Jisu Kim* (jisuk1@andrew.cmu.edu), Department of Statistics, CMU, 5000 Forbes Avenue, Baker Hall 132, Pittsburgh, PA 15213-3890, and Alessandro Rinaldo and Larry Wasserman. Minimax Rate for Estimating the Dimension of a Manifold.

Most manifold learning algorithms require as input the intrinsic dimension of the manifold. This parameter is however rarely known and therefore has to be estimated. We derive upper and lower bounds on the probability of false rejection for testing the hypothesis that the support of the data-generating probability distribution is a well-behaved manifold of intrinsic dimension $d_1$ versus the alternative that it is of dimension $d_2$. With an i.i.d. sample of size $n$, we provide an upper bound of order $O\left(n^{-\left(d_2/d_1-1-\epsilon\right)n}\right)$ based on the TSP path through the data points. We also demonstrate a lower bound of $\Omega\left(n^{-\left(2d_2-2d_1+\epsilon\right)n}\right)$ by applying Le Cam’s lemma with a specific set of $d_1$-dimensional probability distribution. (Received September 22, 2015)