SINGULAR VECTOR DISTRIBUTION FOR
MATRIX DENOSING

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In this talk, we will introduce some recent results about the limiting behavior of the singular vectors of the high-dimensional matrix denosing model $Y = S + X$. Here $S$ is a low rank deterministic matrix and $X$ is a random noise matrix, and both are $M \times n$ rectangle. In the scenario that $M$ and $n$ are comparably large and the signals are supercritical, we study the fluctuation of the outlier singular vectors of $Y$. More specifically, we derive the limiting distribution of angles between the principal singular vectors of $Y$ and their deterministic counterparts, i.e., the singular vectors of $S$. We will show that the limiting distribution is non-universal, and it depends on the structure of $S$ and the distribution of $X$. Further, we also derive the distribution for the sum of principal angles between two subspaces, spanned by the principal singular vectors of $Y$, and those of $S$, respectively.