



COLLEGE OF ENGINEERING  
AND COMPUTER SCIENCE  
FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

## Zhabiz Gharibshah

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

### “Feature Representation Learning for Online Advertising and Recommendations”

July 6, 2023, Thursday, 6:00 PM EST.

<https://fau-edu.zoom.us/j/5618090648?pwd=cUN6Uy90ci9xdzI DTVB5ekppSGJaQT09>

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DEPARTMENT:

Electrical Engineering and Computer Science

ADVISOR:

Xingquan Zhu, Ph.D.

PH.D. SUPERVISORY COMMITTEE:

Xingquan Zhu, Ph.D., Chair

Ankur Agarwal, Ph.D.

Behnaz Ghoraani, Ph.D.

Dingding Wang, Ph.D.

ABSTRACT OF DISSERTATION

Online advertising is mainly based on dynamically selecting ads through a real-time bidding (or auction) mechanism. To maximize revenue and user satisfaction, online advertising platforms must predict the expected user behavior of each displayed advertisement and maximize the user's expectations of clicking. Based on this measurable feedback, these systems are tailored to user preferences to decide the order in that ads or any promoted content should be served to users. This objective provides an incentive to conduct new studies to introduce different machine learning and data mining methods that employ deep learning-based predictive models to learn the representation of input features with the aim of user response prediction. Feature representation learning is known as a fundamental task on how to input information is going to be represented in machine learning models. A good feature representation learning method that seeks to learn low-dimensional embedding vectors is a key factor for the success of many downstream analytics tasks, such as click-through and conversion predictions in recommendation systems and online advertising platforms. It is worth mentioning that the availability of user behavior features varies by online platforms which publish ads. These features are obtained at the event level-- when an ad is shown on a page or when a user clicks on an ad or converts. This dissertation mainly focuses on feature representation learning with the aim of embedding the common input data features in online advertising and recommendations, typically known as tabular data comprised of categorical and numerical values. It aims to map the input data into a compact low-dimensional space later used for prediction tasks. To be more specific, in order to achieve an efficient feature representation that can be applied to online advertising tasks and recommendation systems, the given problem has been studied from various perspectives. 1)To address temporal correlations in historical user behaviors, a sequence-aware feature learning model is formulated to capture latent temporal user interests behind the sequence of user behaviors. 2)We present a graph representation learning method to encode semantic interactions between different data entities in online advertising workflow through tripartite heterogeneous graph modeling. 3)We include a different point of view in our study by proposing a self-supervised learning method using contrastive learning to capture feature correlation for feature representation learning in tabular data by learning local patterns from all features in tabular data. 4)In order to tackle the uncertainty problem and sparsity issue for the next user interest prediction task in recommendation systems and online advertising applications, we propose a novel cross-domain learning based on self-supervised learning which applies data augmentation strategies on the overlapped and the non-overlapped users' interaction sequences between two domains, respectively.

## BIOGRAPHICAL SKETCH

Born in Tehran, Iran

B.S., Shahed University, Tehran, Iran, 2006

M.S., Azad University, Science and Research Branch, Tehran, Iran, 2011

Ph.D., Florida Atlantic University, Boca Raton, Florida, 2023

## CONCERNING PERIOD OF PREPARATION & QUALIFYING EXAMINATION

**Time in Preparation:** 2019 - 2023

**Qualifying Examination Passed:** November 2018

### **Published Papers:**

Zhabiz Gharibshah, Xingquan Zhu, Arthur Hainline, Michael Conway, "Deep Learning for Online Display Advertising User Clicks and Interests Prediction". APWeb-WAIM joint conference on Web and Big Data (APWeb-WAIM), vol 11641. Springer, pp 196–204, 2019, Chengdu, China

Zhabiz Gharibshah, Xingquan Zhu, Arthur Hainline, and Michael Conway. Deep Learning for User Interest and Response Prediction in Online Display Advertising. *Journal of Data Science and Engineering*. 5, pp 12–26 (2020)

Zhabiz Gharibshah, Xingquan Zhu. TriNE: Network Representation Learning for Tri-partite Heterogeneous Networks." IEEE International Conference on Knowledge Graph (ICKG), pp. 497-504, 2020 (Best paper award)

Zhabiz Gharibshah and Xingquan Zhu. 2021. User Response Prediction in Online Advertising. *Journal of ACM Comput. Surv.* 54, 3, Article 64

Zhabiz Gharibshah and Xingquan Zhu. 2022. Local Contrastive Feature Learning for Tabular Data. In *Proceedings of the 31st ACM International Conference on Information & Knowledge Management (CIKM '22)*. Association for Computing Machinery, New York, NY, USA, 3963–3967

Zhabiz Gharibshah, Merium Iqbal, Gaurav Anand, Ali Sahami, Xingquan Zhu "Contrastive Cross-domain Recommendation for Next User Interest Prediction", ACM conference on Information & Knowledge Management (CIKM), 2023 (Under review)