

Stephen Ducret: Minimal Connections

The Hopf Rinow theorem states that, given two points in a proper metric space, there exists a path joining them which has minimal length.

A larger question can be asked : given a compact subset S of a metric space X , is there a connected compact subset C of X such that $S \cap C$ is connected and has minimal Hausdorff measure H^1 ? The answer is yes if good conditions on X are present (for example, when X is proper).

To prove that, the Hausdorff and Gromov Hausdorff distance can be used, the problem being given in terms of variation calculus.

We also introduce a new generalization to these problems, and give solution to it.