

Studying the performance of the jellyfish search optimiser for the application of projection pursuit

H. Sherry Zhang

The University of Texas at Austin, USA

Abstract

The projection pursuit (PP) guided tour interactively optimises a criteria function known as the PP index, to explore high-dimensional data by revealing interesting projections. The optimisation in PP can be non-trivial, involving non-smooth functions and optima with a small “squint angle”, detectable only from close proximity. To address these challenges, this study investigates the performance of a recently introduced swarm-based algorithm, Jellyfish Search Optimiser (JSO), for optimising PP indexes. The performance of JSO for visualising data is evaluated across various hyper-parameter settings and compared with existing optimisers. Additionally, this work proposes novel methods to quantify two properties of the PP index – smoothness and squintability – that capture the complexities inherent in PP optimisation problems. These two metrics are evaluated along with JSO hyper-parameters to determine their effects on JSO success rate. Our numerical results confirm the positive impact of these metrics on the JSO success rate, with squintability being the most significant. The JSO algorithm has been implemented in the `tourr` package and functions to calculate smoothness and squintability are available in the `ferrn` package.