

Recursively generated control theoretic splines for on-the-fly curve approximation

Clyde F. Martin, Texas Tech University, Lubbock, TX, USA 79409 clyde.f.martin@ttu.edu

Shan Sun University of Texas at Arlington, Arlington, TX, USA 76019 shan.sun@uta.edu

Abstract: Smoothing splines in general suffer from the “curse of large numbers” in that they require the inversion of a matrix that is the dimension of the cardinality of the data set. For a fixed data set this is usually not a problem but for a data set that is increasing with time this leads to significant problems. We explore two methods of overcoming this problem. The basic method is to use only the more recent data and to then to use the constructed spline as a proxy for the past data. There are then two ways to attack the problem. The first method uses a standard quadrature method to approximate the spline and the problem then reduces to a problem equivalent to constructing the control theoretic spline. The second method treats the problem as a functional data problem and the past spline is used as a point in L2. Both methods lead to effective constructions.

Key Words: large numbers, proxy, integral equations