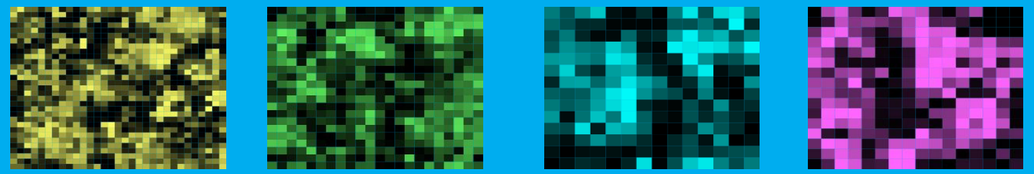
The Characteristic Direction: A Geometrical Approach to Differential Expression – Part Four



Network Analysis in Systems Biology

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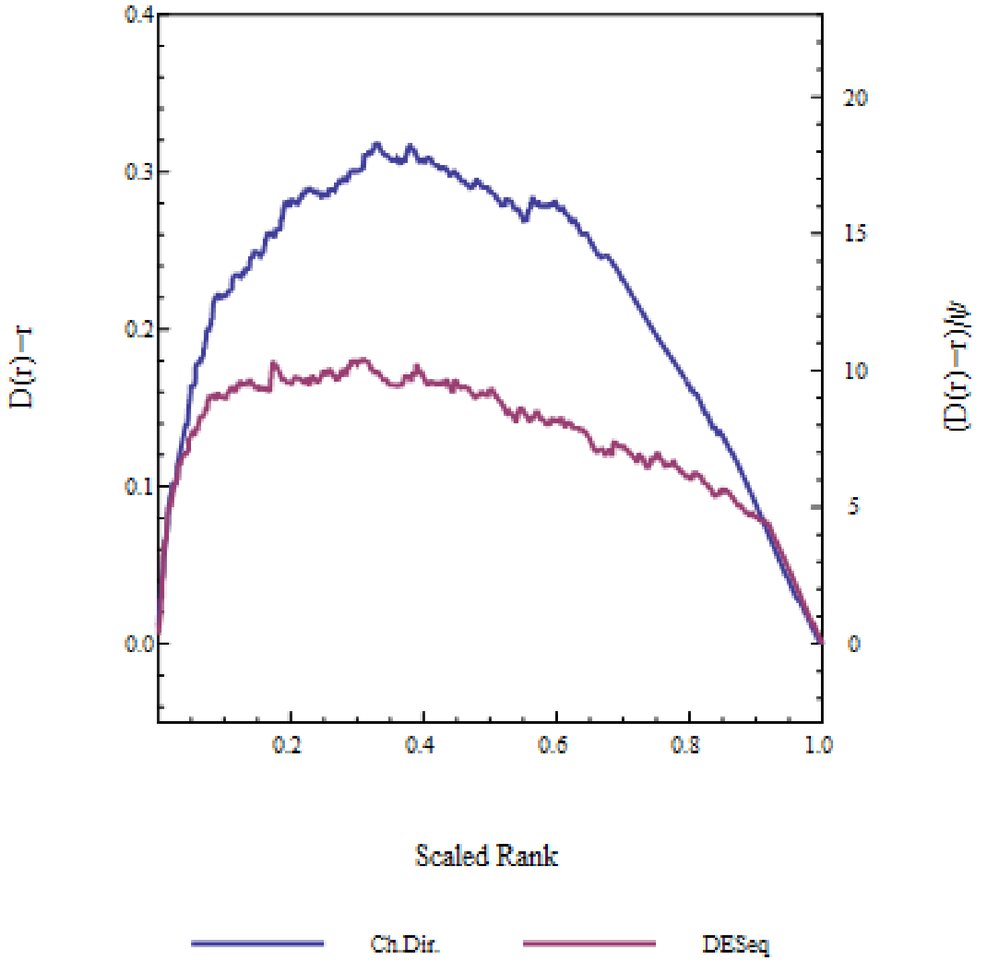
Performance on High-Throughput Sequencing Data

- Study the relationship between differential binding of STAT3 to differential gene expression in large B-cell lymphoma
  - Hardee, Jennifer, et al. "STAT3 Targets Suggest Mechanisms of Aggressive Tumorigenesis in Diffuse Large B-Cell Lymphoma." *G3: Genes| Genomes| Genetics* 3.12 (2013): 2173-2185.
- Compare the performance of the characteristic direction approach in the setting of high-throughput sequencing technologies
  - Compare to DESeq

