The Average Number of Critical Rank-One Approximations to a Tensor

In this talk we present a study of the expected number of real critical points of the Euclidean distance function, on an algebraic variety $X$. This number, denoted by $\text{aEDdegree}(X)$ and called the average ED degree, depends on the underlying probability distribution of the ambient space. In contrast with the number of complex-valued critical points, this number is typically not constant for all generic data points $u$, but rather constant on the connected components of the complement of an algebraic hypersurface. After discussing the general setting in the topic we concentrate on a particular algebraic variety $X$, the variety of rank-one tensors. The average ED degree of $X$ is expressed in terms of the average absolute value of the determinant on a Gaussian-type matrix ensemble.