



A Hybrid Method Based on Least Squares Support Vector Regression and Orthonormal Bernoulli Polynomials for Solving Fredholm Integral Equations

Marzieh Pourbabaee*

Abstract

In this work, we propose a machine learning approach utilizing Least Squares Support Vector Regression (LS-SVR) to numerically solve Fredholm integral equations. The suggested approach utilizes a combination of LS-SVR alongside orthonormal Bernoulli polynomials, as well as Galerkin and collocation spectral techniques. An optimization problem is derived and converted into the solution of a system of algebraic equations. Finally, we present two numerical results that demonstrate the efficiency of the proposed method.

Keywords: Least squares support vector machines, Fredholm integral equation, and orthonormal Bernoulli polynomials.

*Department of Applied Mathematics, Faculty of Mathematical Sciences, University of Kashan, Kashan 87317-53153, Iran,
m.pourbabaee@kashanu.ac.ir