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FIELD	RESPONSE
Manuscript Type	Regular Paper
Title	A Scalable M-Channel Critically Sampled Filter Bank for Graph Signals
Abstract	We investigate a scalable M-channel critically sampled filter bank for graph signals, where each of the M filters is supported on a different subband of the graph Laplacian spectrum. For analysis, the graph signal is filtered on each subband and down More...

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FIELD	RESPONSE
File 1	MCSFB.pdf

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FIELD	RESPONSE
EDICS	• **66. NEG-SPGR Signal processing over graphs (filtering, transforms, etc)** < NEG SIGNAL PROCESSING FOR NETWORKS AND GRAPHS • **65. NEG-SAMP Sampling over graphs** < NEG SIGNAL PROCESSING FOR NETWORKS AND GRAPHS

✔ Step 4: Authors & Institutions Edit

FIELD	RESPONSE
Author 1	**Li, Shuni** sli@macalester.edu Macalester College St. Paul, MN, USA
Author 2	**Jin, Yan** yjin@mit.edu Massachusetts Institute of Technology, Institute for Data, Systems, and Society Cambridge, MA, USA
Author 3	**Shuman, David I** dshuman1@macalester.edu 0000-0002-1989-3190 ✔ Macalester College St. Paul, MN, 55105, USA

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FIELD	RESPONSE
Cover Letter	
Funding	**Howard Hughes Medical Institute** Precollege and Undergraduate Science Education Pro

* Does your paper contain seven (7) or more authors?

Yes

✔ No

* If yes, please provide a brief description of each author's contributions in the text field below. If no, please enter "n/a" into the text field below.

n/a

* What is the contribution of this paper to the Signal Processing Community (a couple of sentences)?	We propose three different classes of critically-sampled filter banks for signals on graphs. The main novelties include (i) a method to partition the graph into uniqueness sets for different filter bands; (ii) a method to leverage an estimation of the spectral density to design the filter bank to be more amenable to polynomial approximation; (iii) efficient sampling and reconstruction methods for graph signals that are not bandlimited; and (iv) adapting the non-uniform random sampling distribution and number of samples for each band to the signal.
* Why is the contribution significant (What impact will it have)?	Unlike most of the existing transforms, the proposed filter bank is computationally efficient, and can be implemented on graphs with millions of vertices. Therefore, it can be used in high-dimensional machine learning and signal processing problems such as semi-supervised learning, compression, and denoising.
* What are the three papers in the published literature most	1. Y. Jin and D. I Shuman, “An M-channel critically sampled filter bank for graph signals,” in Proc. IEEE Int. Conf. Acc., Speech, and Signal Process., Mar. 2017, pp. 3909–3913. 2. S. Chen, R. Varma, A. Sandryhaila, and J. Kovačević´, “Discrete signal processing on graphs: Sampling theory,” IEEE Trans. Signal Process., vol. 63, no. 24, pp. 6510–6523, Dec. 2015.

closely related to this paper?

3. G. Puy, N.Tremblay, R. Gribonval, and P. Vandergheynst, “Random sampling of bandlimited signals on graphs,” Appl. Comput. Harmon. Anal., vol. 44, no. 2, pp. 446–475, Mar. 2018.

Jin and Shuman is an ICASSP paper that contains a preliminary version of this work that only applies to small graphs. The second, third, and fourth novelties mentioned above are among the new contributions to this extended version of the work.

* What is distinctive/new about the current paper relative to these previously published works?

In the context of sampling and interpolation for graph signals, Chen et al. briefly mention a similar filte bank for small graphs, without undertaking a detailed investigation. We go into significantly more deta (e.g., filter design, allocation of samples, numerical approximations for scalability) for three different transforms (the exact transform, the fast transform for large, sparse graphs, and the fast, signal-adapted transform).

Puy et al. consider random sampling for lowpass signals. The generalization of this idea to other type of signals (bandpass, highpass) is one component of our proposed filter bank.

* Have you published any other related papers (including conferences) which are not among the references given in the paper?

No

* **Does your manuscript contain supplementary materials such as multimedia, extended objects, or any other item intended for publication but not included in the main body of the paper? Supplementary materials must go through review and may not be added after acceptance.**

Yes

✔ No

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