البحث رقم (1)

Puplished In:

29th NATIONAL RADIO SCIENCE CONFERENCE (NRSC 2012)
April 10 - 12, 2012, Faculty of Engineering/Cairo University, Egypt

Title

C17. Automatic Detection and Classification of Weld Defects in Radiographic Images Using Wavelet Transform and Support Vector Machines

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ABSTRACT:

Radiography is a reliable non-destructive testing (NDT) technique of welded components which plays an
important role in ensuring the reliable performance of these components. The automation of processing of
radiographic images is an essential stage of any inspection and interpretation aid. A number of signal and image
processing tools have been specifically developed for use with radiographic images and adapted to function
autonomously through automatic configuration of the interpretation parameters according to the nature of the data.
This paper presents several methods based on multi-resolution analysis through Wavelet transform and texture

analysis for de-noising and enhancing the quality of the collected data to help in automatic and accurate detection
and classification of weld defects. The automatic detection is implemented using multi-resolution analysis,
Wavelet packet transform, and statistical techniques. While the automatic classification is implemented using the
support vector machines which are considered faster and more accurate than artificial neural networks.

Keywords:

Radiography testing, defect detection, multi-resolution analysis, Wavelet transform, support vector
machines.

REFERENCES

[1] R. J. Ditchburn, S. K. Burke, and C. M. Scala, “NDT of welds: state of the art”, NDT & E International, vol.
29, no. 2, pp. 111-117, 1996.
[2] H. Charles, “The ABC’s of nondestructive weld examination”, Welding Journal, vol. 76, no. 5, pp. 46-51,
1998.
[3] T. W. Liao, and J. Ni, “An automated radiography NDT system for weld inspection: Part II. Flaw
Detection”, NDT & E International, vol. 31, no. 3, pp. 183-192. 1998.
[4] G. Wang, and T. W. Liao, “Automatic identification of different types of welding defects in radiography
images”, NDT & E International, vol. 35, pp. 519–528, 2002.
[5] R. da Silva Romeu, H. S. Marcio, P. M. Vieira, M. A. Rebello, and P. L. Calo, “Estimated accuracy of
classification of defects detected in welded joints by radiography tests”, NDT& E International, vol. 38, pp.
335–343, 2005.
[6] A. L. Graps, “An introduction to Wavelets”, IEEE Computational Sciences and Engineering, vol. 2, 1995.

[7] V. Matz, M. Kreidl, and R. Smid, “Signal-to-noise ratio improvement based on the discrete Wavelet
transform in ultrasonic defectoscopy”, Acta Polytechnica, vol. 44, no. 4, pp. 61-66, 2004.
[8] M. C. Robini, I. E. Magnin, H. Cattin, and A. Baskurt, “Two-dimensional ultrasonic flaw detection based on
the Wavelet packet transform”, IEEE transactions on Ultrasonics, Ferroelectrics, and Frequency Control,
vol. 44, 1997.
[9] S. E. El-Khamy, M. M. Hadhoud, M. I. Dessouky, B. M. Salam, and F. E. Abd El-Samie, “Regularized
Super-Resolution Reconstruction of Images Using Wavelet Fusion”, Optical Engineering, SPIE, vol. 44, no.
9, September 2005.
[10] S. E. El-Khamy, M. M. Hadhoud, M. I. Dessouky, B. M. Salam, and F. E. Abd El-Samie, “Blind Super-
Resolution Reconstruction of Images Using Wavelet Fusion”, Applied Optics (OSA), vol. 44, Iss. 34, pp.
7349-7356, December 2005.
[11] S. E. El-Khamy, M. M. Hadhoud, M. I. Dessouky, B. M. Salam, and F. E. Abd El-Samie, “Wavelet Fusion:
A Tool To Break The Limits On LMMSE Image Super-Resolution”, International Journal of Wavelets,
Multiresolution and Information Processing (IJWMIP), World Scientific, vol. 4, no. 1, pp. 105-118, 2006.
[12] R. Haralick, K. Shunmugam, and I. Dinstein, “Textural features for image classification”, IEEE
Transactions on Systems, Man Cybernetics, SMC, vol. 3, no. 1, pp. 610-621, 1973.
[13] O. Zahran and W. Al-Nuaimy, “Automatic data processing and defect detection in time-of-flight diffraction
images using statistical techniques”, Insight, vol. 47, no. 9, pp. 538-542, September 2005.
[14] V. N. Vapnik, The Nature of Statistical Learning Theory, 2nd ed., Springer, 2000.
[15] K. M. Rajpoot and N. M. Rajpoot, “Wavelets and support vector machines for texture classification”, in
Proc. INMIC 04, 2004, pp. 328-333, December 2004.
[16] K. Huang and S. Aviyente, “Wavelet feature selection for image classification” , IEEE Transaction on Image
Processing, vol. 17, no. 9, pp. 1709-1720, 2008.

عنوان البحث:

عربي: **تحديد وتصنيف عيوب اللحام أوتوماتيكياً فى الصور الإشعاعية باستخدام التحويل المويجى و وحدات الدعم الإتجاهية**

انجليزي:

O. Zahran, "*Automatic Detection and Classification of Weld Defects in Radiographic Images Using Wavelet Transform and Support Vector Machines*", **The 29th National Radio Science Conference (NRSC 2012),** p-p 293:299, Cairo, Egypt, April **2012**.

صاحب فكرة البحث:

د/ أسامه فوزى زهران.

المشاركين في البحث :

(1) د / أسامه فوزى زهران.

طريقة البحث والطرق المستخدمة:

يقدم هذا البحث طريقة لتحديد وتصنيف عيوب اللحام فى الصور الإشعاعية أوتوماتيكياً عن طريق إستخدام عدة معالجات للصور والإشارات الإشعاعية والتى تتكيف أوتوماتيكياً مع تغييرات طبيعة الصور والاشارات. ويعرض هذا البحث عدة طرق تعتمد على التحليل متعدد الدقة عن طريق إستخدام التحويل المويجى والتحليل النسيجى لإزالة تأثير الضوضاء وتحسين حالة الصور المجمعة مما يساعد فى عمليتى تحديد أماكن العيوب بالصور وتصنيفها أوتوماتيكياً. كما يقدم البحث طريقة لتحديد أماكن العيوب بالصور بدقة عالية تعتمد على التحليل متعدد الدقة والنظم الاحصائية كما يقدم البحث طريقة لتصنيف العيوب أوتوماتيكياً بدقة عالية وذلك باستخدام وحدات الدعم الإتجاهية والتي تعتبر أسرع وأكثر دقة من الشبكات العصبية الاصطناعية.

البحث رقم (2)

Puplished In:

Contents lists available at SciVerse ScienceDirect

Digital Signal Processing

www.elsevier.com/locate/dsp

Title

Synthetic aperture radar imaging with fractional Fourier transform and channel equalization

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Article history:

Available online xxxx

Keywords:

SAR imaging

FrFT

RDA

Inverse filter deconvolution

LMMSE deconvolution

Regularized deconvolution

abstract

This paper investigates the Range-Doppler Algorithm based on the Fractional Fourier Transform (RDAFrFT)

to obtain High-Resolution (HR) images for targets in Synthetic Aperture Radar (SAR) imaging.
A mathematical framework for the RDA-FrFT is developed in this paper with closed-form expressions
for the range and azimuth compression. The channel effect is considered in this paper for the first time
with three inverse techniques to reduce this effect; inverse filter deconvolution, Linear Minimum Mean
Square Error (LMMSE) deconvolution, and regularized deconvolution. The performance of the RDA-FrFT is
compared with the classical RDA, which is based on the Fourier Transform (FT). Simulation results reveal
that the RDA-FrFT offers better focusing capabilities and greater side-lobe reduction ratios. The reflectivity
profile obtained with the RDA-FrFT demonstrates a superior performance to the classical RDA. Results
show also that the RDA-FrFT gives low Peak Side-Lobe (PSL) and Integrated Side-Lobe (ISL) levels after
range and azimuth compression for the detected targets. Finally, the results reveal that the proposed
regularized deconvolution technique enhances the performance of the RDA-FrFT significantly if the
channel effect is considered.

References

[1] S. Zhu, G. Liao, Yi Qu, Z. Zhou, X. Liu, Ground moving targets imaging algorithm
for synthetic aperture radar, IEEE Trans. Geosci. Remote Sens. 49 (2011) 462–
477.
[2] B. Zheng, X. Mengdao, W. Tong, Radar Imaging Techniques, Publishing House
of Electronics Industry, Beijing, China, 2005.
[3] H. Li, B. Yu, W. Xi, K. Wang, A fractional Fourier approach SAR imaging method,
in: Congress on Image and Signal Processing, vol. 5, May 2008, pp. 215–218.

