## Title:

Mutation Testing of Deep Neural Networks (CNNs)

## **Abstract:**

Deep learning (DL) models have become increasingly popular and an important concept in many useful domains such as self-driving cars, facial identity, speech recognition and more others. Presence of defective deep learning models in these applications or systems may lead to catastrophic accidents and consequences. Research efforts have been going on to test these DL models to evaluate their robustness and quality performance, one way to measure their robustness can be through examining their performance on a test dataset. Mutation testing, a fault-based testing technique for quality evaluation of test suites can be used to evaluate the quality of the test dataset from which the confidence of the trained model can be gained. In this thesis, MT framework approach specialized to test DL systems proposed by Lei et al. 2018 to measure the quality of the test dataset will be studied and applied in mutating a Convolutional Neural Network (CNN). The aim is to apply the same approach but with different test subjects to investigate more on new proposed mutation operators relations (i.e., cover more diverse aspects, mutants impact) and to double check the findings of the authors as the research is novel. The thesis will also include a comprehensive study on the usefulness of MT for DL models and a well-known dataset MNIST will be used in the experiment.