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# The Center for Cyber Defenders

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# Malware Detection and Domain Adaptation

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## Problem Statement:

- Static malware analysis provides a powerful tool to security analysts in detecting intrusions
- Out-Of-Distribution (OOD) malware families and adversarial perturbations hinder the effectiveness of static malware analysis
- Domain Adaption/Generalization cannot handle different class families between distributions

## Objectives and Approach:

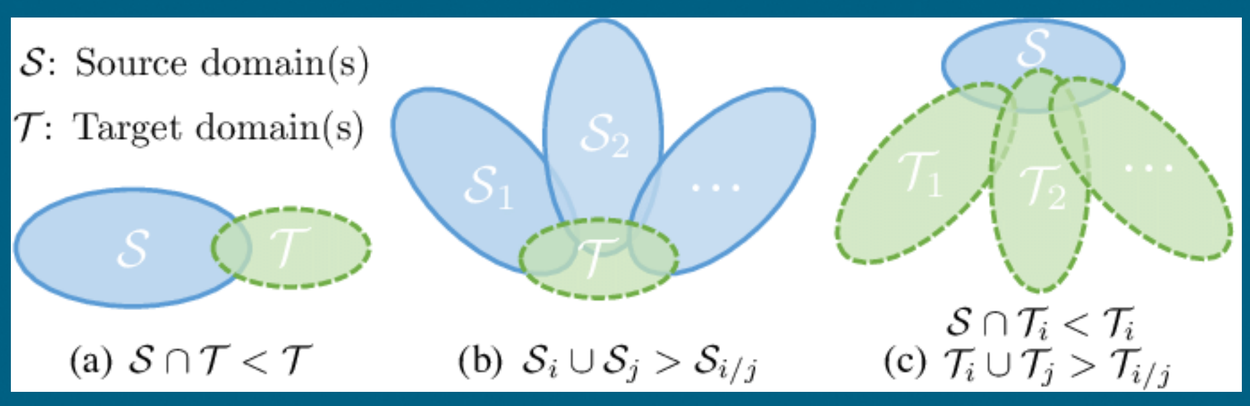
- Use Domain Adaption/Generalization to create a robust static malware classifier
- Proposed Steps:
  - Curate Two Datasets:
    - OOD malware families
    - Adversarial perturbed malware families
  - Use Domain Generalization on adversarial perturbed malware families
  - Use Domain Adaptation on OOD malware families
- Report results

## Results:

- OOD Malware Families:
  - Match families between source and target distribution using multi-class labels
  - For static malware – multi class labels are binary labels indicating whether malware behavior exists or not
- Adversarial Malware Families:
  - Curate dataset of 3 different adversarial attacks
  - Use Domain Generalization to learn invariant features on 2 adversarial families and unperturbed malware family, test against 3rd adversarial attack

## Impact and Benefits:

- By creating a more robust static malware classifier, attackers are less likely to evade detection




Qiao, Fengchun, Long Zhao, and Xi Peng. "Learning to learn single domain generalization." *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2020.

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