Network Anti-Reconnaissance

Messing with Nmap Through Smoke and Mirrors

- AltF4

Anti-Reconnaissance

- Consider 3 main phases of a network attack:
  1) Gain Access
  2) Perform Reconnaissance
  3) Exploit Vulnerability
- Focusing on the second phase
  - Anti-**Reconnaissance**
  - Obscures the network
    - Obfuscate
- Not Intrusion Detection / Prevention
- Not Access Control

Reconnaissance: HowTo

- Find information to use in an exploit
  - Number of systems
    - ARP Sweep scan / ICMP Echo
  - Types (OS) of systems
    - OS detection scans
  - Open ports
    - TCP SYN / CONN (etc...) scans
  - Network Topology
    - Traceroute
  - Running Services
    - Service Detection Scans

Why Is Detecting Recon Hard?

- Signatures Fail
  - Identical at the packet level
    - ARP, TCP SYNs, ICMP, ...
- Speed
  - Being very slow can be stealthy
    - One packet per hour
  - Being very fast can be stealthy
    - Finish before anyone notices
- Already inside your network
  - Border security already bypased (firewall)

Why Is Preventing Recon Hard?

- Metadata
  - Can't encrypt it
- Obfuscation

Constraining The Problem

- A Needle in a Haystack
  - Drown real nodes with realistic fake ones
  - Honeyd
- Two goals:
  - Obfuscates the network
    - Reconnaissance gets lots of bogus results
  - Identifies Reconnaissance
    - Traffic to decoys are presumptively hostile

Honeypots and Decoys

- Low Fidelity Honeypots
  - Not a real machine
  - Nor a “Virtual Machine“ as you know it
  - Can't be exploited like a VM can
  - Can be produced en masse
- Honeyd
  - Last update: 05/07/2007
  - Nmap new probes since then
    - nmap-os-db
  - github.com/datasoft/honeyd

Haystack

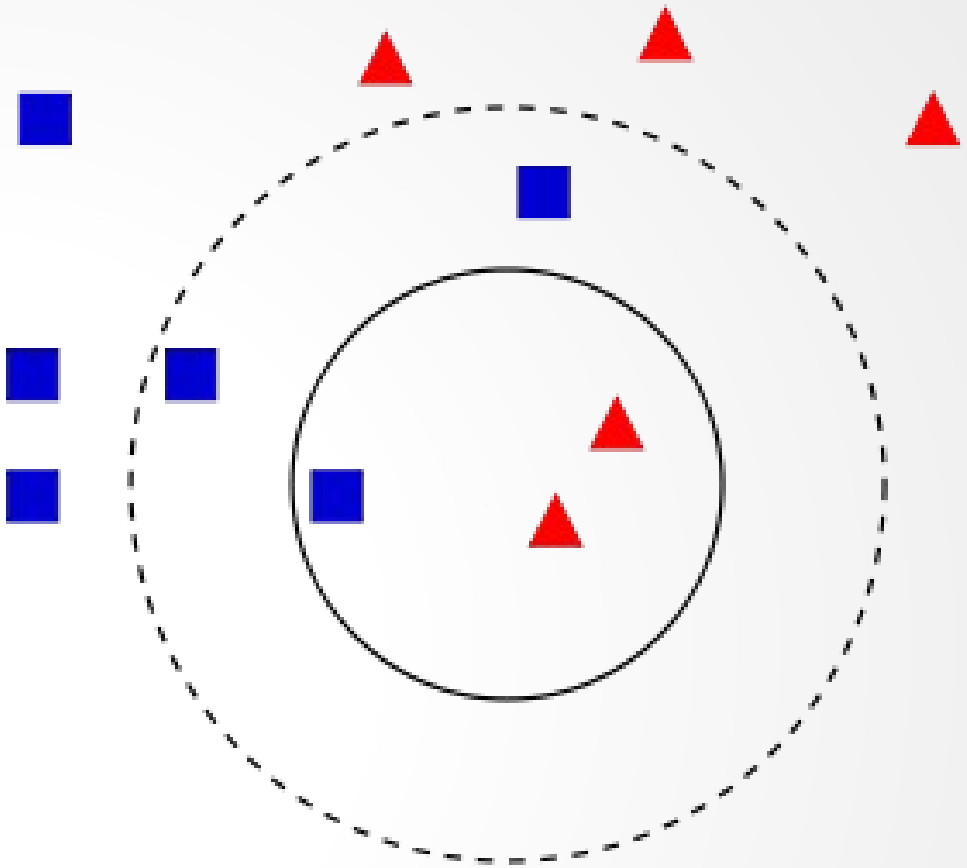
- Attacker gains access
  - Massive network
  - Most machines are fake
  - Can't tell the difference
- Reconnaissance becomes:
  - Ineffective
  - Cumbersome
  - Obvious

