Many dimension reduction techniques (including IsoMap) start by constructing a graph on the data in order to estimate the geodesic distance from the underlying manifold. We present an algorithm that uses persistent homology (in dimensions one and zero) to construct a weighted proximity graph based on a carefully chosen $\epsilon$; our initial experiments show that the shortest path metric associated to this graph produces strikingly good estimates of the underlying geodesic distance. (Received September 15, 2011)