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OASIS: An Active Framework for Set Inversion

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In this work, we introduce a novel method for solving the set inversion problem by formulating it as a binary classification problem. Aiming to develop a fast algorithm that can work effectively with high-dimensional and computation- ally expensive nonlinear models, we focus on active learning, a family of new and powerful techniques which can achieve the same level of accuracy with fewer data points compared to traditional learning methods. Specifically, we propose OASIS, an active learning framework using Support Vector Machine algorithms for solving the problem of set inversion. Our method works well in high dimensions and its computational cost is relatively robust to the increase of dimension. We illustrate the performance of OASIS by several simulation studies and show that our algorithm outperforms VISIA, the state-of-the-art method.

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