Lecture 22: Element-wise Sampling and Matrix Completion

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Warning: these notes are still very rough. They provide more details on what we discussed in class, but there may still be some errors, incomplete/imprecise statements, etc. in them.

22 Element-wise Sampling and Matrix Completion

Today and in the next class we will discuss element-wise sampling and matrix completion. Here is the reading for today.

- Recht, "A Simpler Approach to Matrix Completion"

- Chen, Bhojanapalli, Sanghavi, and Ward, "Coherent Matrix Completion"

The basic connection here is that the element-wise sampling algorithm we discussed in the last class gives additive-error algorithms (just as did row/column sampling when the sampling was with respect row norms and not leverage scores) but to get relative-error algorithms is much harder, e.g., one needs the matrices to be exactly low rank, one needs very strong incoherence assumptions, one needs to use tools from convex optimization, etc. (Note that a relative-error algorithms gives the exact answer if the matrix is exactly low-rank.) I'm not going to tex up these notes in detail.