

# VCU Discrete Mathematics Seminar

## *Approximating L1-Norm Best-Fit Lines*

**Paul Brooks**  
**VCU**

Wednesday, Oct. 30

1:00-1:50

4145 Harris Hall



Fitting lines to data can be the foundation for many data analysis tasks including regression, ranking, recommendation, background subtraction in video analysis, text mining, and principal component analysis. Measuring error using the L1-norm rather than the traditional squared L2-norm error criterion can provide an insensitivity to outlier observations. However, the L1-norm version of the optimization problem is NP-hard.

We provide sufficient conditions for a deterministic algorithm for finding a best-fit line. In doing so, we derive fundamental properties of the L1-norm projection on a line and establish an equivalence between the algorithm and independently-derived algorithms based on linear programming. The proposed algorithm is based on finding a series of sortings. The equivalence implies that it is a 2-factor approximation algorithm which is the best-known factor among deterministic algorithms. Among known 2-factor approximation algorithms, the proposed algorithm has the smallest worst-case computational requirements. This is joint work with José Dulá.

For the DM seminar schedule, see:

<http://www.people.vcu.edu/~dcranston/DM-seminar/>