," *IEEE Transactions on Circuits and Systems, Part I: Fundamental Theory and Application*, Special Issue on Multidimensional Signals and Systems, vol. 49, no. 6, pp. 779-789, June 2002.
2. Y. Q. Shi, X. M. Zhang, Z. Ni and N. Ansari, "Interleaving for combating bursts of errors," *IEEE Circuits and Systems Magazine*, vol. 4, no. 1, pp.29-42, First Quarter, 2004.

### Conference paper

1. F. Elmasry and Y. Q. Shi, "2-D interleaving for enhancing the robustness of watermarking signals embedded in still images," *Proceedings of IEEE International Conference on Multimedia & Expo (ICME00)*, New York, July 31 to August 2, 2000.
2. F. Elmasry and Y. Q. Shi, "3-D interleaving for enhancing the robustness of watermarking signals embedded in video sequences," *Proceedings of IEEE International Conference on Multimedia & Expo (ICME00)*, New York, July 31 to August 2, 2000.

## **Reversible data hiding**

### Book chapter

1. Y. Q. Shi, G. Xuan and W. Su, "Lossless Data Hiding: Fundamentals, Algorithms and Applications," in *Multimedia Security Handbook*, Chapter 17, pp. 531-547, Editors: B. Furht and D. Kirovski, Publisher: CRC Press, Boca Raton, FL, December 2004.

### Conference paper

1. Y. Q. Shi, "Reversible data hiding," invited key-note speech, *Proceedings of International Workshop on Digital Watermarking (IWDW04)*, Korea, October 2004.
2. Y. Q. Shi, Z. Ni, D. Zou, C. Liang and G. Xuan, "Lossless data hiding: Fundamentals, algorithms and applications," *Proceedings of IEEE International Symposium on Circuits and Systems (ISCAS04)*, vol. II, pp. 33-36, Vancouver, Canada, May 2004.

## Fragile reversible data hiding

### Journal paper

1. G. Xuan, J. Zhu, J. Chen, Y. Q. Shi, Z. Ni and W. Su, "Distortionless data hiding based on integer wavelet transform," *IEE Electronics Letters*, vol. 38, no. 25, pp. 1646-1648, December 2002.
2. Z. Ni, Y. Q. Shi, N. Ansari and W. Su, "Reversible data hiding," *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 16, no. 3, pp. 354-362, March 2006.
3. H. J. Kim, V. Sachnev, Y. Q. Shi, J. Nam, H. G. Choo, "A novel difference expansion transform for reversible data embedding," *IEEE Transactions on Information Forensics and Security*, vol. 3, issue 3, pp. 456-465, September 2008.
4. V. Sachnev, H. J. Kim, J. Nam, S. Suresh, Y. Q. Shi, "Reversible watermarking algorithm using sorting and prediction," *IEEE Transactions on Circuits and Systems for Video Technology*, (accepted July 2008)