[4] Ian G. Cumming, Frank H. Wong, Digital Processing of Synthetic Aperture
Radar Data: Algorithms and Implementations, Artech House, Inc., Norwood,
MA, 2005.
[5] C. Capus, K. Brown, Fractional Fourier transform of the Gaussian and fractional
domain signal support, IEE Proc. Vision Image Signal Process. 150 (2) (2003)
99–106.
[6] L.R. Varshney, D. Thomas, Side-lobe reduction for matched filter range processing,
in: Proc. IEEE Radar Conf., Huntsville, May 2003, pp. 446–451.
[7] X. Chen, J. Guan, A fast FRFT based detection algorithm of multiple moving
targets in sea clutter, in: Proceedings IEEE International Radar Conference,
May 2010, pp. 402–406.
[8] H.M. Ozaktas, Z. Zalevsky, M.A. Kutay, The Fractional Fourier Transform with
Applications in Optics and Signal Processing, Wiley, New York, 2001.
[9] R. Tao, B. Deng, W. Zhang, Y. Wang, Sampling and sampling rate conversion
of band limited signals in the fractional Fourier transform domain, IEEE Trans.
Signal Process. 56 (1) (2008) 158–171.
[10] H.M. Ozaktas, O. Arikan, M.A. Kutay, G. Bozdagi, Digital computation of the
fractional Fourier transform, IEEE Trans. Signal Process. 44 (1996)
2141–2150.
[11] O. Akay, G.F. Boudreaux-Bartels, Fractional autocorrelation for detection in
communications, in: B. Boashash (Ed.), Time–Frequency Signal Analysis and
Processing, Elsevier, Oxford, UK, 2003, pp. 568–575 (Chapter 13.4).
[12] O. Akay, Fractional convolution and correlation: Simulation examples and
an application to radar signal detection, in: IEEE 5th Nordic Signal Processing
Symposium (NORSIG 2002), October 2002 (CD-ROM).
[13] C. Capus, K. Brown, Short-time fractional Fourier methods for the time–

frequency representation of chirp signals, J. Acoust. Soc. Am. 113 (6) (2003)
3253–3263.
[14] Z. Hongyuan, Z. Yunhua, J. Jingshan, Synthetic aperture radar simulation system
based on Matlab, in: Proc. IEEE ISAPE, August 2000, pp. 130–133.
[15] C. Oliver, S. Quegan, Understanding Synthetic Aperture Radar Images, SciTech
Publ. Inc., Raleigh, NC, 2004.
[16] Y.K. Chan, S.Y. Lim, Synthetic Aperture Radar (SAR) signal generation, Prog.
Electromagn. Res. B 1 (2008) 269–290.
[17] S.E. El-Khamy, M.M. Hadhoud, M.I. Dessouky, B.M. Salam, F.E. Abd El-Samie,
Optimization of image interpolation as an inverse problem using the LMMSE
algorithm, in: Proc. IEEE MELECON, 2004, pp. 247–250.
[18] N.P. Galatsanos, R.T. Chin, Digital restoration of multichannel images, IEEE
Trans. Acoust. Speech Signal Process. 37 (3) (1989) 415–421.
[19] N.B. Karayiannis, A.N. Venetsanopoulos, Regularization theory in image restoration
– The stabilizing functional approach, IEEE Trans. Acoust. Speech Signal
Process. 38 (7) (July 1990) 1155–1179.
[20] H.C. Andrews, B.R. Hunt, Digital Image Restoration, Prentice Hall, Englewood
Cliffs, NJ, 1977.
[21] C. Candan, M.A. Kutay, H.M. Ozaktas, The discrete fractional Fourier transform,
IEEE Trans. Signal Process. 48 (2000) 1329–1337.
[22] T. Ran, L. Xue-Mei, L. Yan-Lei, W. Yue, Time-delay estimation of chirp signals in
the fractional Fourier domain, IEEE Trans. Signal Process. 57 (2009) 2852–2855.
[23] C. Candan, On the implementation of optimal receivers for LFM signals using
fractional Fourier transform, in: IEEE Radar Conference, RADAR'08, 2008, pp. 1–
4.
[24] A.I. Zayed, On the relationship between the Fourier and fractional Fourier

transforms, IEEE Signal Process. Lett. 3 (12) (December 1996) 310–311.
[25] A.S. Amein, J.J. Soraghan, Fractional chirp scaling algorithm: Mathematical
model, IEEE Trans. Signal Process. 55 (August 2007) 4162–4172.
[26] W.G. Carrara, R.S. Goodman, R.M. Majewski, Spotlight Synthetic Aperture Radar:
Signal Processing Algorithms, Artech House, London, UK, 1995.
[27] Bassem R. Mahafza, Radar Systems Analysis and Design Using Matlab, 2nd ed.,
Chapman & Hall/CRC, Upper Saddle River, 2005.
[28] Bu-chin Wang, Digital Signal Processing Techniques and Applications in Radar
Image Processing, John Wiley & Sons, Inc., New Jersey, 2008.
[29] A. Papoulis, Systems and Transforms with Application to Optics, McGraw–Hill,
New York, 1968.
[30] R.K. Raney, A new and fundamental Fourier transform pair, in: Proc. IGARSS,
vol. 1, May 1992, pp. 106–107.
[31] N. Levenon, E. Mozeson, Radar Signals, John Wiley & Sons, Inc., New York, 2004.
[32] M.A. Abd El-Fattah, M.I. Dessouky, S.M. Diab, W. Al-Nuaimy, F.E. Abd El-Samie,
Speech deconvolution as an inverse problem, Int. J. speech Technol. 14 (4)
(2011) 273–284.
[33] S.E. El-Khamy, M.M. Hadhoud, M.I. Dessouky, B.M. Sallam, F.E. Abd El-Samie,
Efficient implementation of image interpolation as an inverse problem, J. Digit.
Signal Process. 15 (2) (2005) 137–152.
[34] S.E. El-Khamy, M.M. Hadhoud, M.I. Dessouky, B.M. Salam, F.E. Abd El-Samie,
Wavelet fusion: A tool to break the limits on LMMSE image super-resolution,
Int. J. Wavelets Multiresolut. Inf. Process. 4 (1) (2006) 105–118.
[35] S.E. El-Khamy, M.M. Hadhoud, M.I. Dessouky, B.M. Salam, F.E. Abd El-Samie,
Efficient solutions for image interpolation treated as an inverse problem, J. Inf.
Sci. Eng. 22 (2006) 1569–1583.

[36] S.E. El-Khamy, M.M. Hadhoud, M.I. Dessouky, B.M. Salam, F.E. Abd El-Samie,
Regularized super-resolution reconstruction of images using wavelet fusion, J.
Opt. Eng. 44 (9) (2005).
[37] S.E. El-Khamy, M.M. Hadhoud, M.I. Dessouky, B.M. Salam, F.E. Abd El-Samie,
A wavelet based entropic approach to high resolution image reconstruction,
Int. J. Mach. Graph. Vision 17 (4) (2008) 235–256.

Biographies

Osama Zahran Osama Zahran received the B.Sc. (Honors), from Faculty of Electronic Engineering, Menofia University, Egypt, in 1997, and the Ph.D. from Liverpool University, UK, in 2006. He joined the teaching staff of the Department of Electronics and Electrical Communications Engineering, Faculty of Electronic Engineering, Menofia University, Egypt, in 2006. He is a co-author of about 50 papers in national and international conference proceedings and journals. His current research areas of interest include image enhancement, data hiding, multimedia communications, medical image processing, and non-destructive testing applications.

Moawad I. Dessouky received the B.Sc. (Honors) and M.Sc. degrees from the Faculty of Electronic Engineering, Menofia University, Menouf, Egypt, in 1976 and 1981, respectively, and the Ph.D. from McMaster University, Canada, in 1986. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menofia University, Menouf, Egypt, in 1986. He has published more than 170 scientific papers in national and international conference proceedings and journals. He is currently the vice dean of Faculty of Electronic Engineering, Menofia University. He has received the most cited paper award from Digital Signal Processing journal for 2008. His current research areas of interest include spectral estimation techniques, image enhancement, image restoration, super resolution

Mohamad El-Kordy received the B.Sc. (Honors), M.Sc., and Ph.D. from the Faculty of Electronic Engineering, Menofia University, Menouf, Egypt, in 1979, 1985, and 1991, respectively. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menofia University, Menouf, Egypt, in 1991. His current research areas of interest include SAW applications, radiation applications, image processing, and signal processing.

Fathi E. Abd El-Samie received the B.Sc. (Honors), M.Sc., and Ph.D. from the Faculty of Electronic Engineering, Menofia University, Menouf, Egypt, in 1998, 2001, and 2005, respectively. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menofia University, Menouf, Egypt, in 2005. He is a co-author of about 160 papers in international conference proceedings and journals. He has received the most cited paper award from Digital Signal Processing journal for 2008.
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عنوان البحث:

عربي : **تطبيق تحويل فورير الجزيئى فى أنظمة الرادار وتقنيات الإستخلاص للإشارات لتقليل الشوشرة**

انجليزي :

M. G. El-Mashed, **O. Zahran**, M. Dessouky, M. El-kordy, and F. E. Abd El-Samie, "*Application of Fractional Fourier Transform for Synthetic Aperture Radar Processing and Deconvolution Techniques for Noise Rejection*". Accepted for publication in **Digital Signal Processing – Elsevier,** DOI 10.1016/j.dsp.2012.09.001, **2012.**

صاحب فكرة البحث: جميع المشاركين بالبحث.

المشاركين في البحث :

(1) د / أسامه فوزى زهران.

(2) م / محمد جلال المشد.

(3) أ.د/ معوض إبراهيم الدسوقى.

(4) أ.د/ محمد فهيم الكردى.

(5) د/ فتحى السيد عبد السميع.

