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Karamatou A Yacoubou Djima*, kyacoub1@swarthmore.edu, **Wojciech Czaja**,
wojtek@math.umd.edu, and **Lucia D Simonelli**, lsimonel@umd.edu. *Analysis of Retinal Images
Via Dimension Reduction on Graphs.*

First, we present a novel method for automated anomaly detection in auto-fluorescent retinal images provided by the National Institute of Health (NIH). This work is motivated by the need for new tools to improve the capability of diagnosing macular degeneration in its early stages, track the progression over time, and test the effectiveness of new treatment methods. The method that we propose is a combination of a nonlinear dimensionality reduction on graphs, Laplacian Eigenmaps, along with a new classification method, Vectorized Matched Filtering. Comparison to other schemes shows that this novel method yields the highest rate of accurate anomaly detection. Next, we describe a set of Harmonic Analysis tools, which comprises Laplacian Eigenmaps, so-called kernel-based techniques on graphs. Finally and as an example, we introduce a new system in this family. (Received September 22, 2015)