### Conference paper

1. G. Xuan, J. Chen, J. Zhu, Y. Q. Shi, Z. Ni and W. Su, "Lossless data hiding based on integer wavelet transform," *Proceedings of IEEE International Workshop on Multimedia Signal Processing (MMSP02)*, St. Thomas, US Virgin Islands, December 2002.
2. Z. Ni, Y. Q. Shi, N. Ansari and W. Su, "Reversible data hiding," *IEEE International Symposium on Circuits and Systems (ISCAS03)*, May 2003, Bangkok, Thailand.
3. G. Xuan, Y. Q. Shi, D. Zou, "A secure internet-based personal identity verification system using lossless watermarking and fingerprint recognition," *Proceedings of International Workshop on Digital Watermarking (IWDW04)*, Korea, October 2004.
4. G. Xuan, Y. Q. Shi, Z. Ni, "Lossless data hiding using integer wavelet transform and spread spectrum," *IEEE International Workshop on Multimedia Signal Processing (MMSP04)*, Siena, Italy, September 2004.
5. G. Xuan, Y. Q. Shi, Z. Ni, "Reversible data hiding using integer wavelet transform and companding technique," *Proceedings of International Workshop on Digital Watermarking (IWDW04)*, Korea, October 2004.
6. G. Xuan, Y. Q. Shi, D. Zou, "A secure internet-based personal identity verification system using lossless watermarking and fingerprint recognition," *IWDW04*, Korea, October 2004.
7. G. Xuan, C. Yang, Y. Q. Shi, Z. Ni, "High capacity lossless data hiding algorithms," *IEEE International Symposium on Circuits and Systems (ISCAS04)*, Vancouver, Canada, May 2004.
8. G. Xuan, Y. Q. Shi, C. Yang, Y. Zheng, D. Zou, P. Chai, "Lossless data hiding using integer wavelet transform and threshold embedding technique," *IEEE International Conference on Multimedia and Expo*, Amsterdam, Netherlands, July, 2005.
9. G. Xuan, Q. Yao, C. Yang, J. Gao, P. Chai, Y. Q. Shi, Z. Ni "Lossless data hiding using histogram shifting method based on integer wavelets," *International Workshop on Digital Watermarking (IWDW)*, November 2006, Jeju, Korea.
10. G. Xuan, Y. Q. Shi, Z. Ni, P. Chai, X. Cui and X. Tong, "Reversible data hiding for JPEG images based on histogram pairs," *International Conference on Image Analysis and Recognition (ICIAR07)*, August 22-24, 2007, Montreal, Canada.
11. G. Xuan, Y. Q. Shi, P. Chai, X. Cui, Z. Ni and X. Tong, "Optimum histogram pair based image lossless data embedding," *International Workshop on Digital Watermarking (IWDW07)*, Guangzhou, China, December 2007.

12. G. Xuan, Y. Q. Shi, P. Chai , X. Tong, J. Teng, J. Li, “Reversible binary image data hiding by run-length histogram modification,” *IEEE International Conference on pattern Recognition, ICPR08*, Florida, USA, December 2008.

#### Patent

1. G. Xuan and Y. Q. Shi, “Method and Apparatus for Distortionless Data Hiding based on Integer Wavelet Transform,” US patent pending, S/N 10/737,327.
2. Y. Q. Shi, Z. C. Ni and N. Ansari, “Method and Apparatus for Lossless Data Hiding through Histogram Modification Implemented in Spatial Domain” US patent pending, S/N 10/823,086, also filed for PCT international patent protection PCT/US2004/011331.
3. G. Xuan, and Y. Q. Shi, “IWT-based Lossless Data Hiding Using Companding Technique,” US patent pending, S/N 11/252,155, also filed for PCT international patent protection PCT/US2005/037255.
4. G. Xuan and Y. Q. Shi, “IWT-based Lossless Data Hiding Using Spread-Spectrum Technique,” US patent pending, S/N 11/068,063, also filed for PCT international patent protection PCT/US2005/006604.
5. G. Xuan and Y. Q. Shi, “Lossless data hiding using histogram shifting in integer wavelet transform domain,” US Non-provisional patent serial no.: 11/418,821 and PCT patent (field May 5, 2006).
6. G. Xuan and Y. Q. Shi, “An apparatus and method for reversible data hiding for JPEG images,” US patent 11/676399 filed on February 19, 2007.
7. G. Xuan and Y. Q. Shi, “Histogram-pair based lossless data hiding for binary text images and binary image,” US Provisional patent 61/063,241 filed on February 1, 2008.

#### **Semi-fragile reversible data hiding**

##### Journal paper

1. D. Zou, Y. Q. Shi, Z. Ni and W. Su. “A semi-fragile lossless digital watermarking scheme based on integer wavelet transform,” *IEEE Transactions on Circuits and Systems for Video Technology*, vol.16, no. 10, pp. 1294-1300, October 2006.
2. Z. Ni, Y. Q. Shi, N. Ansari, W. Su, Q. Sun and X. Lin, “Robust lossless image data hiding designed for semi-fragile image authentication,” *IEEE Transactions on Circuits and Systems for Video Technology*, vol.18, no. 4, pp. 497-509, April 2008.

