

Robust Image Processing for Quantitative Ophthalmology

Abstract. We propose practical solutions to longstanding problems in acquiring and analyzing ophthalmic images in a clinical setting. These include introduction of a sparse representation based technique to significantly enhance the image quality and acquisition speed of ophthalmic imaging systems, while compressing the size of captured data. On another front, we introduce graph-theory and deep-learning based image analysis tools to quantitatively measure novel biomarkers of the onset and progression of ophthalmic and neurological diseases such as age-related macular degeneration, diabetic retinopathy, retinopathy of prematurity, ALS, and Alzheimer's Disease.

Biography. Sina Farsiu received his PhD in electrical engineering from the University of California, Santa Cruz (UCSC), in 2005. He was a Postdoctoral Scholar at UCSC from 2006 to 2007 and a postdoctoral research associate in the Department of Ophthalmology, Duke University, Durham, NC, from 2007 to 2009. He is currently a tenured Associate Professor in the Departments of Biomedical Engineering and Ophthalmology, with secondary appointments in the Departments of Electrical and Computer Engineering, and Computer Science at Duke University. His technical interests are in the broad areas of medical imaging and image processing, including automatic detection, quantification, and segmentation of ophthalmic disease imaging biomarkers; development of efficient signal processing based methods to overcome the theoretical and practical limitations constraining the achievable resolution of biomedical and consumer electronics imaging devices, and adaptive optics imaging. Dr. Farsiu is a Senior Area Editor for the IEEE Transactions on Image Processing, an Associate Editor of Biomedical Optics Express, and a recipient of the Association for Research in Vision and Ophthalmology (ARVO) Foundation/Pfizer Ophthalmics Carl Camras Translational Research Award.



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