I Know I don’t Know: An Evidential Deep Learning Framework for Traffic Classification

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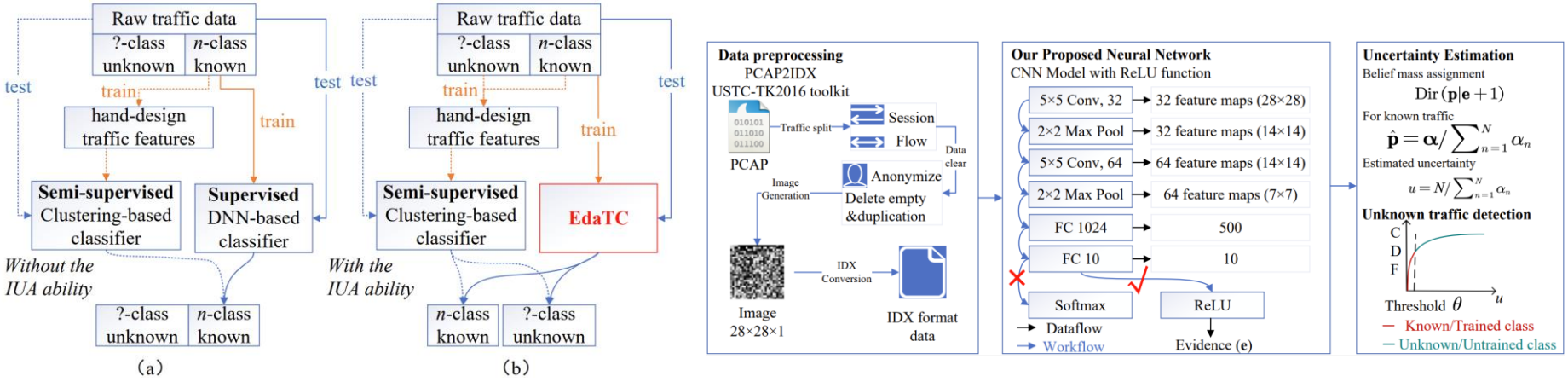
Problems & Ideas

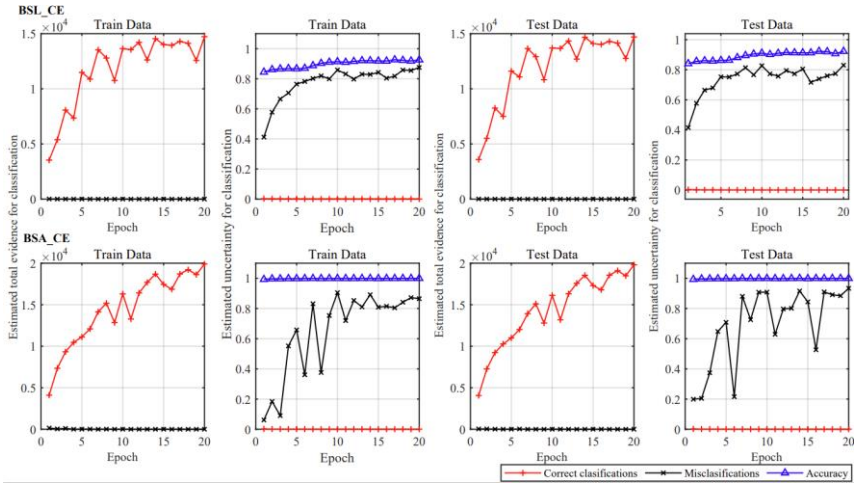
- Problems of conventional learning-based traffic classifiers approaches:
  - Infeasible to classify either the unknown/unseen/unlabeled application or zero-day application traffic.
  - The clustering methods can identify the unknown traffic but need lots of human intervention to feature choice, hyperparameter configuration and traffic division
- Ideas: By leveraging Evidential deep learning, EdaTC enables the ability to quantify the prediction uncertainty which evaluate if the classifier performs a reliable prediction on known traffic.

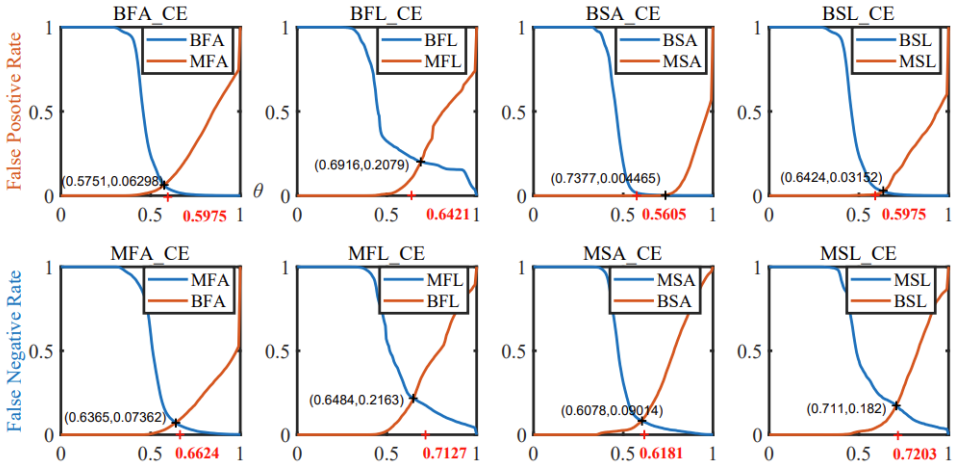


Left: The train and test process of the conventional learning-based traffic classifier and EdaTC;
Right: The framework of the proposed evidential deep learning traffic classifier, EdaTC.

Main Contributions

- Contributions:
  - A new dimension for IUA problem, exploiting to estimate the classification uncertainty and indicate the prediction reliability;
  - A novel training framework, EdaTC, which can reduce the manual intervention of time-consuming feature designing and the unknown traffic extraction. Simplify the training procedure without any accuracy degradation and enableing traffic classifier with the IUA ability;
  - A simple but effective method to configure the operational threshold Θ.





Left: Traing and testing Performace of BSA_CE and BSL_CE model; Right: The FPR and FNR change according to θ.