

Abstract: Geodesics between Phylogenetic Trees

Phylogenetic Trees are objects of high interest in biology. They depict the evolution of different species in a tree structure with the primordial ancestor being the root and the current existing descendants being the leaves of the tree. In many cases however, the mutations, i.e., the stages inbetween the root and the leaves, are unknown and the goal is to determine a tree which most likely corresponds to the actual evolution of the species.

In order to determine these trees of interest one needs several foundations. Firstly, one defines phylogenetic trees with n leaves mathematically as *metric n -trees* and finds methods to describe the structure, called *topology*, of the trees. With this one can define an interesting metric space, the Tree Space \mathcal{T}_n , and wants to find shortest paths, called *geodesics* in it. With the geodesics one can find the mean tree of some given trees which might eventually model the evolution correctly.