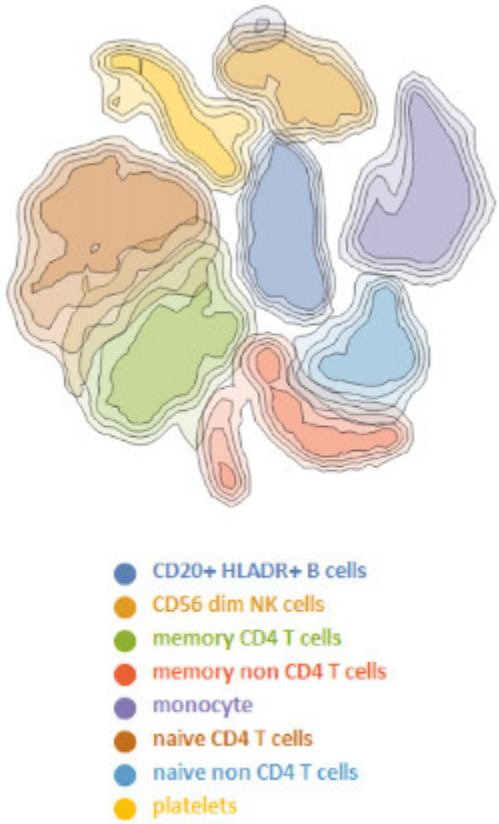
Docket #: S12-069

Compressed Sensing for dimensionality expansion in flow cytometry

Compressed sensing has revolutionized signal acquisition by enabling high dimensional signals to be measured with remarkable fidelity using a small number of so-called incoherent sensors. Stanford researchers have demonstrated that proteins measured in a flow experiment can be analyzed in an analogous manner, yielding a dramatic increase in the effective dimensionality of flow cytometric data. The flow experiments are modified whereby each channel measures a mixture of multiple proteins. The number of proteins outnumbers the number of channels with each protein measured on several channels. In this configuration, each channel serves as an incoherent sensor of the proteins measured in that channel. The compressed sensing framework is implemented to reconstruct the measurements and report the original quality of each protein. Using flow datasets in which the setup is imposed in silico, the researchers demonstrate that this approach yields substantial dimensionality improvements while maintaining high accuracy of deconvolved protein measurements.



Looking at 4 channels, one of which compressed 8 markers. Researchers are seeing almost perfect accuracy.

Applications

- Flow cytometry
- Mass cytometry

Advantages

- May dramatically increase the number of available parameters
- Runs on existing instruments, needs no new instrumentation
- Uses a kit and simple deconvolution software to achieve dimensionality expansion
- Performs noise filtering, can achieve higher accuracy results than standard methods

Patents

- Published Application: 20140106976
- Published Application: 20180150596

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