Title: Minimization of Distance, Geodesics, and Conjugate Points

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Abstract: The minimization of distance is an important problem in mathematics, and its solution is well understood in Euclidean space. However, one encounters difficulties when generalizing this problem to other spaces. In order to address this problem, this talk will introduce some of the basic notions of Riemannian geometry, such as the definitions of a manifold and a metric. This will then lead us to appropriate generalizations of the concepts of a derivative and a straight line, namely a covariant derivative and a geodesic, respectively. We will then explore how these concepts are used to determine the minimization of distance on Riemannian manifolds. Lastly, we will see that there can exist points, called conjugate points, past which geodesics no longer minimize distance.