

De-noising of electrogastrogram signals by wavelet shrinkage

Zhi-Shun Wang, Wen-Hua Li, Zhen-Ya He, Jiande-Z Chen, Jie Liang

Zhi-Shun Wang, Wen-Hua Li, Zhen-Ya He, Jiande Z Chen, Jie Liang, Department of Radio Engineering, Southeast University, Nanjing 210096, Jiangsu Province, China

Jiande Z Chen, Jie Liang, Institute for Healthcare Research, Baptist Medical Center, Oklahoma, OK 73112, United States

Author contributions: All authors contributed equally to the work.

Original title: *China National Journal of New Gastroenterology* (1995-1997) renamed *World Journal of Gastroenterology* (1998-).

Received: August 15, 1995

Revised: April 28, 1996

Accepted: August 17, 1996

Published online: September 15, 1996

Abstract

AIM: This abstract introduces our study work on De-noising of

electrogastrogram signals by wavelet shrinkage, which aims at removing noise from the noisy Electrogastrogram (EGG) signals.

METHODS: The noisy EGG signals are transformed into the wavelet domain using an orthogonal periodic wavelet transform based on Nearly Symmetric wavelets with 8 vanishing moments (S8). The wavelet coefficients are subjected to soft thresholding, $\theta - t(\omega) = \text{sgn}(\omega)(|\omega| - t) - +$, with threshold $t - tn = (2\log(n)\sigma)^{-1/2}$. The results is then inverse transformed. If we let $W - S8$ denote the wavelet transform with Symmlet 8 wavelets, the whole de noising process amounts to a nonlinear operator $T\theta, S8(Y)$, where $T\theta, S8 = W1 - S8\theta - tn\theta W - S8$.

RESULTS: The computer simulation are performed for four typical sets of noisy EGG data (Table 1), which represents Normal, Tachygastria, Bradygastria and Arrhythmia (Figure 1), stored in files, GE33A, MOT13C, LINA and GE70A, respectively, Noisy signals and de-noised signals are illustrated in Figure 2. It is shown that the proposed method used de noising EGG signals is efficient.

Table 1 The computer simulation are performed for four typical sets of noisy Electrogastrogram data

	GE33A	MOT13C	LINA	GE70A
RMSE	9.9170	11.9289	11.2523	10.6053

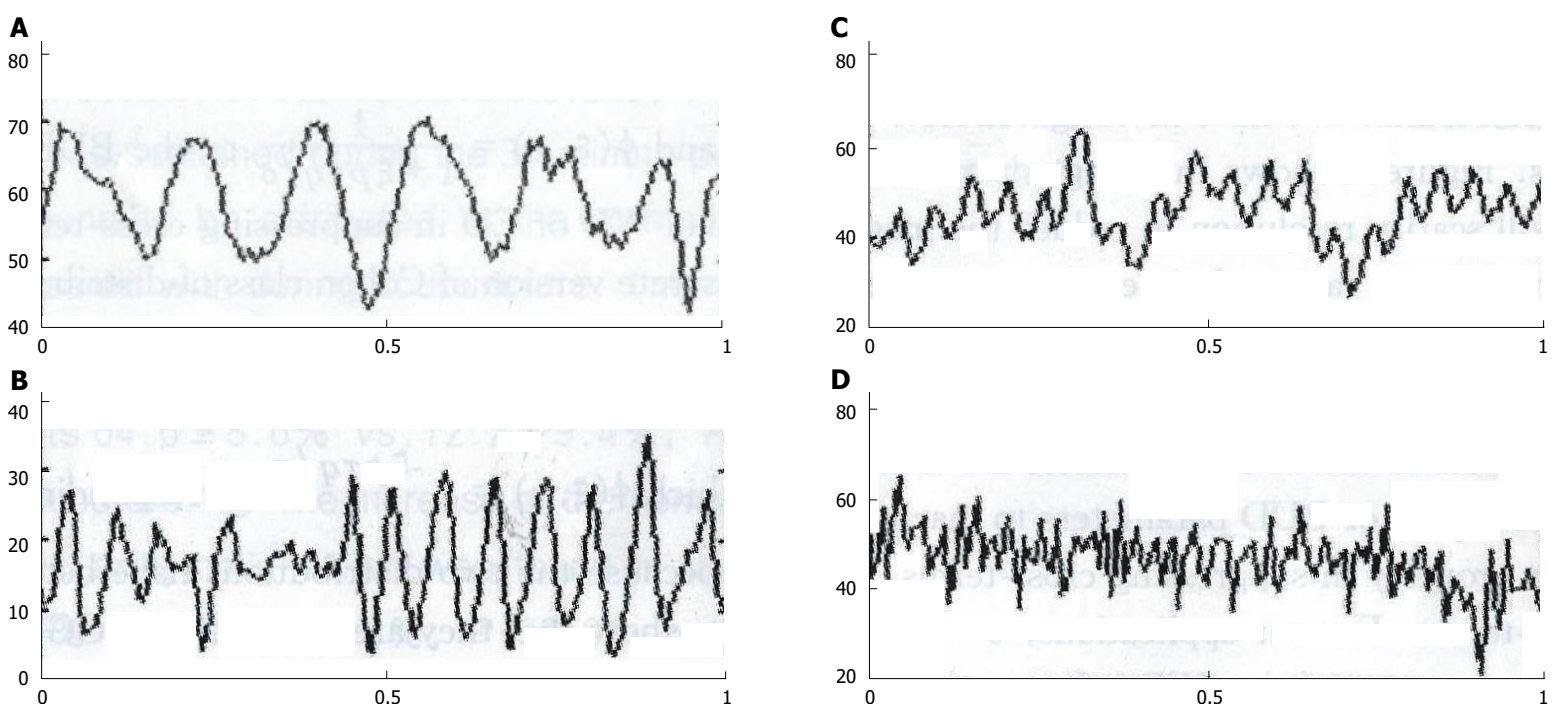


Figure 1 A: Noisy GE33A (Normal); B: Noisy MOT13C (Tachygastria); C: Noisy LINA (Bradygastria); D: Noisy GE70A (Arrhythmia).

