

**TUS**

Technological University of the Shannon:
Midlands Midwest
Ollscoil Teicneolaíochta na Sionainne:
Lár Tíre Iarthar Láir

POSTGRADUATE RESEARCH OPPORTUNITY

Project Title: Contextualized Embedding Using Transformers for Multi-Modal Intrusion Detection

Project Description:

Cybersecurity attacks have become an increasingly serious global problem, and the numerous cybersecurity incidents pose a major threat to social and economic development. In order to protect organizations and individuals from network attacks, intrusion detection techniques play an important role in ensuring information security, and the accurate identification of various attacks in the network is one of the key techniques, therefore, the research on the automatic detecting attack behavior is particularly important. Overfitting and high bias due to irrelevant or redundant features, as well as the heterogeneous characteristic of network attack behavior data, make traditional machine learning methods underperform. In response to the above problems, this study proposes a multimodal transformer framework to detect attack behavior with the help of feature extraction. Due to the strong ability of semantic learning of language models and the similar essential characteristics between text and cybersecurity related data stream, we utilize a language to construct a transform encoder, and then fuse the multimodal feature embeddings with a transformer decoder using a multi-head attention mechanism. To protect the privacy of data, a hierarchical federated learning is used during the training process. The proposed framework will be implemented, deployed, and researched for company, government, and university use cases to reduce security risks.

Duration of Project: 48 months
Funding Agency: TUS Presidents Doctoral Scholarship
Type of Degree Offered: PhD

Minimum Qualifications/Experience Necessary/Any Other Requirements: [list relevant undergraduate programmes]

We are seeking a motivated and enthusiastic candidate with a BSc (or equivalent) with minimum classification of 2.1 honours or higher degrees. The ideal candidate will have a background in Computer science. Excellent programming skills (python) mathematical knowledge are a prerequisite.

Candidates with primary degrees in ...computer science.....

IELTS [International English Testing System] Applicants must have a minimum of 6.0 with no component score less than 6.0.

Research Supervisors: Dr Jia Yu, Dr Brian Lee, Dr Nianfeng Shi & Dr Yuansong Qiao

For further information please contact:

Jia.yu@tus.ie

Download Application Form at

[Funded Postgraduate Research Opportunities - TUS](#)

Closing date for receipt of completed application forms is 31 January 2024

Please submit your completed application: pro@tus.ie

Please reference **Project Title in all correspondence.**