طريقة البحث والطرق المستخدمة:

يقدم هذا البحث خوارزم جديد لإستخدام تحويلات فوريير الجزئية فى الحصول على صور فائقة الدقة لأنظمة الرادار ذات الفتحة. ويقدم البحث مقارنة بين إستخدام تحويل فوريير التقليدى وتحويل فوريير الجزيئى المقترح من ناحية جودة الصورة التى يتم الحصول عليها مظهراً تفوق النظام المقترح. كما يقدم البحث ثلاثة طرق جديدة لإستخلاص الإشارة المستخدمة فى الحصول على الصورة فى وجود تأثير لقناة الإتصال والشوشرة. وقد أظهرت النتائج تفوقاً واضحاً للتقنيات المقترحة مما يعطي أداء أفضل مقارنة مع التقنيات الأخرى.

البحث رقم (3)

Puplished In

Contents lists available at SciVerse ScienceDirect
journal homepage: www.elsevier.com/locate/apradiso
Applied Radiation and Isotopes

Title

Power density spectrum for the identification of residence time distribution signals

O. Zahran n, H. Kasban, F.E. Abd El-Samie, M. El-Kordy

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H I G H L I G H T S

**** A new method for RTD signal identification based on power density spectrum (PDS) is proposed.***

**** The idea of applying feature extraction from the PDS of RTD signal is interesting and has novelty.***

**** The performance of the proposed approach is tested in the presence of different kinds of noise.***

**** The proposed approach is robust and reliable especially in the presence of noise.***

**** The proposed approach can achieve recognition rates up to 100%.***

a r t i c l e i n f o:

Article history:

Received 21 November 2011

Received in revised form

25 April 2012

Accepted 8 May 2012

Available online 18 May 2012

Keywords:

Radioisotopes

Residence time distribution

Signal identification

Power density spectrum

a b s t r a c t:

One of the most important applications of radioisotopes in industry is the residence time distribution (RTD) measurement. RTD can be used for optimizing the design of industrial systems and determining their malfunctions. The RTD signal may be subject to different sorts of noise. This leads to errors in the RTD calculations, and hence leads to wrong analysis in the determination of system malfunctions. This paper presents a proposed approach for RTD signal identification based on power density spectrum (PDS). The cepstral features are extracted from the signal or/and its PDS. The PDS is estimated using nonparametric, parametric, and eigen-analysis methods. The identification results are analyzed and compared for different estimation methods in order to select the best PDS estimation method for RTD signal identification. Neural networks are used for training and testing in the proposed approach. The proposed approach is tested using RTD signals obtained from the measurements carried out with

radiotracer technique. The experimental results show that the proposed approach with features
extracted from the PDS of the RTD signals calculated using eigen-analysis methods is the most robust
and reliable in RTD signal identification.

References

Ahsan, S.T., 2002. Optimal window design, comparing it with the Kaiser window.
IEEE Potentials, 40–44.
Bronez, T.P., 1992. On the performance advantage of multi-taper spectral analysis.
IEEE Trans. Signal Process. 40, 2941–2946.
Chengalvarayan, R., Deng, L., 1998. Speech trajectory discrimination using the
minimum classification error learning. IEEE Trans. Speech Audio Process. 6 (6),
505–515.
Furman, L., 2002. Z-transform and adaptive signal processing in analysis of tracer
data. Can. J. Chem. Eng. 80 (3), 472–477.
Furman, L., Petryka, L., Ste_gowski, Z., Wierzbicki, A., 2003. Data acquisition and
processing in radiotracer experiments. Nucl. Instrum. Methods Phys. Res. Sect.
211 (3), 436–442. Elsevier.
Furui, S., 1981. Cepstral analysis technique for automatic speaker verification. IEEE
Trans. Acoust., Speech Signal Process. 2, 254–272.
Galushkin, A.I., 2007. Neural Networks Theory. Springer-Verlag, Berlin Heidelberg.
Ingle, V.K., Proakis, J.G., 1998. Advanced Digital Signal Processing Using MATLAB.
International Thomson Publishing Company.
Kasban, H., Zahran, O., Abd El-Samie, F.E., 2010. New trends for on-line troubleshooting
in industrial problems using radioisotopes. The Online J. Electron. Electr. Eng. 2 (3), 284–292.
Kasban, H., Zahran, O., Arafa, H., El-Kordy, M., Elaraby, Sayed M.S., El-Samie,

F.E.Abd, 2010. An Efficient Approach for Residence Time Distribution Signal
Processing and Identification. The 7th International Conference on Informatics
and Systems. Cairo, Egypt, 28–30 March, 2010.
Kasban, H., Zahran, O., Elaraby, Sayed M.S., EL-Rabaie, S., El-Kordy, M.,
Abd El-Samie, F.E., 2010. Using Radiotracer in Industrial Applications. The
27th National Radio Science Conference. Menouf, Egypt, March 2010.
Kasban, H., Zahran, O., Arafa, H., El-Kordy, M., Elaraby, Sayed M.S., Abd El-Samie,
F.E., 2010. Laboratory experiments and modeling for industrial radiotracer
applications. Appl. Radiat. Isot. 68, 1045–1054. Elsevier.
Kasban, H., Zahran, O., Arafa, H., El-Kordy, M., Elaraby, Sayed M.S., El-Samie,
F.E.Abd, 2011. Welding defect detection from radiographic image with a
cepstral approach. Nondestr. Test. Eval. 44, 226–231.
Manolakis, D.G., Ingle, V.K., Kogon, S.M., 2005. Statistical and Adaptive Signal
Processing. Artech House.
Percival, D.B., Walden, A.T., 1993. Spectral Analysis for Physical Applications: Multitaper
and Conventional Univariate Techniques. Cambridge University Press.
Proakis, J.G., 1992. Advanced Digital Signal Processing. Macmillan.
Proakis, J.G., Nikias, C.L., Rader, C.M., Ling, F., Moonen, M., Proudler, I.K., 2002.
Algorithms for Statistical Signal Processing. Prentice Hall.
Shao, R.H., Chen, Y., 2009. Stochastic resonance in time-delayed bistable systems
driven by weak periodic signal. Physica A 388, 977–983.
Sugiharto, Z.S., Wibisono, R.K., Abidin, Z., 2009. Radiotracer method for residence
time distribution study in multi-phase flow system. Int. J. Radiat. Appl. Instrum. 67 (7), 1445–1448.
Thomson, D.J., 1982. Spectrum estimation and harmonic analysis. Proceedings of
the IEEE 70 (9), 1055–1096.
Vaseghi, S.V., 2008. Advanced Digital Signal Processing and Noise Reduction.
Wiley.

Viitanen, P., 1997. Experiences on fast fourier transform as a deconvolution
technique in determination of process equipment residence time distribution.
Appl. Radiat. Isot. 48 (7), 893–898. Elsevier.
Zahran, O., Kasban, H., Arafa, Horya A., El-Kordy, M., Abd El-Samie, F.E., 2009.
Residence Time Distribution Measurements in Phosphate Production Unit Using Radiotracer Techniques. The 48th Annual British Conference on
Non-Destructive Testing. Blackpool, UK, September 2009

عنوان البحث:

عربي : **تحويلات كثافة القدرة الطيفية للتعرف على إشارات توزيع زمن البقاء**

انجليزي :

O. Zahran, H. Kasban, F. E. Abd El-Samie, and M. El-Kordy, "*Power density spectrum for the identification of residence time distribution signals*", **Applied Radiation and Isotopes - Elsevier,** Vol. 70, p-p 2638:2645, **2012.**

صاحب فكرة البحث: جميع المشاركين بالبحث.

المشاركين في البحث :

(1) د / أسامه فوزى زهران.

(2) د/ هانى كسبان عبد الحى.

(3) د/ فتحى السيد عبد السميع.

(4) أ.د/ محمد فهيم الكردى.

طريقة البحث والطرق المستخدمة:

يقدم هذا البحث لأول مرة دراسة لإستخدام تقنيات تحليل كثافة القدرة الطيفية فى مجال معالجة الإشارات للتعرف على إشارات توزيع زمن البقاء فى الأنظمة الصناعية التى تستخدم النظائر المشعة. وتتضح أهمية البحث فى إمكانية التعرف على الإشارات المختلفة المعبرة على حالة النظام من تحليلها الطيفى. كما يقدم البحث مقارنة بين الطرق المختلفة لحساب تحليل كثافة القدرة الطيفية للإشارات مظهراً تفوق الطرق التى تعتمد على التحليل المميز على بقية الطرق التقليدية فى حساب تحليل القدرة الطيفية والتعرف على أنماط إشارات توزيع زمن البقاء.

البحث رقم (4)

Puplished In:

Journal Name

Wireless Personal Communications

DOI 10.1007/s11277-012-0622-6

Title :

Efficient Image Transmission with Multi-Carrier CDMA

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Keywords :

MC-CDMA Chaotic interleaving FDE

Abstract:

This paper presents 1 a new approach for efficient image transmission overMulti-
2 Carrier Code Division Multiple Access (MC-CDMA) systems using chaotic interleaving.

