Referee’s report on the paper

A Hidden Markov Model Block-Thresholding Technique

This paper considers the problem of wavelet thresholding for non-Gaussian errors. For this purpose,

the authors propose a block-thresholding approach based on a hidden Markov modeling in the

wavelet coefficient domain. For evaluation of the empirical performance of the proposed method,

numerical experiments including a simulation study and real data analysis are conducted. In

addition, an extension of two-dimensional thresholding has been studied.

It deals with an important issue and is carefully organized with some merit. However, there is

some concerns regarding the contribution in terms of significance and/or novelty, which should be

carefully addressed before publication.

Major comment

• The proposed method can be regarded as a mixed approach of a hidden Markov model

(HMM) of Rabinar and Juang (1986) and cross-validated wavelet block thresholding based

on Nason (1996) and Cai (1999). In the literature, McGinnity et al. (2017) proposed a

level-dependent wavelet block thresholding for non-Gaussian errors, and several papers dealt

with the non-Gaussianity problem with wavelet thresholding based on wavelet-domain hidden

Markov model, for example, Romberg et al. (2001) and Fan and Xia (2001). Due to the

structure of HMM, it is natural to handle a mixture distribution, but there are some extra

steps for HMM. Therefore, the proposed method is well performed through simulation studies

compared to other methods, but it is not clear whether this method will actually be used

better than others. Moreover, it does not provide any theoretical justification under non-

Gaussian situations. In conclusion, I am not sure that the current paper conveys something

new for wavelet thresholding.

- Romberg et al. (2001). Bayesian Tree-Structured Image Modeling Using Wavelet-Domain

Hidden Markov Models, IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 10, NO.

7, 1056–1068.

- Fan and Xia (2001). Improved Hidden Markov Models in the Wavelet-Domain, IEEE

TRANSACTIONS ON IMAGE PROCESSING, VOL. 10, NO. 1, 115–120.

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• I am not sure that the current paper explains the proposed method properly. Steps 4 and

5 should be revised for a better explanation of the proposed method. It is not easy to

understand how to incorporate HMM and wavelet coefficients. Furthermore, since Nason’s

E-O CV is performed at each level, a correction of thresholding value λj is necessary, but it

does not describe at all.

• In the literature, there are plenty of papers to study wavelet thresholding for non-Gaussian er-

rors. For example, Neumann and von Sachs (1995), Averkamp and Houdre (2003), Averkamp

and Houdre (2005). I think a more extensive literature review is necessary.

- Neumann and von Sachs (1995). Wavelet thresholding: beyond the Gaussian iid situation,

Wavelets and Statistics, 301–329, Springer, New York, NY .

- R. Averkamp. and C. Houdr ́e (2003). Wavelet thresholding for non-necessarily Gaussian

noise: idealism, Ann. Statist. 31 (1) 110 - 151.

- R. Averkamp. and C. Houdr ́e (2005). Wavelet thresholding for nonnecessarily Gaussian

noise: Functionality, Ann. Statist. 33 (5) 2164 - 2193.

• The excellence of the method proposed in this paper is demonstrated through numerical

experiments. However, the simulation setting is rather limited. So, various SNRS and noise

scenarios and several test functions in McGinnity et al. (2017) should be required.

• I doubt that the two-dimensional expansion shows a significant contribution. It is all about

showing the excellence of the proposed method as a simulation study based on two image data.

Even this considered only the errors following the normal distribution. In order to maintain

this part, I think an extensive simulation considering various test images is necessary.

Minor comment

• The resolution of some figures should be improved, for example, Figures 1, 3, 4, 5, 9, and 11.

• Page 5, line 29: import → important

• Page 7, line 39: the even-odd cross-validation method of Nason (1996)

• Page 8, line 25: λˆ