COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
FLORIDA ATLANTIC UNIVERSITY

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Feng Liu

for the degree of Doctor of Philosophy (Ph.D.)

"Meta-Learning and Ensemble Methods for Deep Neural Networks"

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DEPARTMENT:
Computer & Electrical Engineering and Computer Science

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ABSTRACT OF DISSERTATION
Meta-learning and Ensemble Methods for Deep Neural Networks

Deep Neural Networks have been widely applied in many different applications and achieve significant improvement over classical machine learning techniques. However, training a neural network usually requires large amount of data, which is not guaranteed in some applications such as medical image classification. To address this issue, people propose to implement meta learning and ensemble learning techniques to make deep learning trainers more powerful. This thesis focuses on using deep learning equipped with meta learning and ensemble learning to study specific problems. In the first part, we consider the suggestion mining problems and apply the ensemble method, Random Multi-model Deep Learning (RMDL). In the second part, we propose a new meta-learning method -- named HARMLESS (Hawkes Relational Meta Learning method for Short Sequences) for learning heterogeneous point process models from short event sequence data along with a relational network. In the third part, we propose two generic ensemble approaches, gradient boosting and meta-learning, to solve the catastrophic forgetting problem in tuning pre-trained neural network models. Numerical experiments on multiple datasets are presented to justify the good performance of our methods.

BIOGRAPHICAL SKETCH
Born in China
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CONCERNING PERIOD OF PREPARATION & QUALIFYING EXAMINATION

Time in Preparation: 2016 - 2020

Qualifying Examination Passed: Semester Spring 2017

Published Papers:
Feng Liu, Liangji Wang, Xiaofeng Zhu, and Dingding Wang, "Suggestion Mining from Online Reviews using Random Multi-model Deep Learning," IEEE International Conference on Machine Learning and Applications (ICMLA), 2019.
Feng Liu, Xiaofeng Zhu, Goce Trajcevski, and Dingding Wang, "Frosting Weights for Better Continual Training," IEEE International Conference on Machine Learning and Applications (ICMLA), 2019.
Feng Liu, and Dingding Wang, "MVP: Finding the Most Valuable Posts in Financial Social Networks," International Conference on Semantic Computing (ICSC), 2019.
Yujia Xie, Haoming Jiang, Feng Liu, Tuo Zhao, Hongyuan Zha, "Meta Learning with Relational Information for Short Sequences," Annual Conference

on Neural Information Processing Systems (NIPS), 2019.

Haoming Jiang, Zhehui Chen, Minshuo Chen, Feng Liu, Dingding Wang, Tuo Zhao, "On Computation and Generalization of Generative Adversarial Networks under Spectrum Control," International Conference on Learning Representations (ICLR), 2019.