CMU Ghosts to Simulate a Cybersecurity Environment and Detect Novelty

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Problem Statement

As the world becomes even more tech focused, there is a need for detecting possible security threats that cannot be detected by a person or team. The training and evaluation of AI-based techniques for detecting novel security threats would benefit from a realistic synthetic data generator for enterprise security scenarios.

CMU Ghosts

A framework built for simulating a user environment. Creates agents and their interactions similar to how an office or company would interact.

We are using this framework to develop an AI that can detect novel situations. More specifically, we want this AI to be able to detect possible insiders who are compromising security of the simulated environment.

-**What is Novelty?**

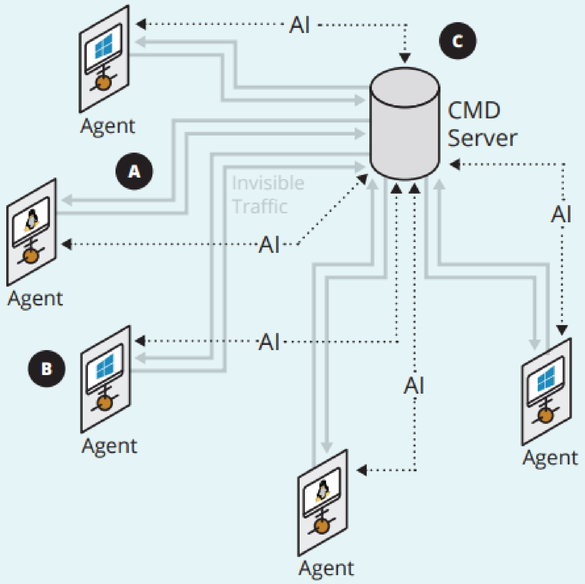
-Novelty is described as a situation or data that differs from the previous data, or data that has been introduced previously.

-**What is an Insider?**

-An insider would be an agent that is acting in ways that differ from the expected patterns of other agents but attempting to hide their actions, similar to how someone in real life could leak or steal secrets or volatile information.

Animator

Ghosts-Animator is a tool that generates “hyper-realistic user details” or user profiles. Animator draws from a large list of sources to generate lifelike users. This can be used to model groups of people and insider threats. These profiles include name, occupation, and relationships.



GHOSTS Highlights

GHOSTS provides the realism that is missing in cyber environments that lack random, independently generated traffic from multiple sources to multiple destinations.

A. GHOSTS uses vTunnel to hide the connection to the central command server from exercise participants.

B. Artificial intelligence powers non-player characters to create realistic and self-directed communications.

C. Event managers can give instructions to any number of GHOSTS clients from a central command server.

Expansions on the System

In the future the system could be used to create active intervention scenarios, in which an AI or person could actively intervene as opposed to just using an AI to interpret data like we are using the system. The figure above describes how this scenario would be organized.

Ghosts for Data Generation

The purpose of setting up Ghosts is so that we can use the system to generate a log of user behavioral data and then use this data to evaluate an AI’s ability to detect the insider.

References

-Software Engineering Institute, CMU, “Ghosts, A Framework for Realistic NPC Organization”
-CMU Ghosts GitHub: https://github.com/cmu-sei/GHOSTS

Acknowledgment

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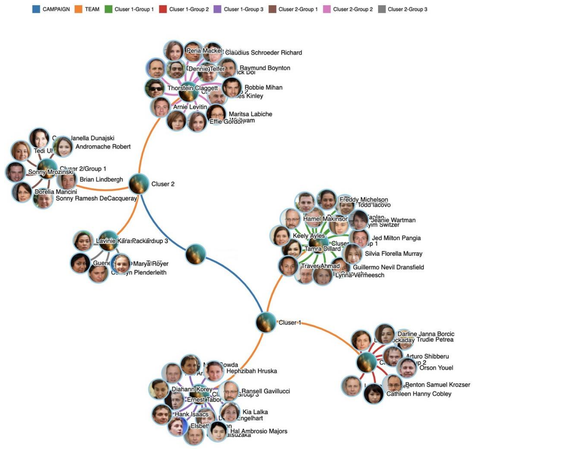
Ghosts Groups

Ghosts has the capability to simulate groups as well, such as teams inside of a company, or a department.



Spectre

Ghosts-Spectre makes agents activities more lifelike. It does this by pulling information from their profiles and tune it better with browser activity. This in turn will make new timeline for agent activity.

How our System Works

-Multiple machines running VM’s to allow ghosts to run consistently for as long as required.
-Each VM gets “taken over” by the Ghosts system, and it will do actions as dictated by the host, such as opening an excel document, sending an email, etc.
-In the future, we would like to get a sort of portal set up, so our collection of machines can be accessed from anywhere, and we can run experiments more conveniently.