3 The chaotic interleaving scheme based on Baker map is applied on the image data prior to
4 transmission. The proposed approach transmits images over wireless channels, efficiently,
5 without posing significant constraints on the wireless communication system bandwidth and
6 noise. The performance of the proposed approach is further improved by applying Frequency-
7 Domain Equalization (FDE) at the receiver. Two types of frequency-domain equalizers are
8 considered and compared for performance evaluation of the proposed MC-CDMA system;
9 the Zero-Forcing equalizer and the Linear Minimum Mean Square Error (LMMSE) equal10
izer. Several experiments are carried out to test the performance of the image transmission
11 with different sizes over the proposed MC-CDMA system. Simulation results show that
12 image transmission over wireless channels using the proposed chaotic interleaving approach
13 is much more immune to noise and fading.Moreover this chaotic interleaving process adds a
14 degree of encryption to the transmitted data. The results also show a noticeable performance
15 improvement in terms of the RootMean Square Error and Peak Signal-to-Noise Ratio values
16 when applying FDE in the proposed approach, especially with the LMMSE equalizer

References

1. Rappaport, T. S. (2002). Wireless communications principles and practice, 2nd edn. New Jersey:
Pearson Education.
2. Nee, R. V., & Prasad, R. (2000). OFDM for wireless multimedia communications. London: Artech
House.
3. Schulze, H., & Luders, C. (2005). Theory and applications of OFDM and CDMA. New York: Wiley.

4. Hanzo, L., Yang, L., Kuan, E., & Yen, K. (2003). Single and multi-carrier DS-CDMA: Multi-user
detection, space-time spreading, synchronisation, networking and standards. New York: Wiley.
5. Fazel, K., & Kaiser, S. (2003). Multi-carrier and spread spectrum systems. Chichester: Wiley.
6. Hara, S., & Prasad, R. (1997). Overview of multi-carrier CDMA. IEEE Cornmunicolionc
Magmine, 35, 126–133.
7. Verdu, S. (1998). Multi-user detection. Cambridge, UK: Cambridge University Press.
8. Dang, P. P., & Chau, P. M. (2000). Robust image transmission over CDMA channels. IEEE Trans
on Consumer Electronics, 46, 3.
9. Kathiyaiah, T., & Oh, T. H. (2009). Performance analysis of JPEG2000 transmission through low
SNR MC-CDMA Channel. In Proceedings of IEEE 9th international conference on communications,
pp. 15–17, Malaysia.
10. Rogers, J. K., & Cosman, P. C. (1998). Wavelet zerotree image compression with packetization. IEEE
Signal Processing Letters, 5(5), 105–107.
11. Proakis, J. G. (1995). Digital communications, 3rd edn. New York: McGraw-Hill.

12. Shi, Y. Q., Zhang, X. M., Ni, Z. C., & Ansari, N. (2004). Interleaving for combating bursts of errors.
In IEEE circuts and systems magazine (Vol. 4). First Quarter.
13. Nguyen, V. D., & Kuchenbecker, H. (2001). Block interleaving for soft decision viterbi decoding in
ofdm systems. In IEEE VTC (pp. 470–474).
14. Sung, C. K., Heo, J., & Lee, I. (2007). Adaptive bit-interleaved coded OFDM with reduced feedback
information. IEEE Transactions on Communications, 55(9), 1649–11655.
15. Jovic, B., & Unsworth, C. (2007). Chaos-based multi-user time division multiplexing communication
system. IET Communications, 1, 4.
16. Matthews, R. (1989). On the derivation of a chaotic encryption algorithm. Cryptologia XIII (Vol. 1).
17. Fridrich J. (October 1998). Symmetric ciphers based on two-dimensional chaotic maps. International
Journal of Bifurcation and Chaos, 8.
18. Han, F., Yu, X., & Han, S. (2006). Improved baker map for image encryption. In ISSCAA (pp.
1273–1276).
19. Hassan, E. S., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., Abd El-Samie, F. E. (2009). New
interleaving scheme for continuous phase modulation based OFDM systems using chaotic maps.
In Proceedings of WOCN-09, Cairo, Egypt, pp. 28–30.
20. Hassan, E. S., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F. E. (2012). cha236
otic interleaving scheme for continuous phase modulation based single-carrier frequency-domain
equalization systems. Wireless Personal Communications, 62(1), 183–199.
21. Fazel, K., & Kaiser, S. (2003). Multi carrieir and spread spectrum systems. New York: Wiley.
239 22. Klein, A. (1997). Data detection algorithms specially designed for the downlink of CDMA mobile
radio systems. Proceedings of IEEE VTC, 1, 203–207.
23. IEEE 802.16 Broadband Wireless Access Working Group. (2001). Channel models for fixed wireless
applications. IEEE 802.16a.3c-01/01.
24. Yuan, D., Wang, C., & Yao, Q. (1999). Two novel interleaving schemes of the (2,1,3) convolutional

code and its performance in the mobile image communication system. In Proceedings of IEEE military
communications xonference, MILCOM.
25. Subramanya, S. R., & Sabharwalz, C. (2001). Performance evaluation of hybrid coding of images using wavelet transform and predictive coding. In Proceedings of ICCIMA.

عنوان البحث:

عربي :نقل الصور بكفاءة على نظام التقسيم الكودى متعدد النيل ومتعدد الحامل

انجليزي :

E. M. El-Bakary, E. S. Hassan, **O. Zahran**, S. A. El-Dolil and F. E. Abd El-Samie, "*Efficient Image Transmission with Multi-Carrier CDMA*", Accepted for publication in **Wireless Personal Communications - Springer**, DOI 10.1007/s11277-012-0622-6, **2012.**

صاحب فكرة البحث: جميع المشاركين بالبحث.

المشاركين في البحث :

(1) د / أسامه فوزى زهران.

(2) م/ إيمان البقرى.

(3) د/ عماد سعيد حسن.

(4) أ.د/ سامى عبد المنعم الضليل.

(5) د/ فتحى السيد عبد السميع.

طريقة البحث والطرق المستخدمة:

يقدم هذا البحث دراسة لنقل الصورة بكفاءة على أنظمة التقسيم الكودى المتعدد النيل والمتعدد الحامل لما لهذه الدراسة من أهمية كبيرة فى نقل إشارات الفيديو والوسائط المتعددة على هذه

الأنظمة. ويقترح البحث إستخدام خرائط بيكر العشوائية فى تحسين أداء نظام نقل الصور حيث تمكن هذه الخرائط من بعثرة البيانات وتقليل تأثير قناة الإتصال عليها كما أنه يعتبر تشفير للبيانات المنقولة. بالإضافة إلى ذلك تم بالبحث دراسة نظم التعديل فى النطاق الترددى لتقليل تأثير قناة الإتصال. وتظهر النتائج تفوق نظام التعديل الخطى ذو أقل مربع خطأ فى هذا الغرض.

البحث رقم (5)

Puplished In

29th NATIONAL RADIO SCIENCE CONFERENCE (NRSC 2012) April 10 - 12, 2012, Faculty of Engineering/Cairo University, Egypt.

Title

K2. Automatic Pectoral Muscle Boundary Detection in Mammograms Using Eigenvectors Segmentation

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ABSTRACT:

Mammograms are X-ray images, which are used in breast cancer detection. Automatic pectoral muscle removal on Medio-Lateral Oblique-view (MLO) of mammograms is an essential step for many mammography processing algorithms. Presence of pectoral muscle gives false positive results in automated breast cancer detection. The sizes, the shapes and the intensity contrasts of pectoral muscles change greatly from one MLO view to another. So, the suppression or exclusion of the pectoral muscle from the mammograms is demanded for computer-aided analysis, and this task requires the identification of the pectoral muscle. The main objective of this study is to propose an automated method to efficiently identify the pectoral muscle in MLO mammograms. This work uses a normalized graph cuts segmentation technique for identifying the pectoral muscle edge.

Keywords:

Mammograms, Pectoral muscle, Image segmentation, Normalized graph cuts.

REFERENCES

[1] R. GUPTA, AND P.E. UDRILL : “The Use of Texture Analysis to Delineate Suspicious Masses in Mammography”, Phys. Med.Biol., VOL.40, PP.835-855 (1995)

[2] S.M. KWOK, R. CHANDRASEKHAR, Y. ATTIKIOUZEL, AND M.T.RICKARD : “Automatic Pectoral Muscle Segmentation on Mediolateral Oblique View Mammograms”, IEEE TRANS. on Medical Imaging, VOL.23, PP.1129-1140, 8 September(2004)

[3] XU WEIDONG AND XIA SHUNREN : "A Model Based Algorithm to Segment The Pectoral Muscle in Mammograms", in: Proceedings of IEEE Int. Conf. Neural Networks & Signal Processing, Nanjing, China, 2003. Piscataway, NJ: IEEE; 2003. P. 1163–69

[4] R.J. FERRARI, ET AL : “Automatic Identification of The Pectoral Muscle in Mammograms”, IEEE Trans. on Medical Imaging, VOL.23, NO.2, PP.232-245 (2004).