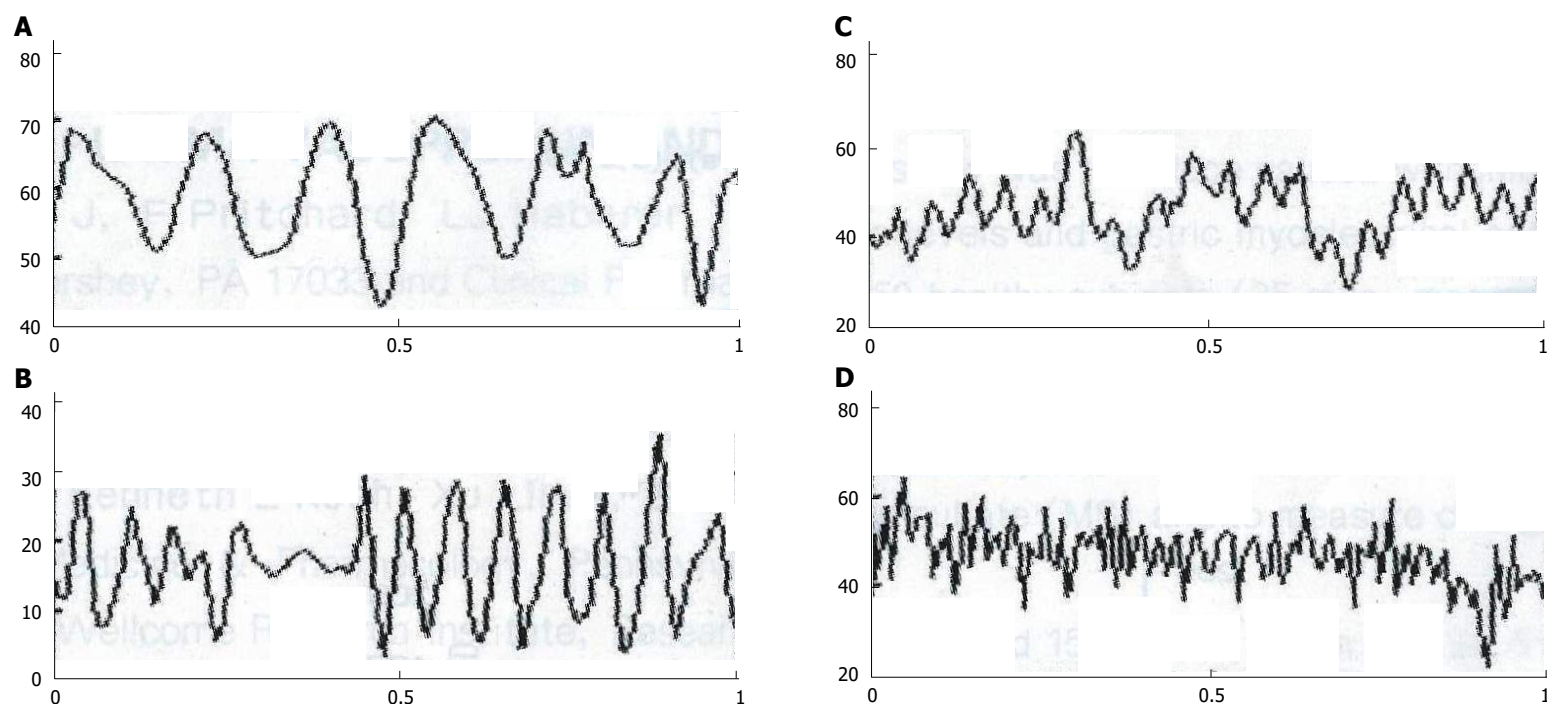


Figure 2 A: Denoised GE33A; B: Denoised MOT13C; C: Denoised LINA; D: Denoised GE70A.

© The Author(s) 1996. Published by Baishideng Publishing Group Inc. All rights reserved.

Wang ZS, Li WH, He ZY, Jiande Z. Chen, Liang J. De-noising of

electrogastrogram signals by wavelet shrinkage. *World J Gastroenterol* 1996; 2(Suppl1): 123-124 Available from: URL: <http://www.wjgnet.com/1007-9327/full/v2/iSuppl1/123.htm> DOI: <http://dx.doi.org/10.3748/wjg.v2.iSuppl1.123>

E- Editor: Liu WX



Published by **Baishideng Publishing Group Inc**
8226 Regency Drive, Pleasanton, CA 94588, USA
Telephone: +1-925-223-8242
Fax: +1-925-223-8243
E-mail: bpgoffice@wjgnet.com
Help Desk: <http://www.wjgnet.com/esps/helpdesk.aspx>
<http://www.wjgnet.com>