##### Conference paper

1. D. Zou, Y. Q. Shi, Z. Ni, “A semi-fragile lossless digital Watermarking scheme based on integer wavelet transform,” *IEEE International Workshop on Multimedia Signal Processing (MMSP04)*, Siena, Italy, September 2004.
2. Z. Ni, Y. Q. Shi, N. Ansari, W. Su, Q. Sun and X. Lin, “Robust lossless data hiding,” *IEEE International Conference on Multimedia and Expo (ICME04)*, Taipei, Taiwan, June 2004.

##### Patent

1. Y. Q. Shi, Z. C. Ni and N. Ansari, “Systems and Methods for Robust Reversible Data Hiding and Data Recovery in the Spatial Domain,” US Non-Provisional Patent S/N 11/004,041, also filed for PCT international patent protection PCT/US2004/040441,

- December 3, 2004.
2. Y. Q. Shi, D. K. Zou and Z. C. Ni, "System and Method for Robust Lossless Data Hiding and Recovering from the Integer Wavelet Domain," US Non-Provisional Patent S/N 11/004,040, also filed for PCT international patent protection PCT/US2004/040442, December 3, 2004.

#### Standardization activity

Two developed semi-fragile reversible data hiding schemes have been utilized in a unified authentication framework for JPEG2000 images, that has been jointly proposed by Institute of Infocomm Research at Singapore and New Jersey Institute of Technology, and has been included into the Security JPEG2000 (JPSEC), an ISO Standard, JPSEC (ISO/IEC 15444-8:2007), 2007.

#### **Text document image data hiding**

##### Journal paper

1. H. P. Lu, A. C. Kot and Y. Q. Shi, "Distance-reciprocal distortion measure for binary document images," *IEEE Signal Processing Letters*, vol. 11, no. 2, pp. 228-231, February 2004.
2. H. P. Lu, Y. Q. Shi, A. C. Kot and L. Chen, "Binary image watermarking through blurring and biased binarization," *International Journal of Image and Graphics*, vol. 5, no. 1, pp. 67-87, January 2005.

##### Conference paper

1. H. Lu, J. Wang, A. C. Kot and Y. Q. Shi, "An objective distortion measure for binary document images based on human visual perception", in *Proceedings of International Conference on Pattern Recognition (ICPR02)*, vol. IV, pp. 239-242, Quebec, Canada August 2002.
2. H. Lu, X. Shi, Y. Q. Shi, A. C. Kot and L. Chen, "Watermark embedding in DC components of DCT for binary images," *Proceedings of IEEE International Workshop on Multimedia Signal Processing (MMSP02)*, pp. 300-303, St. Thomas, US Virgin Islands, December 2002.
3. D. Zou and Y. Q. Shi, "Formatted Text Document Data Hiding Robust to Printing, Copying and Scanning," *IEEE International Symposium on Circuits and Systems*, Kobe, Japan, May 2005.

##### Patent

1. Y. Q. Shi and D. K. Zou, "System and Method For Data Hiding Using Inter-Word Space Modulation," US patent pending, S/N 60/641,127

#### **Secure data hiding**

1. J. Huang, J. Hu, D. Huang, Y. Q. Shi, "A secure fragile watermarking using parameterized integer wavelet transform," *IEEE International Conference on Image Processing (ICIP04)*, October 2004.

2. X. Kang, Y. Q. Shi and J. Huang, "Achieving non-ambiguity of quantization based watermarking," *SPIE Electronic Imaging: Security, Steganography, and Watermarking of Multimedia Contents*, San Jose, CA, January 2006.