[5] D. RABA, A. OLIVER, J. MARTÍ, M. PERACAULA, J. ESPUNYA :"Breast Segmentation with Pectoral Muscle Suppression on Digital Mammograms", Lect Notes Comp SCI 3523:471–478, 2005

[6] M. BAJGER, F. MA, M.J. BOTTEMA: "Minimum Spanning Trees and Active Contours for Identification of The pectoral Muscle in Screening Mammograms", Digital Image Computing: Techniques and Applications Conference. 47–53, 2005

[7] F. MA, M. BAJGER, M.J. BOTTEMA: "Extracting The Pectoral Muscle in Screening Mammograms Using a Graph Pyramid", AprsWorkshop on Digital Image Computing, University of Queensland. 39–42, 2005
[8] F. MA, M. BAJGER, J.P. SLAVOTINEK, M.J. BOTTEMA:" Two Graph Theory Based Methods for Identifying the Pectoral Muscle in Mammograms", Pattern Recogn 40:2592–2602, 2007
[9] Z. WU AND R. LEAHY : "An Optimal Graph Theoretic Approach to Data Clustering: Theory and Its Application to Image Segmentation", º IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 15, NO. 11, PP. 1,101-1,113, Nov. 1993.
[10] J. SHI AND J. MALIK:" Normalized Cuts and Image Segmentation", IN CVPR, JUN. 1997. 2057, 2058
[11] S. MAJI, N.K VISHNOI; J. MALIK:"Biased Normalized Cuts", Patern Analysis and Machine Inteligence, IEEE Ttranaction on 20-25 JUNE 2011
[12] R. CHANDRASEKHAR, S. M.KWOK, AND Y. ATTIKIOUZEL:" Automatic Evaluation of Mammographic Adequacy and Quality on The Mediolateral Oblique View. in Digital Mammography", IWDM 2002: PROC. 6TH INT. Workshop Digital Mammography,Bremen, Germany, JUNE 22–25. 182–186, 2002
[13] J. SUCKLING,J. PARKER, D.R DANCE,S. ASTLEY, I. HUTT, R.M. BOGGISC, I. RICKETTS, E. STAMATAKIS, N.CERNEAZ,S.L. KOK , P.TAYLOR ,D.BETAL , J.SAVAGE: "The Mammographic Image Analysis Society Digital Mammogram Database", Excerpta Medica International Congress Series 1069:375–378, 1994.
[14] T. COUR, S. YU, AND J. SHI, Normalized Cuts Matlab Code [Online]. Available: HTTP://WWW.CIS.UPENN.EDU/~JSHI/SOFTWARE
640

عنوان البحث:

عربي : تحديد حواف العضلات الصدرية فى صور الثدى أوتوماتيكياً فى صور الأشعة السينية للثدى باستخدام تقسيم المتجهات المميزة

انجليزي :

H. Abdellatif, T. E. Taha, **O. Zahran**, W. Al-Nauimy, F. E. Abd El-Samie, "*Automatic Pectoral Muscle Boundary Detection in*

Mammograms Using Eigenvectors Segmentation", **The 29th National Radio Science Conference (NRSC 2012)**, p-p 633:640, Cairo, Egypt, April **2012**.

صاحب فكرة البحث: جميع المشاركين بالبحث.

المشاركين في البحث :

(1) د / أسامه فوزى زهران.

(2) م/ هبه عبد اللطيف.

(3) أ.د/ طه السيد طه.

(4) د/ وليد النعيمى.

(5) د/ فتحى السيد عبد السميع.

طريقة البحث والطرق المستخدمة:

يقدم هذا البحث تطبيقاً جديداً لتقنية تقسيم الصور بالتقطيع فى مجال فصل العضلات الصدرية فى صور الأشعة السينية للثدى لما لهذا التطبيق من أهمية كبيرة فى تشخيص سرطان الثدى وذلك بسبب التشابه بين صور العضلات الصدرية وأجزاء الثدى المصابة بالسرطان. والهدف من هذه الدراسة هو إجراء عملية تقسيم لهذه النوعية من الصور بشكل أوتوماتيكى بعيداً عن التقسيم اليدوى بمجرد النظر. وقد أظهرت الدراسة نجاح التقنية المقترحة فى التعرف على العضلات الصدرية فى صور الثدى وفصلها عن باقى الصورة والتى غالباً ما يتسبب وجودها فى إعطاء نتائج إيجابية كاذبة في الكشف الآلي عن سرطان الثدي.

البحث رقم (6)

Puplished In

Contents lists available at ScienceDirect
NDT&E International
www.elsevier.com/locate/ndteintjournal homepage:

Title

Welding defect detection from radiography images with a cepstral approach

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Article history:

Received 4 February 2010
Received in revised form
8 October 2010
Accepted 11 October 2010
Available online 16 October 2010

Keywords:

Welding
Defect detection

Radiography

Feature extraction

MFCCs

DWT

DCT

DST

a b s t r a c t

This paper presents a new approach for feature extraction from radiography images acquired with gamma rays in order to detect weld defects. In this approach, images are lexicographically ordered into 1D signals. Then, Mel-Frequency Cepstral Coefficients (MFCCs) and polynomial coefficients are extracted from these signals, one of their transforms, or both of them. Discrete Wavelet Transform (DWT), Discrete Cosine Transform (DCT), and Discrete Sine Transform (DST) are tested and compared for efficient feature extraction. Neural networks are used for featurematching in the proposed approach. Sixteen radiography images containing seventy three weld defects are used to evaluate the performance of the proposed approach. For performance evaluation, the tested images are degraded by Gaussian, impulsive, speckle, or Poisson noises with and without blurring. The experimental results show that the proposed approach can be used in a reliable way for automatic defect detection from radiography images in the presence of noise and blurring.

References

[1] Ditchburn RJ, Burke SK, Scala CM. NDT of welds: state of the art. NDT & E International 1996;29(2):111–7.

[2] Hayes Charles. The ABC's of nondestructive weld examination. Welding Journal
1998;76(5):46–51.
[3] Liao TW, Ni J. An automated radiography NDT system for weld inspection: Part
II. Flaw Detection, NDT & E International 1998;31(3):183–92.
[4] Liao TW, Li DM, Li YM. Detection of welding flaws from radiography images
with fuzzy clustering methods. Fuzzy Sets and Systems 1999;108(2):
145–58.
[5] Lashkia V, Aleshin S. Test feature classifiers: performance and applications.
IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics
2001;31(4):643–50.
[6] Wang G, Liao TW. Automatic identification of different types of welding defects
in radiography images. NDT & E International 2002;35:519–28.
[7] Kazantsev IG, Lemahieu I, Salov GI, Denys R. Statistical detection of defects in
radiography images in nondestructive testing. Signal Processing 2002;82:
791–801.
[8] da Silva Romeu R, Siqueira Marcio HS, Vieira de Souza Marcos Paulo, Rebello
Joa\widetildeo MA, Calo\widehatb Luiz P. Estimated accuracy of classification
of defects detected in welded joints by radiography tests. NDT& E International
2005;38:335–43.
[9] Leong SS, Samad Z, Ratnam MM, Khalid MA. Weld extraction from digitized
radiographs using graphical analysis of weld intensity profiles. Journal of
Technology 2006;45(D):167–80.
[10] Saravanan T, Bagavathiappan S, Philip J, Jayakumar T, Raj B. Segmentation of
defects from radiography images by the histogram concavity threshold method. Insight 2007;49(10):578–84.
[11] Mirapeix J, Garcia-Allende PB, Cobo A, Conde OM, Lo´ pez-Higuera JM. Real-time
arc-welding defect detection and classification with principal component

analysis and artificial neural networks. NDT & E International 2007;40: 315–23.
[12] Thai WKF, Development of a computed radiography-based weld defect
detection and classification system. MSc thesis, University of Sains, Malaysia,
2008.
[13] Amin ES. Application of artificial neural networks to evaluate weld defects of
nuclear components. Journal of Nuclear and Radiation Physics 2008;3(2):
83–92.
[14] Vilar R, Zapat J, Ruiz R. Classification of welding defects in radiography images
using an ANN with modified performance function. Berlin Heidelberg: Springer; 2009. 284–93.
[15] Zapata J, Vilar R, Ruiz R. An adaptive network-based fuzzy inference system for
classification of welding defects. NDT & E International 2010;43(3):191–9.
[16] Valavanis I, Kosmopoulos D, Multiclass defect detection and classification in
weld radiographic images using geometric and texture features. Expert Systems with Applications 2010;37(12):7606–14.
[17] Silva RR, Mery D. State-of-the-art of weld seam inspection by radiography
testing: Part I – Image Processing. Materials Evaluation 2007;65(6):643–7.
[18] Kasban H Detection of buried objects using acoustic waves, MSc thesis, Faculty
of Electronic Engineering, Menofia University, Egypt, 2008.
[19] Muralishankar R. Theoretical complex cepstrum of DCT and warped DCT filters.
IEEE Signal Processing Letters 2007;14(5):367–70.
[20] Hashad FG, Halim TM Diab SM and Sallam BM A new approach for fingerprint
recognition based on Mel frequency cepstral coefficients. in: Proceedings of the
international conference on computer engineering and systems, Cairo, Egypt,
December 2009, pp. 263–8.
[21] Kinnunen T Spectral features for automatic text-independent speaker recognition.

Licentiate's Thesis, University of Joensuu, Department of Computer Science, Finland, 2003.
[22] Vergin R, Shaughnessy DO, Farhat A. Generalized Mel frequency cepstral
coefficients for large-vocabulary speaker-independent continuous-speech
recognition. IEEE Transactions on Speech and Audio Processing 1999;7(5):
525–32.
[23] Prochazka A, Uhlir J, Rayner PJW, Kingsbury NJ. Signal analysis and prediction.
USA: Birkhauser Inc.; 1998.
[24] Dreyfus G. Neural networks methodology and applications. Berlin Heidelberg:
Springer-Verlag; 2005.

