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FLORIDA ATLANTIC UNIVERSITY
COLLEGE OF ENGINEERING & COMPUTER SCIENCE
announces the
Ph.D. Dissertation Defense
of
KARL ROBERT WEISS
for the degree of
DOCTOR OF PHILOSOPHY (PH.D.)
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in
Engineering East, Room 405
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ABSTRACT OF DISSERTATION

Design of a Test Framework for the Evaluation of Transfer Learning Algorithms

A traditional machine learning environment is characterized by the training and testing data being drawn from the same domain, therefore having similar distribution characteristics. In contrast, a transfer learning environment is characterized by the training data having different distribution characteristics from the testing data. Previous research on transfer learning has focused on the development and evaluation of transfer learning algorithms using real-world datasets. Testing with real-world datasets exposes an algorithm to a limited number of data distribution differences and does not exercise an algorithm’s full capability and boundary limitations. In this research, we define, implement, and deploy a transfer learning test framework to test machine learning algorithms. The transfer learning test framework is designed to create a wide-range of distribution differences that are typically encountered in a transfer learning environment. By testing with many different distribution differences, an algorithm’s strong and weak points can be discovered and evaluated against other algorithms. This research additionally performs case studies that use the transfer learning test framework. The first case study focuses on measuring the impact of exposing algorithms to the Domain Class Imbalance distortion profile. The next case study uses the entire transfer learning test framework to evaluate both transfer learning and traditional machine learning algorithms. The final case study uses the transfer learning test framework in conjunction with real-world datasets to measure the impact of the base traditional learner on the performance of transfer learning algorithms. These case studies will be of interest to researchers who develop and improve transfer learning algorithms. This research will also be of benefit to machine learning practitioners in the selection of high-performing transfer learning algorithms.