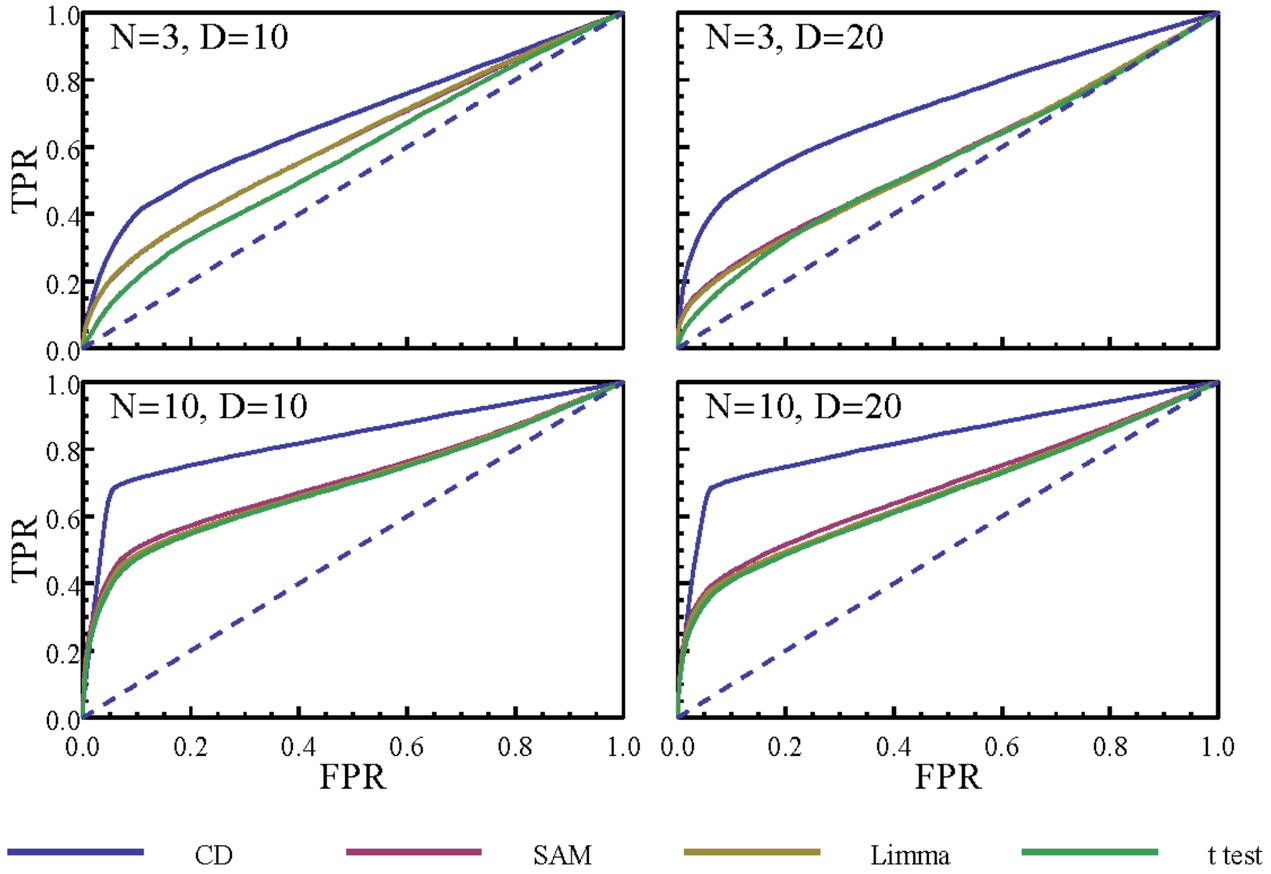
Performance on High-Throughput Sequencing Data

- Examine differential binding an expression between two subtypes of Large B-cell Lymphoma:
  - germinal center B-cell-like
  - activated B-cell-like

- To what degree are genes which are differentially bound by STAT3 also differentially expressed?



Performance on Synthetic Data



Summary

- We have proposed a new approach to differential expression
- Our approach successfully:
  - Addressed the curse of dimensionality
  - Takes into account the fact that genes work together rather than in isolation
- Our approach outperforms the current most popular methods
- We have very promising natural extensions of our method in the making.