البحث رقم (7)

Puplished In

International Journal of Signal Processing, Image Processing and Pattern Recognition Vol. 5, No. 2, June, 2012

Title

Quantitative and Qualitative Evaluation for Gamma Radiographic Image Enhancement

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Abstract :

This paper presents some image processing techniques that can be used for radiographic image enhancement. Contrast enhancement, filtering, denoising, and interpolation processes are carried out in this paper. Contrast enhancement is carried out using adaptive histogram equalization. Filtering is carried out using median, Wiener, Lee, and Kuan filters. Wavelet and curvelet transforms are used for image denoising. Three interpolation are carried out. The results are evaluated qualitatively and quantitatively using the Peak Signal-to-Noise Ratio (PSNR), Root Mean Squire Error (RMSE), Standard Deviation (SD), smoothness, entropy, Structural Similarity (SSIM), and execution time. The results show that the contrast enhancement improves the radiographic image quality, the Wiener filter achieves better enhancement results than other filters, the curvelet transform denoising gives better enhancement than wavelet denoising. The bicubic interpolation with resolution factor two is promising in terms of the quality assessment metrics.

Keywords:

Radiographic image, Filtering, Denoising, Interpolation, Wavelet, Curvelet

References

[1] A. Movafeghi, M. Taheri, M. H. Kargarnovin, F. Ghasemi, B. Rokrok, M.Seiedi, K. Edaalati, A. Kermani and N. Rastkhah, “Quality Improvement of Digitized Radiographs by Filtering Technique Development Based on Morphological Transformations”, Nuclear Science Symposium Conference, vol. 3, (2004), pp. 1845 – 1849, Rome.
[2] Z. Xiao-guang, G. Ding and X. Jian-jian, “Generalized Fuzzy Enhancement of Image for Radiographic Testing Weld”, 4th

International Symposium on Image and Signal Processing and Analysis, (2005), pp. 94-99.
[3] X. Wang, B. S. Wong, C. G. Tui, K. P. Khoo and F. Foo, “Image Enhancement for Radiographic Non-Destructive Inspection of The Aircraft”, Asia-Pacific Conference on NDT, New Zealand, (2006).
[4] N. Arulmozhi, N. Manoharan, R. B. Sheela, B. Venkatraman and R. Baldev, “Isolation of Defects in Radiographic Weld Images With Wavelet Denoising Using Log-Gabor Filter”, International Conference on Computational Intelligence and Multimedia Applications, (2007), pp. 394-399.
[5] I. Frosio, M. Lucchese, F. Lissandrello and N. A. Borghese, “Automatic Contrast Enhancement in Digital Radiography”, Nuclear Science Symposium Conference Record, (2008), pp. 4331 – 4334.
[6] H. R. Sheikh and A. C. Bovik, “Image Information and Visual Quality”, Transactions on Image Processing, vol. 15, no. 2, (2006), pp. 430 – 444.
[7] C. Yim and A. C. Bovik, “Quality Assessment of Deblocked Images”, IEEE Transactions on Image Processing, vol. 20, no. 1, (2011), pp. 88-98.
[8] Z. Wang, A. C. Bovik, H. R. Sheikh and E. P. Simoncelli, “Image Quality Assessment: From Error Visibility to Structural Similarity”, IEEE Transactions on Image Processing, vol. 13, no. 4, (2004), pp. 1-14.
[9] T. R. Wojcik and D. Krapf, “Solid-State Nanopore Recognition and Measurement Using Shannon Entropy", IEEE Photonics Journal, vol. 3, no. 3, (2011), pp. 337-343.
[10] F. G. Hashad, T. M. Halim S. M. Diab, B. M. Sallam and F. E. Abd El-Samie, “A Hybrid Algorithm for Fingerprint Enhancement”, International Conference on Computer Engineering & Systems, (2009), pp. 57 – 62, Cairo, Egypt.
[11] D. Coltuc, P. Bolon and J. M. Chassery, "Exact Histogram Specification", IEEE Transactions on Image Processing, vol. 15, no. 5, (2006), pp.1143-1152.
[12] E. D. Pisano, E. B. Cole, B. M. Hemminger, M. J. Yaffe, S. R. Aylward, A. D. A. Maidment, R. E. Johnston, M. B. Williams, L.T. Niklason, E. F. Conant, L. L. Fajardo, D. B. Kopans, M.E. Brown and S. M. Pizer, "Image Processing Algorithms for Digital Mammography: A Pictorial Essay", Radiographics, vol. 20, (2000), pp. 1479-1491.
[13] S. M. Alghalandis and G. H. Nozad, “Welding Defect Pattern Recognition in Radiographic Images of Gas Pipelines Using Adaptive Feature Extraction Method and Neural Network Classifier", 23rd World Gas Conference, Amsterdam, (2006).

[14] X. Wanga and B. S. Wong, “Image Enhancement for Radiography Inspection”, NDT.net, vol. 10, no.4, (2005).
[15] I. Frosio and N. A. Borghese, “Statistical Based Impulsive Noise Removal in Digital Radiography” , IEEE Transactions on Medical Imaging, vol. 28, no. 1, (2009), pp. 3-16.
[16] T. W. Liao, D. M. Li and Y. M. Li, “Extraction of Welds from Radiographic Images Using Fuzzy Classifiers”, Informatics and Computer Science: An International Journal, vol. 126, (2000), pp. 21–42.
[17] G. Wang and T. W. Liao, “Automatic Identification of Different Types of Welding Defects in Radiographic Images”, NDT & E International, vol. 35, (2002), pp. 519-528.
[18] S. Lee, “Speckle Analysis and Smoothing of Synthetic Aperture Radar Images”, Computer Graphics Image processing, vol.17, (1981), pp. 24-32.
[19] D. T. Kuan, A. A. Sawchuk, T. C. Strand and P. Chavel, “Adaptive Restoration of Images With Speckle”, IEEE Transactions on Acoustics Speech Signal Processing, vol. ASSP-35, (1987), pp.373-383.
[20] K. Arulmozhi, S. A. Perumal, K. Kannan and S. Bharathi, “Contrast Improvement of Radiographic Images in Spatial Domain by Edge Preserving Filters”, International Journal of Computer Science and Network Security, vol.10, no.2, (2010), pp. 233-240.
[21] S. G. Chang, B. Yu and M. Vetterli, “Adaptive Wavelet Thresholding for Image Denoising and Compression”, IEEE Transactions on Image Processing, vol. 9, no. 9, (2000), pp.1532-1546,.
[22] J. Portilla, V. Strela, M. J. Wainwright and E. P. Simoncelli, “Image Denoising Using Scale Mixtures of Gaussians in The Wavelet Domain”, IEEE Transactions on Image Processing, vol. 12, no. 11, (2003), pp. 1338-1351.
[23] F. Luisier, T. Blu and M. Unser, “Image Denoising in Mixed Poisson–Gaussian Noise”, IEEE Transactions on Image Processing, vol. 20, no. 3, (2011), pp.696-708.
[24] S. K. Mohideen, S. A. Perumal and M. M. Sathik, “Image De-noising Using Discrete Wavelet Transform”, International Journal of Computer Science and Network Security, vol. 8, no. 1, (2008), pp. 213-216.
[25] F. Bömers, “Wavelets in Real Time Digital Audio Processing: Analysis and Sample Implementations”, M. Sc. Thesis, Department of Computer Science, University of Mannheim, (2000).

[26] D. L. Ward, “Redundant discrete wavelet transform based super-resolution using sub-pixel image registration”, M. Sc. Thesis, Department of the Air Force, Air University, (2003).
[27] B. C. Rao and M. M. Latha, “Selective Neighbouring Wavelet Coefficients Approach For Image Denoising”, International Journal of Computer Science and Communication, vol. 2, no. 1, (2011), pp. 73–77.
[28] E. J. Candes and D. L. Donoho, “New Tight Frames of Curvelets and Optimal Representations of Objects With Piecewise C2 Singularities”, Communications on Pure and Applied Mathematics, vol. 57, no. 2, (2004), pp. 219–266.
[29] F. E. Ali, I. M. El-Dokany, A. A. Saad and F. E. Abd El-Samie, "Curvelet Fusion of MR and CT images," Progress In Electromagnetics Research C, vol. 3, (2008), pp. 215-224.
[30] J. L. Starck, P. Abrial, Y. Moudden and M. K. Nguyen, "Wavelets, Ridgelets and Curvelets on the Sphere", Astronomy and Astrophysics, vol. 446, (2006), pp.1191-1204.
[31] F. E. Ali, “Processing of Magnetic Resonance Images”, M. Sc. Thesis, Faculty of Electronic Engineering, Menofia University, (2009).
[32] F. E. Ali, I. M. El-Dokany, A. A. Saad and F. E. Abd El-Samie, “A Curvelet Transform Approach for The Fusion of MR and CT Images”, Journal of Modern Optics, vol. 57, no. 4, (2010), pp.273 – 286.
[33] J. L. Starck, E. Candes and D. L. Donoho, “The Curvelet Transform for Image Denoising”, IEEE Transactions on Image Processing, vol. 11, no. 6, (2002), pp. 670 -684.
[34] R. Sivakumar, “Denoising of Computer Tomography Images Using Curvelet Transform”, ARPN Journal of Engineering and Applied Sciences, vol. 2, no. 1, (2007).
[35] A. D. Ali, P. D. Swami and J. Singhai, “Modified Curvelet Thresholding Algorithm for Image Denoising”, Journal of Computer Science, vol. 6, no. 1, (2010), pp. 18-23.
[36] M. Unser, A. Aldroubi and M. Eden “B-Spline Signal Processing: Part I- Theory”, IEEE Transactions on Signal Processing, vol. 41, no.2, (1993), pp. 821-833.