### **Audio data hiding**

#### Journal papers

1. S. Wu, J. Huang, D. Huang, Y. Q. Shi, "Efficiently self-synchronized audio watermarking for assured audio data," *IEEE Transactions on Broadcasting*, vol. 51, no. 1, pp. 69-76, March 2005.

#### Conference paper

1. J. Huang, Y. Wang and Y. Q. Shi, "A blind audio watermarking algorithm with self-synchronization," *IEEE International Symposium on Circuits and Systems (ISCAS02)*, Scottsdale, AZ, May 2002.
2. S. Wu, J. Huang, D. Huang and Y. Q. Shi, "Self-synchronized audio watermarking in DWT domain," *IEEE International Symposium on Circuits and Systems (ISCAS04)*, vol. 5, pp. 23-26, Vancouver, Canada, May 2004.

### **Identity verification using data hiding**

1. G. Xuan, D. Jiang, H. Ji, Y. Q. Shi, D. Zou, L. Liu and H. Liu, "Identity verification system using data hiding and fingerprint recognition," *IEEE International Workshop on Multimedia Signal Processing (MMSP05)*, Shanghai, China, October 2005.

### **Authentication**

#### Journal paper

1. J. Hu, J. Huang, D. Huang and Y. Q. Shi, "Image fragile watermarking based on fusion of multi-resolution tamper detection," *IEEE Electronic Letters*, vol. 38, no. 24, pp. 1512-1513, November, 2002.

#### Conference paper

1. Z. Zhang, Q. Sun, X. Lin, Y. Q. Shi and Z. Ni, "A unified authentication framework for JPEG2000 images," *IEEE International Conference and Expo (ICME04)*, Taipei, Taiwan, June 2004.
2. D. Zou, C. W. Wu, G. Xuan and Y. Q. Shi, "A content-based image authentication system with lossless data hiding," *IEEE International Conference on Multimedia and Expo (ICME03)*, July 2003, Baltimore, Maryland.

#### Standardization activity

A unified authentication framework for JPEG2000 images has been jointly proposed by Institute of Inforcomm Research at Singapore and New Jersey Institute of Technology, and has been included into the Security JPEG2000 (JPSEC), an ISO Standard, JPSEC (ISO/IEC 15444-8:2007), 2007.

