A Streaming Tensor Decomposition Analysis of of a Multi–Ceilometer Based Lidar Aerosol Network.

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ABSTRACT

Aerosols are collections of suspended solid or liquid particles in the gaseous atmosphere, such as dust, sulfates and nitrate molecules, black and organic carbon, sea salt ocean droplets that can absorb and scatter solar radiation, act as nuclei in forming liquid

BACKGROUND WORK

Evaluated implementation of SPLATT (Surprisingly ParalleL spArse Tensor Toolkit) on a set of 10 tensors from the FROSTT (The Formidable Repository of Open Sparse Tensors and Tools) collection, a set of tensors taken from scientific and data analytic

DATASET

- Three ceilometer stations (Bristol,Crownpoint, Blacksburg) based aerosol backscatter profiles for 1 month

- Data: continue monitoring/streaming/archiving 3 ceilometers' data

Site name	Total size of the dataset
Crownpoint	3.42 GB
Blacksburg	3.04 GB
Bristol	1.21 GB

- Bristol aerosol backscatter profile
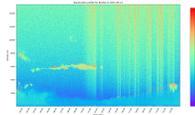
- Crownpoint aerosol backscatter profile
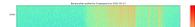
METHODS

- Tensor parser package is used to convert three ceilometer sites .csv file data in to sparse tensor to get .tns and .map files

RESULTS

3 ceilometer network to 31 days, 24 hours and 3 stations :---

Rank 3 decomposition for night time with Lambda values

3.487796e+04

8.348548e+03

8.666932e+03
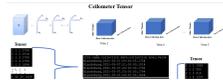
CONCLUSION

- We have conducted and tested a scalable, secure, streaming prototype network for in-line processing and analysis of ground and space LIDAR aerosol backscatter profile concentrations.

- We performed a streaming application of planetary boundary layer heights from a distributed system of ceilometers along the East coast from PA, MD to VA and applied the CP tensor decomposition algorithm of S

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