[37] G. Ramponi, “Warped Distance for Space Variant Linear Image Interpolation”, IEEE Transactions on Image Processing, vol. 8, (1999), pp. 629- 639.
[38] P. Thevenaz, T. Blu and M. Unser, “Interpolation Revisited”, IEEE Transactions on Medical Imaging, vol. 19, no.7, (2000), pp. 739-758.

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البحث رقم (8)

Title

Laboratory experiments and modeling for industrial radiotracer applications

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Article history:

Received 4 September 2009
Received in revised form
18 January 2010
Accepted 29 January 2010

Keywords:

Radiotracer

RTD

Mixing time

Flow rate

abstract:

This paper presents three laboratory experiments, which have been carried out using the
Molybdenum-99 (Mo99) radiotracer to measure the residence time distribution (RTD), the mixing
time and the flow rate in a water flow rig. The results of the RTD measurement experiment are
preprocessed using the MATLAB software for background correction, radioactive decay correction,
starting point correction, filtering, and data extrapolation. After preprocessing, six mathematical
models are investigated on this data using the International Atomic Energy Agency (IAEA) RTD
software. The parameters of each model are optimized to calculate the value of the RTD, and to
determine the model, which gives the best match with the practical data. The selected model with the
best match is used to calculate the RTD in this experiment. The mixing time experiment is carried out
for different rotation speeds and repeated three times in each case. The results show that the mixing
time is inversely proportional to the rotation speed. The flow rate experiment is carried out to measure
the flow rate in the flow rig. The experimental results show a high reliability of the radiotracer used in
the RTD, mixing time and flow rate measurements.

References:

Behin, J., Aghajari, M., 2008. Influence of water level on oil–water separation by
RTD curves investigations. Sep. Purif. Technol. 64 (1), 48–55.

Bernea, Ph., Thereska, J., 2004. Simulation of a radiotracer experiment by flow and
detection-chain modelling: a first step towards better interpretation. Appl. Radiat. Isot. 60, 855–861.
Chong, T.H., Wong, F.S., Fane, A.G., 2007. Enhanced concentration polarization by unstirred fouling layers in reverse osmosis detection by sodium chloride tracer response technique. J. Membr. Sci. 287 (2), 198–210.
Din, G.U., Chughtai, I.R., Inayat, M.H., Khan, I.H., 2009. Study of axial mixing,
holdup and slip velocity of dispersed phase in a pulsed sieve plate extraction column using radiotracer technique. Int. J. Radiat. Appl. Instrum. 67 (7), 1248–1253.
IAEA, 2008. Residence time distribution method for industrial and environmental
applications, training course Series (31), IAEA, Vienna Austria.
Machado, H.C., Leclerc, J.P., Avilan, E., Landaeta, G., Anorga, N., Capote, O., 2005.
Flow modeling of a battery of industrial crude oil/gas separators using 113mIn
tracer experiments. Chem. Eng. Proc. 44, 760–765.
Moreira, R.M., Pinto, M.F., Mesnier, R., Lecler, J.P., 2007. Influence of inlet positions
on the flow behavior inside a photo reactor using radiotracers and colored tracer investigations. Appl. Radiat. Isot. 65 (4), 419–427.
Pant, H.J., 2000. Flow rate measurement in a draft tube crystallizer by means of a
neutrally buoyant sealed radioactive flow follower technique. Appl. Radiat. Isot. 53, 999–1004.
Pant, H.J., Thyan, J.R., Bhatt, B.C., 2001. Radioisotope tracer study in a sludge
hygienization research irradiator. Appl. Radiat. Isot. 54, 1–10.
Roelandt, J.R., 2000. Seeing the heart; the success story of cardiac imaging. Eur.
Heart J. 21 (16), 1281–1288.
Sharma, V.K., Pendharkar, A.S., Pant, H.J., Kulkarni, R., Verma, S.P., Singh, G., 2004. Radiotracer investigation in a pilot-scale visbreaker.
In: Fifteenth Annual Conference of Indian Nuclear Society (INSAC), Mumbai, India.
Shin, S., Kim, J., Jung, S., Jin, J., 2003. The RTD measurement on a submerged bioreactor
using a radioisotope tracer and the RTD analysis. Int. J. Control Auto. Syst. 1 (2), 201–215.

Sugiharto, Z.S., Wibisono, R.K., Abidin, Z., 2009. Radiotracer method for residence
time distribution study in multi-phase flow system. Int. J. Radiat. Appl. Instrum. 67 (7), 1445–1448.
Yelgaonkar, V.N., Jayakumar, T.K., Singh, S., Sharma, M.K., 2009. Combination of sealed source and radiotracer technique to understand malfunctioning in a chemical plant. Int. J. Radiat. Appl. Instrum. 67 (7), 1244–1247.
Yianatos, J.B., Larenas, J.M., Moys, M.H., Diaz, F.J., 2008. Short time mixing response
in a big flotation cell. Int. J. Miner. Process. 89, 1–8.
Zitny, R., Thyn, J., 1999. RTD Software for Identification of Spatially Localised
Models. IAEA, Vienna.

عنوان البحث:-

عربي : الكشف عن عيوب اللحام فى الصورة الإشعاعية بإستخدام نمط الكبسترال

انجليزي :

H. Kasban, **O. Zahran**, H. Arafa, M. El-Kordy, Sayed M. S. Elaraby and F. E. Abd El-Samie, "Welding Defect Detection from Radiographic Image with A Cepstral Approach", **Non-destructive Testing and Evaluation (NTD & E International), An International Journal-Elsevier**, No. 44, p-p 266:231, October **2011**.

صاحب فكرة البحث: جميع المشاركين بالبحث.

المشاركين في البحث :

(1) د / أسامه فوزى زهران.

(2) د/ هانى كسبان عبد الحى.

(3) أ.د/ حورية عرفة.

(4) أ.د/ محمد فهيم الكردى.

(5) أ.د/ سيد محمد العربى.

(6) د/ فتحى السيد عبد السميع.

طريقة البحث والطرق المستخدمة:

يقدم هذا البحث طريقة جديدة لإكتشاف عيوب اللحامات فى صور أشعة جاما باستخدام تحويل الكبسترم بهدف التعرف على أنماط العيوب عن طريق استخلاص صفات مميزة لكل منها تساعد فى الكشف الآلى عنها. حيث يتم تحويل الصور إلى إشارات أحادية البعد ثم يتم استخلاص معاملات الكبسترم ومعاملات كثيرة الحدود من هذه الإشارات، أو من إحدى تحويلاتها أو من كليهما. كما يتم تدريب الشبكات العصبية للتعرف على عيوب اللحام فى أى صور أخرى جديدة. وقد أظهرت النتائج تفوقاً واضحاً للطريقة المقترحة فى فى وجود أنواع مختلفة من العيوب والشوشرة.

البحث رقم (9)

Puplished In:

Int J Speech Technol (2010) 13: 231–242
DOI 10.1007/s10772-010-9081-1

Title

Encryption of speech signal with multiple secret keys in time and transform domains

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Article history:

Received: 16 July 2010 / Accepted: 26 October 2010 / Published online: 4 November 2010

Abstract :

This paper introduces a new speech cryptosystem, which is based on permutation and masking of speech segments using multiple secret keys in both time and transform domains. The main key is generated, randomly, using a Pseudo Noise (PN) sequence generator, and two other keys are generated from the main key to be used in the subsequent rounds of encryption. Either the Discrete Cosine Transform (DCT) or the Discrete Sine Transform (DST) can be used in the proposed cryptosystem to remove the residual intelligibility resulting from permutation and masking in the time domain. In the proposed cryptosystem, the permutation process is performed with circular shifts calculated from the key bits. The utilized mask is also generated from the secret key by circular shifts. The proposed cryptosystem has a low complexity, small delay, and high degree of security. Simulation results prove that the proposed cryptosystem is robust to the presence of noise.

Keywords :

Speech encryption Chaotic maps Advanced encryption standard (AES) DCT DST

References

Abd El-Samie, F. E. (2009). An efficient singular value decomposition algorithm for digital audio watermarking. International Journal of Speech Technology, 12(1), 27–45.

Advanced Encryption System (2001). Federal Information Processing Standards Publication 197.

Andrade, J. F., Campos, M. L., & Apolinario, J. A. (2008). Speech privacy for modern mobile communication systems. In IEEE international conference on acoustics, speech and signal processing.