## Steganalysis

### Conference paper

1. Y. Q. Shi, G. Xuan, C. Yang, J. Gao, Z. Zhang, P. Chai, D. Zou, C. Chen, W. Chen, "Effective steganalysis based on statistical moments of wavelet characteristic function," *IEEE Conference on Information Technology: Coding and Computation (ITCC05)*, Las Vegas, Nevada, USA, April 4-6, 2005.
2. G. Xuan, Y. Q. Shi, J. Gao, D. Zou, C. Yang, Z. Zhang, P. Chai, C. Chen, W. Chen, "Steganalysis Based on multiple features formed by statistical moments of wavelet characteristic functions," *Information Hiding Workshop (IHW05)*, June 2005.
3. Y. Q. Shi, G. Xuan, D. Zou, J. Gao, C. Yang, Z. Zhang, P. Chai, W. Chen, C. Chen, "Steganalysis based on moments of characteristic functions using wavelet decomposition, prediction-error image, and neural network," *IEEE International Conference on Multimedia and Expo (ICME05)*, Amsterdam, Netherlands, July, 2005.
4. G. Xuan, J. Gao, Y. Q. Shi and D. Zou, "Image steganalysis based on statistical moments of wavelet subband histograms in DFT domain," *IEEE International Workshop on Multimedia Signal Processing*, Shanghai, China, October 2005.
5. D. Zou, Y. Q. Shi, W. Su and G. Xuan, "Steganalysis based on Markov model of thresholded prediction-error image," *IEEE International Conference on Multimedia and Expo (ICME06)*, Toronto, Canada, Netherlands, July 2006. (Accepted)
6. Y. Q. Shi, C. Chen and W. Chen, "A Markov process based approach to effective attacking JPEG steganography," *Information Hiding Workshop (IH06)*, Old Town Alexandria, Virginia, USA, 10-12 July 2006.
7. D. Fu, Y. Q. Shi, D. Zou and G. Xuan, "JPEG Steganalysis Based on Empirical Transition Matrix in DCT Domain," *IEEE MMSP06*, October 2006, Victoria, Canada.
8. C. Chen, Y. Q. Shi, W. Chen and G. Xuan, "Statistical moments based universal steganalysis using JPEG 2-D array, and 2-D characteristics function," *IEEE International Conference on Image Processing (ICIP06)*, Atlanta, Georgia, October 2006. (Best student paper award)
9. G. Xuan, Y. Q. Shi, C. Huang, D. Fu, X. Zhu, P. Chai, and J. Gao, "Steganalysis Using High-Dimensional Features Derived from Co-Occurrence Matrix and Class-wise Non-Principal Components Analysis (CNPCA)," *International Workshop on Digital Watermarking (IWDW)*, November 2006, Jeju, Korea.
10. G. Xuan, Y. Q. Shi, X. Cui, W. Chen, X. Tong, C. Huang, "JPEG steganalysis based on classwise non-principal components analysis and multi-directional Markov model," *IEEE International Conference on Multimedia and Expo (ICME07)*, Beijing, China, July 2007.
11. C. Chen, Y. Q. Shi, G. Xuan, "Steganalyzing texture images," *IEEE International Conference on Image Processing (ICIP07)*, Texas, US, September 2007.
12. Y. Q. Shi, C. Chen, G. Xuan, W. Su, "Steganalysis versus splicing detection," *International Workshop on Digital Watermarking (IWDW07)*, Guangzhou, China, December 2007.
13. B. Li, F. Huang, S. Tan, J. Huang, Y. Q. Shi, "Effect of different coding patterns on compressed frequency domain based universal JPEG steganalysis," *International Workshop on Digital Watermarking (IWDW07)*, Guangzhou, China, December 2007.

14. S. Tan, J. Huang, Y. Q. Shi, "Steganalysis of enhanced BPCS steganography with the Hilbert-Huang transform based sequential analysis," *International Workshop on Digital Watermarking (IWDW07)*, Guangzhou, China, December 2007.
15. C. Chen and Y. Q. Shi, "JPEG image steganalysis utilizing both intrablock and interblock correlations," *IEEE International Symposium on Circuits and Systems (ISCAS08)*, Seattle, WA, May 2008.
16. B. Li, Y. Q. Shi and J. Huang, "Steganalysis of YASS," ACM Workshop on Multimedia Security, Oxford, UK, September, 2008.
17. F. Huang, Y. Q. Shi, J. Huang, "A study on security performance of YASS," *IEEE International Conference on Image Processing*, San Diego, California, USA, October 2008.

#### Patent

1. Y. Q. Shi and G. Xuan, "Steganalysis Based on Statistical Moments of Characteristic Functions of Prediction-Error Image, Test Image and Their Wavelet Subbands," US patent pending, S/N 11/340,419, also filed for PCT international patent protection PCT/US2006/
2. Y. Q. Shi and D. K. Zou, "Method for Identifying Marked Content," US Non-provisional patent S/N 11/331,688, also filed for PCT international patent protection PCT/US2006/.
3. Y. Q. Shi and C. H. Chen, "Method for Identifying Marked Images Using Statistical Moments Based at Least in Part on a JPEG Array," US Non-provisional patent S/N 11/331,766, also filed for PCT international patent protection PCT/US2006/.
4. Y. Q. Shi and C. H. Chen, "Method for Identifying Marked Image Using Based at Least in Part on Fequency Domain Coefficient Differences," US Non-provisional patent S/N 11/331,767, also filed for PCT international patent protection PCT/US2006/.
5. G. Xuan and Y. Q. Shi, "Method for identifying marked content, such as using a class-wise non-principal component approach," US Non-provisional patent serial no.: 11/418,820 and PCT patent (filed May 5, 2006)
6. Y. Q. Shi and C. H. Chen, "Steganalyzing texture images," 11/624816, filed January 19, 2007)
7. B. Li and Y. Q. Shi, "Steganalysis of YASS," US Provisional patent 61/044,595 (filed on 4/14/2008).

