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A polynomial metric on rooted binary tree shapes

In this talk, we will define a polynomial and show that the polynomial characterizes all rooted binary tree shapes, that is, two unlabeled rooted binary trees are isomorphic if and only if their corresponding polynomials are identical. Metrics on rooted binary tree shapes can be defined using this characterizing polynomial. We will show that these metrics can distinguish random tree shapes generated by different models as well as phylogenetic trees of seasonal and tropical influenza. Finally, we will introduce some mathematical conjectures about and generalizations of the polynomial and its future applications in computational biology and other sciences.