SAN DIEGO STATE UNIVERSITY
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SDSU
presents
a thesis defense for
Master of Science
degree in
Computer Science

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GMCS 405

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Solving Inverse Problems by Decomposition, Classification and Simple Modeling: Extension to Ill-conditioned Cases

Abstract

Inverse problems are found in many areas of science and engineering. It is usually difficult to approximate the inverse relationship due to the generally multi-valued and discontinuous nature. Several approaches to the solution of inverse problem have been proposed, but they are generally not applicable to situations and applications other than those they are developed for.

In this thesis work, we expand the concepts introduced by M. Tarokh to inverse problems with discontinuities and other ill-conditioned situations. The method is based on decomposition of output space into cells, with the corresponding regions in the input space. Then data points in each region are classified into separate clusters and relationship between data in an output cell and the corresponding input region is modeled by a simple polynomial. The coefficients of the polynomials are stored and are used to evaluate inverse function.

The method is tested on three applications: Gaussian function, a multivalued mapping function with discontinuities, and *two-link inverse kinematics problem.* The results show that the proposed method achieves very high accuracy.

Thesis Committee

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