#### **Digital data forensics**

##### Conference papers

- 1) D. Fu, Y. Q. Shi and W. Su, "Detection of image splicing based on Hilbert-Huang transform and moments of characteristic functions with wavelet decomposition," *International Workshop on Digital Watermarking (IWDW06)*, November 2006, Jeju, Korea.
- 2) D. Fu, Y. Q. Shi and W. Su, "A generalized Benford's law for JPEG coefficients and its applications in image forensics," *SPIE Electronic Imaging: Security, Steganography, and Watermarking of Multimedia Contents*, San Jose, CA, USA, January 2007.
- 3) W. Chen, Y. Q. Shi, and W. Su, "Image splicing detection using 2-D phase congruency and statistical moments of characteristic function," *SPIE Electronic*

*Imaging: Security, Steganography, and Watermarking of Multimedia Contents*, San Jose, CA, USA, January 2007.

- 4) W. Chen and Y. Q. Shi, "Identifying computer graphics using HSV color model and statistical moments of characteristic function," *IEEE International Conference on Multimedia and Expo (ICME07)*, Beijing, China, July 2007.
- 5) Y. Q. Shi, C. Chen, W. Chen, "A natural image model approach to splicing detection," ACM Workshop on Multimedia Security, Dallas, Texas, September 2007.
- 6) Y. Q. Shi, C. Chen, G. Xuan, "Steganalysis versus splicing detection," *International Workshop on Digital Watermarking (IWDW07)*, Guangzhou, China, December 2007.
- 7) B. Li, Y. Q. Shi and J. Huang, "Detecting double compressed JPEG Image by using mode based first digit features," *IEEE International Workshop on Multimedia Signal Processing (MMSP08)*, Queensland, Australia, October 2008.
- 8) W. Chen and Y. Q. Shi, "Detection of double MPEG video compression using first digits statistics," *International Workshop on Digital Watermarking (IWDW08)*, Busan, Korea, November 2008.
- 9) C. Chen, Y. Q. Shi, W. Su, "A machine learning based scheme for double JPEG compression detection," *IEEE International Conference on pattern Recognition (ICPR08)*, Tampa, Florida, USA, December 2008.
- 10) W. Chen, Y. Q. Shi, G. Xuan, W. Su, "Computer graphics identification using genetic algorithm," *IEEE International Conference on pattern Recognition (ICPR08)*, Tampa, Florida, USA, December 2008.

#### Patent

- 1) Y. Q. Shi and D. D. Fu, "Systems and/or method for image tampering detection," US Non-provisional patent serial no.: 11/418,822 (filed May 5, 2006)
- 2) Y. Q. Shi and W. Chen, "Tampering detection using high-order statistics of wavelet characteristic functions and phase congruency," US patent serial no.: 60/806,277 (filed July 2006)
- 3) Y. Q. Shi and D. D. Fu, "A generalized Benford's law for JPEG coefficients and some of its potential applications," US patent serial no.: 60/806,281 (filed July 2006)
- 4) Y. Q. Shi and W. Chen, "Identifying computer graphics from digital photographs using HSV color model and statistical moments of characteristic functions," 11/624595, filed on 1/18/07.
- 5) Y. Q. Shi and C. Chen, "A method and apparatus for a natural image model based approach to image splicing/tampering detection," 11/673529, (filed on Feb. 9 2007).
- 6) C. Chen and Y. Q. Shi, "Markov Process Approach to Identifying Double JPEG Compression," US Provisional patent 61/044,598 (filed on April 14, 2008).
- 7) W. Chen and Y. Q. Shi, "Detection of Double MPEG Video Compression Using First Digit Statistics," US provisional patent 61/044,590 (filed on April 14, 2008).
- 8) B. Li and Y. Q. Shi, "Detecting Double JPEG Compressed Images by Using Mode Based First Digit Features," US Provisional patent 61/045,753 (filed on 4/17/2008).

