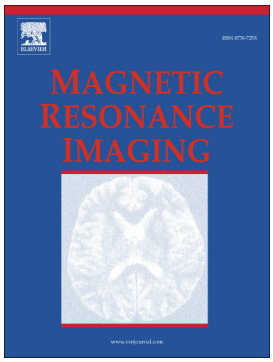
Accepted Manuscript




# Robust Estimation of the Apparent Diffusion Coefficient Invariant to Acquisition Noise and Physiological Motion

Santiago Sanz-Estébanez, Tomasz Pieciak, Carlos Alberola-López, Santiago Aja-Fernández

PII: S0730-725X(18)30068-7
DOI: doi:10.1016/j.mri.2018.07.005
Reference: MRI 9000

To appear in: *Magnetic Resonance Imaging*

Received date: 22 April 2018
Revised date: 7 July 2018
Accepted date: 14 July 2018

Please cite this article as: Santiago Sanz-Estébanez, Tomasz Pieciak, Carlos Alberola-López, Santiago Aja-Fernández , Robust Estimation of the Apparent Diffusion Coefficient Invariant to Acquisition Noise and Physiological Motion. Mri (2018), doi:10.1016/j.mri.2018.07.005

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

# Robust Estimation of the Apparent Diffusion Coefficient Invariant to Acquisition Noise and Physiological Motion

Santiago Sanz-Estébanez[a,*], Tomasz Pieciak[a,b], Carlos Alberola-López[a], Santiago Aja-Fernández[a]

[a] *Laboratorio de Procesado de Imagen, Department of Teoría de la Señal y Comunicaciones e Ingeniería Telemática, ETSIT, Universidad de Valladolid, Campus Miguel Delibes s.n., 47011, Valladolid, Spain.*
[b] *AGH University of Science and Technology, al. Mickiewicza, 30-059, Kraków, Poland*

**Abstract**

*Purpose:* In this work we have proposed a methodology for the estimation of the apparent diffusion coefficient in the body from multiple breath hold diffusion weighted images, which is robust to two preeminent confounding factors: noise and motion during acquisition.

*Methods:* We have extended a method for the joint groupwise multimodal registration and apparent diffusion coefficient estimation, previously proposed by the authors, in order to correct the bias that arises from the non-Gaussianity of the data and the registration procedure.

*Results:* Results show that the proposed methodology provides a statistically significant improvement both in robustness for displacement fields calculation and in terms of accuracy for the apparent diffusion coefficient estimation as compared with traditional sequential approaches. Reproducibility has also been measured on real data in terms of the distribution of apparent diffusion coefficient differences obtained from different *b-values* subsets.

*Conclusions:* Our proposal has shown to be able to effectively correct the estimation bias by introducing additional computationally light procedures to the original method, thus providing robust apparent diffusion coefficient maps in the liver and allowing an accurate and reproducible analysis of the tissue.

*Keywords:* Diffusion Weighted Imaging, Acquisition Noise, Patient Movement Correction, Multimodal Groupwise Registration, Apparent Diffusion Coefficient

*Corresponding author
*Email address:* ssanest@lpi.tel.uva.es (Santiago Sanz-Estébanez)
*URL:* www.lpi.tel.uva.es/ssanest (Santiago Sanz-Estébanez)

Download English Version:

https://daneshyari.com/en/article/8159716

Download Persian Version:

https://daneshyari.com/article/8159716

Daneshyari.com