COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

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

"Automated Detection of Offensive Texts Based on Ensemble Learning and Hybrid Deep Learning Techniques"

February 3, 2025, 1:00 p.m.
Engineering East Building, Room #405
777 Glades Road
Boca Raton, FL

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ABSTRACT OF DISSERTATION

Automated Detection of Offensive Texts Based on Ensemble Learning and Hybrid Deep Learning Techniques

The impact of communication through social media is currently considered a significant social issue. This issue can lead to inappropriate behavior using social media, which is referred to as cyberbullying. Automated systems can efficiently identify cyberbullying and perform sentiment analysis on social media platforms. In this dissertation, our focus is on enhancing a system to detect cyberbullying in various tasks. Therefore, we apply natural language processing techniques utilizing artificial intelligence algorithms to identify offensive texts in various public datasets. The first approach leverages two RNN models to classify a large-scale dataset, combining two techniques: data augmentation and the GloVe pre-trained word representation method to improve training performance.

In addition, we utilized multi-classification algorithms on a cyberbullying dataset to identify six types of cyberbullying classes. Our approach achieved high accuracy, particularly with TF-IDF (bigram) feature extraction, compared to previous experiments and traditional machine learning algorithms applied to the same dataset. Moreover, we developed an ensemble for binary classification that used four feature extraction methods, BoW, TF-IDF, Word2Vec, and GloVe, to determine which method works best with the ensemble technique in terms of enhancing the performance and classification time. Finally, we utilized a multi-channel convolutional neural network (CNN), which improved with an attention mechanism and was optimized using a focal loss function. Our results demonstrate significant improvements in accuracy and performance when applying these techniques.

Our research addresses key challenges in cyberbullying detection, including class imbalance, multi-class classification, enhancing context understanding, and parallelism issues in specific machine learning and RNN models. These challenges are critical for ensuring robust and accurate detection across diverse scenarios.

BIOGRAPHICAL SKETCH
Born in Bisha, Saudi Arabia
B.S., University of Bisha, Bisha, Saudi Arabia, 2012

M.S., Rochester Institute of Technology, Rochester, New York, 2018
Ph.D., Florida Atlantic University, Boca Raton, Florida, 2025

CONCERNING PERIOD OF PREPARATION
& QUALIFYING EXAMINATION

Time in Preparation: 2021 - 2025

Qualifying Examination Passed: Fall 2021

Published Papers:

Alqahtani, A. F., & Ilyas, M. (2022). Using Natural Language Processing to Detect Offensive Text and Cyberbullying in Social Media: A Review. Malaysian Journal of Information and Communication Technology (MyJICT), Vol. 7, Issue 2, pp. 107-118. https://myjict.uis.edu.my/index.php/journal/article/view/163/95

Alqahtani, A. F., Ilyas, M. (2023). Using Deep Learning LSTM and CNN With Word Embedding for the Detection of Offensive Text on Twitter. *Proceedings of the 14th International Conference on Society and Information Technologies (ICSIT), Orlando, Florida, March 28-31, 2023,* pp. 86-91. https://doi.org/10.54808/ICSIT2023.01.86

Alqahtani, A. F., & Ilyas, M. (2024). An Ensemble-Based Multi-Classification Machine Learning Classifiers Approach to Detect Multiple Classes of Cyberbullying. Machine Learning and Knowledge Extraction, Vol. 6, Number 1, pp. 156-170. **https://doi.org/10.3390/make6010009**

Alqahtani, A. F., & Ilyas, M. (2024). A Machine Learning Ensemble Model for the Detection of Cyberbullying. International Journal of Artificial Intelligence and Applications (IJAIA). Vol. 15, Number 1, pp. 115-129. https://doi.org/10.48550/arXiv.2402.12538