## **Other topics**

### **Journal papers**

1. M. Sun, Y. Q. Shi, Q. Liu, and R. J. Sclabassi, "Sample domain integration of medical data for multimedia diagnosis," *Journal of VLSI Signal Processing Systems*.
2. N. Ansari, P. Sakarindr, E. Haghani, C. Zhang, A. K. Jain, and Y. Q. Shi, "Evaluating electronic voting systems equipped with voter-verified paper records," *IEEE Security and Privacy Magazine*, vol.6, no.3, pp. 30-39, May/June, 2008.

### **Conference paper**

3. J. Huang and Y. Q. Shi, "Embedding gray level images," *IEEE International Symposium on Circuits and Systems (ISCAS01)*, Sydney, Australia, May 2001.
4. J. Hu, J. Huang, D. Huang and Y. Q. Shi, "A DWT-based fragile watermarking tolerant to JPEG compression," *International Workshop on Digital Watermarking (IWDW02)*, November 2002, Seoul, Korea.
5. M. Sun, Y. Q. Shi, Q. Liu, and R. J. Sclabassi, "Sample domain integration of medical data for multimedia diagnosis," *Proceedings of IEEE International Workshop on Multimedia Signal Processing (MMSP02)*, St. Thomas, US Virgin Islands, December 2002.
6. Y. Fang, J. Huang and Y. Q. Shi, "Image watermarking algorithm applying CDMA," *IEEE International Symposium on Circuits and Systems (ISCAS03)*, Bangkok, Thailand, May 2003.

## **IEEE CASS Distinguished Lecturer Program**

Serve as an IEEE CASS Distinguished Lecturer (2002-2003). The following topics were provided.

1. Robustness Issue in Multimedia Watermarking
2. A New Approach to 2-D/3-D Interleaving and Its Application in Digital Image/Video Watermarking
3. Reversible Data Hiding

## **Three-hour Tutorials**

1. Y. Q. Shi, tutorial, "Lossless data hiding," IEEE International Symposium on Circuits and Systems (ISCAS), Bangkok, Thailand, May 2003.
2. Y. Q. Shi, tutorial, "Steganography and steganalysis," IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), France, May 2006.
3. Y. Q. Shi, tutorial, "Steganography and steganalysis," IEEE International Conference on Multimedia and Expo (ICME), Toronto, Canada, July 2006.
4. Y. Q. Shi, tutorial, "Digital Image Forensics," IEEE International Conference on Image Processing (ICIP), San Antonio, Texas, September 2007.
5. Y.Q. Shi, "Digital data forensics," Pacific-Rim Conference of Multimedia (PCM), Tainan, Taiwan, December 2008.

### **Invited Speeches**

1. Y. Q. Shi, "Reversible data hiding," invited opening lecture, International Workshop on Digital Watermarking (IWDW04), Seoul, Korea, October 2004.
2. Y. Q. Shi, "Digital data forensics," invited opening key-note speech, IEEE Intelligence Information Hiding and Multimedia Signal Processing (IIT-MSP), Pasadena, California, December 18, 2006.
3. Y. Q. Shi, "Multimedia forensics," invited Sterling Hou Lecture in University of Missouri at Columbia, March 14, 2007.
4. Y. Q. Shi, "Digital image forensics," invited opening speech, China Information Hiding Workshop (CIHW07), Nanjing, China, November 12, 2007.
5. Y. Q. Shi, "First digit law and its application to digital forensics," invited opening lecture, International Workshop on Digital Watermarking (IWDW08), Busan, Korea, November 2008.