Anoop (2007). Public key cryptography—applications algorithm and mathematical explanations.
Behnia, S., Akhshani, A., Mahmodi, H., & Akhavan, A. (2006). A novel algorithm for image encryption based on mixture of chaotic maps. Chaos, Solitons and Fractals.
Bradley, E. (1995). Autonomous exploration and control of chaotic systems. IEEE Transactions on Systems, Man, and Cybernetics, 26(5), 499–519.
Daemen, J., & Rijndael, V. R. (2001). The advanced encryption standard.
Dr. Dobb's Journal, 26(3), 137–139.
El-Fishawy, N., & Abu Zaid, O. M. (2007). Quality of encryption measurement of bitmap images with RC6, MRC6, and Rijndael block cipher algorithms. International Journal of Network Security, 5(3), 241–251.
Fridrich, J. (1998). Symmetric ciphers based on two-dimensional chaotic maps. International Journal of Bifurcation and Chaos, 8(6), 1259–1284.
Goldburg, B., Sridharan, S., & Dawson, E. (1993). Design and cryptanalysis
of transform based analog speech scramblers. IEEE Journal of Selected Areas on Communication, 11, 735–743.
Hassan, E. S., Zhu, X., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F. E. (2010). A chaotic interleaving scheme for the continuous phase modulation based single-carrier frequency-domain equalization system. Wireless Personal Communications.
doi:10.1007/s11277-010-0047-z.
Koduru, S. C., & Chandrasekaran, V. (2008). Integrated confusiondiffusion
mechanisms for chaos based image encryption. In IEEE 8th international conference on computer and information technology workshops.
Kuo, C. J. (1993). Novel image encryption technique and its application in progressive transmission. Journal of Electronic Imaging, 2(4), 345–351.
Mao, Y. B., Chen, G., & Lian, S. G. (2004). A novel fast image encryption
scheme based on the 3D chaotic Baker map. International Journal of Bifurcation and Chaos in Applied Sciences and Engineering, 14(10), 3613–3624.
National Bureau of Standards (1977). Data encryption standard. Federal

Information Processing Standards Publication no. 46, U.S. Government Printing Office, Washington.
Shannon, C. E. (1949). Communication theory of secrecy system. The Bell System Technical Journal, 28, 656–715.
Thongpon, T., & Sinchai, K. (2009). Accelerating asymmetric-key cryptography using parallel-key cryptographic algorithm (PCA). In 6th international conference on computer and information technology (Vol. 2, pp. 812–815

عنوان البحث:-

عربي : **تشفير إشارة الكلام باستخدام المفاتيح السرية المتعددة في النطاق الزمنى ونطاقات التحويل**

انجليزي :

E. Mosa, N. W. Messiha, **O. Zahran** and F. E. Abd El-Samie, "Encryption of Speech Signal with Multiple Secret Keys in Time and Transform Domains", **International Journal of Speech Technology, Springer,** Vol. 13, No. 4, p-p. 231:242, **2010.**

صاحب فكرة البحث: جميع المشاركين بالبحث.

المشاركين في البحث :

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(2) م/ عماد موسى عبد الحليم.

(3) أ.د/ ناجى وديع مسيحه.

(4) د/ فتحى السيد عبد السميع.

طريقة البحث والطرق المستخدمة:

يقدم هذا البحث طريقة جديدة لتشفير الإشارات الصوتية باستخدام مفاتيح تأمين متعددة يتم توليدها عشوائياً فى كل من النطاق الزمنى ونطاقات التحويل. وقد تمت المقارنة بين النطاق الزمنى ونطاقات التحويل للغرض المذكور.وقد أظهرت النتائج الجودة العالية للتشفير فى نطاقات التحويل

ودرجة الثبات العالية لنظام التشفير المقترح لاسيما فى وجود الشوشرة بالإضافة إلى بساطته من حيث التعقيد وصغر الزمن المطلوب للتشفير.

البحث رقم (10)

Puplished In:

Progress In Electromagnetics Research C, Vol. 6, 79–92, 2009

Title

EFFICIENT DETECTION OF LANDMINES FROM ACOUSTIC IMAGES

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Abstract:

—The Laser Doppler Vibrometer (LDV)-based Acoustic to Seismic (A/S) landmine detection system is one of the reliable and powerful landmine detection systems. The interpretation of the LDVbased
A/S data is performed off-line, manually, depending heavily on the skills, experience, alertness and consistency of a trained operator. This takes a long time. The manually obtained results suffer from errors, particularly when dealing with large volumes of data. This paper proposes some techniques for the automatic detection of objects from the acoustic images which are obtained from the LDV-based A/S landmine detection system. These techniques are based on color image transformations, morphological image processing and the

wavelet transform. The proposed techniques are compared considering
the probability of detection, the false alarm rate, the accuracy and the processing speed.

REFERENCES:

1. "International campaign to ban landmines," Landmine Monitor Report, Egypt section, 2007.
2. Kasban, H., O. Zahran, S. M. S. Elaraby, M. El-Kordy, and F. E. Abd El-Samie, "Automatic object detection from acoustic to seismic landmines images," IEEE International Conference on Computer Engineering & Systems, Cairo, Egypt, November 2008.
3. Bellman, F., A. Bulletti, and L. Capineri, "Technology survey nonlinear
acoustic landmine detection study," EUDEM 2 Technology Survey Report, Lausanne, Switzerland, November 2004.
4. Xiang, N. and J. M. Sabatier, "Landmine detection measurements using acoustic-to-seismic coupling," Proceedings of SPIE, Vol. 4038, 645–655, Orlando, USA, 2000.
5. Bradley, M. and J. M. Sabatier, "Fusion of acoustic/seismic and ground penetrating radar sensors for antitank mine detection," Proc. SPIE, Vol. 4394, 979–990, 2002.
92 Kasban et al.
6. Bednarz, T. P., C. Lei, and J. C. Patterson, "Particle image thermometry for natural convection flows," 16th Australasian Fluid Mechanics Conference Crown Plaza, Gold Coast, Australia, December 2007.
7. Rasras, R. J., I. M. M. El Emary, and D. E. Skopin, "Developing a new color model for image analysis and processing," COMSIS, Vol. 4, No. 1, 43–56, June 2007.
8. Kasban, H., O. Zahran, S. M. S. Elaraby, M. El-Kordy, and F. E. Abd El-Samie, "Automatic object detection from acoustic to seismic landmines images," IEEE International Conference on Computer Engineering & Systems, Cairo, Egypt, November 2008.
9. Kasban, H., "Detection of buried objects using acoustic waves," M.Sc. thesis, Department of Electronics and Electrical Communications Engineering, Faculty of Electronic Engineering, Menoufia University, 2008.
10. Paik, J., C. P. Lee, and M. A. Abidi, "Image processing based mine detection techniques: A review," Subsurface Sensing Technologies

and Applications: An International Journal, Vol. 3, No. 3, 153–202, July 2002. http://imaging.utk.edu/publications/papers/20-02/paik ssta02.pdf
11. Ederra, G. B., "Mathematical morphology techniques applied to anti-personnel mine detection," M.Sc. thesis, Vrije Universiteit Brussel (VUB), Faculteit Toegepaste Wetenschappen, ETRO Department, 1999. http://gershwin.ens.fr/great/master Basterra-1999.pdf
12. Banerji, A. and J. Goutsias, "A morphological approach to automatic mine detection problems," Aerospace and Electronic Systems, IEEE Transactions, Vol. 34, No. 4, 1085–1096, 1998.
13. Kaiser, G., A Friendly Guide to Wavelets, Birkhauser, Boston, 1994.
14. Kasban, H., O. Zahran, S. M. S. Elaraby, M. El-Kordy, and F.E.Abd El-Samie, "Data interpretation of acoustic to seismic based LDV landmine detection system using morphology and wavelet," Proceeding of the International Workshop on Acoustics and Vibration in Egypt, Cairo, Egypt, Oct. 2008.

عنوان البحث:-

عربي :الكشف بكفاءة عن الألغام الأرضية فى صور الموجات الصوتية

انجليزي :

H. Kasban, **O. Zahran**, Sayed M. S. Elaraby, S. EL-Rabaie, M. El-Kordy and F. E. Abd El-Samie, "*Efficient Detection of Landmines from Acoustic Images*", **Progress in Electromagnetic Research C (PIER C),** Vol. 6, p-p. 79:92, **2009**.

صاحب فكرة البحث:

جميع المشاركين بالبحث.

المشاركين في البحث :

(1) د / أسامه فوزى زهران.

(2) د/ هانى كسبان عبد الحى.

(3) أ.د/ سيد محمد العربى.

(4) أ.د/ سيد الربيعى.

(5) أ.د/ محمد فهيم الكردى.

(6) د/ فتحى السيد عبد السميع.

طريقة البحث والطرق المستخدمة:

يقدم هذا البحث مجموعة من التقنيات ذات الكفاءة العالية لكشف الألغام أوتوماتيكياً فى صور الموجات الصوتية. وقد تم إستخدام تقنيات التقسيم والتحويلات المورفولوجية فى هذه الطرق. كما تم أيضاً إستخدام التحويل المويجى مع التحويلات المورفولوجية لهذا الغرض. وقد تمت مقارنة التقنيات المقترحة من حيث احتمالية الكشف ومعدل الإنذار الكاذب والدقة وسرعة المعالجة. وقد أظهرت النتائج تفوقاً كبيراً للتحويل المويجى مع التحويلات المورفولوجية فى كشف الألغام حيث أن هذه التحويلات تعمل على تقليل المساهمة التى يتم البحث فيها عن اللغم بطريقة أكثر كفاءة.