Classification

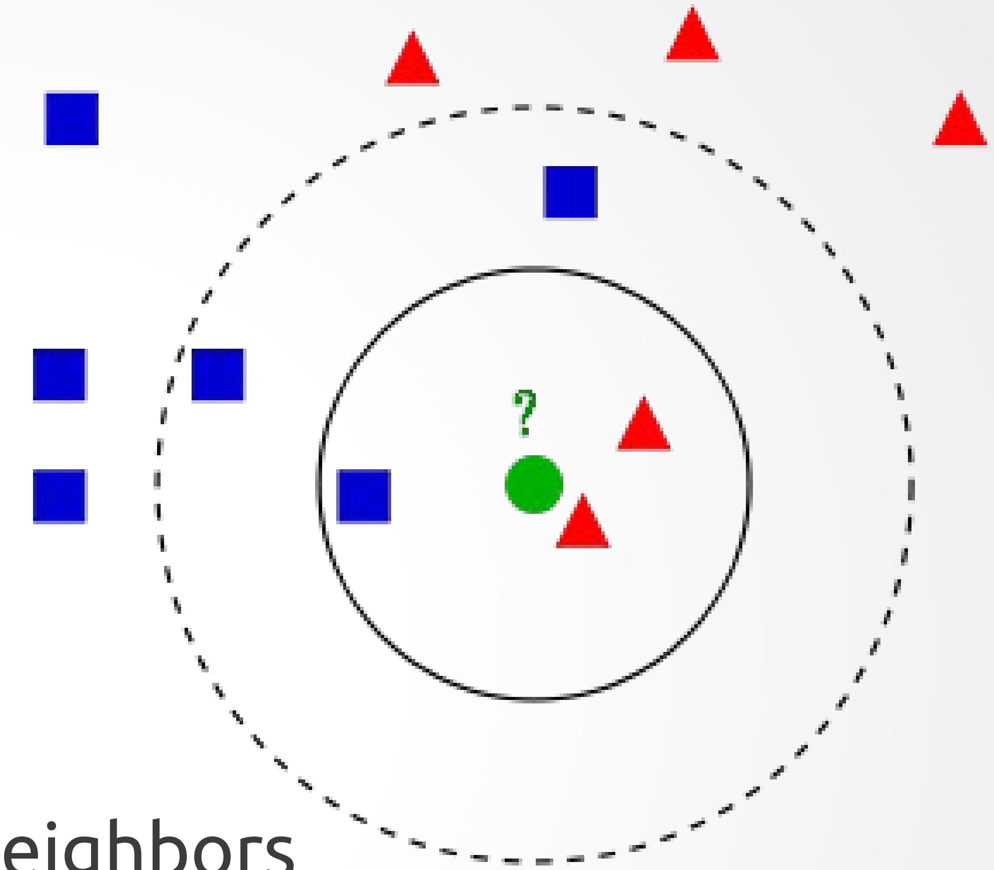
- High Fidelity Honeypots
  - Inspect log files
    - Manually
    - Maybe automated tools
  - Signatures
    - IDS / Antivirus
    - Mostly fails

Machine Learning

- K - Nearest Neighbors
  - N Statistical Features
  - Scalar Values
    - Packet Timing
    - IPs contacted
    - Ports contacted
    - Haystack nodes contacted
- Training Data
  - Programmed into the system
    - Like a spam filter
  - Plot data points in N dimensional space



Machine Learning

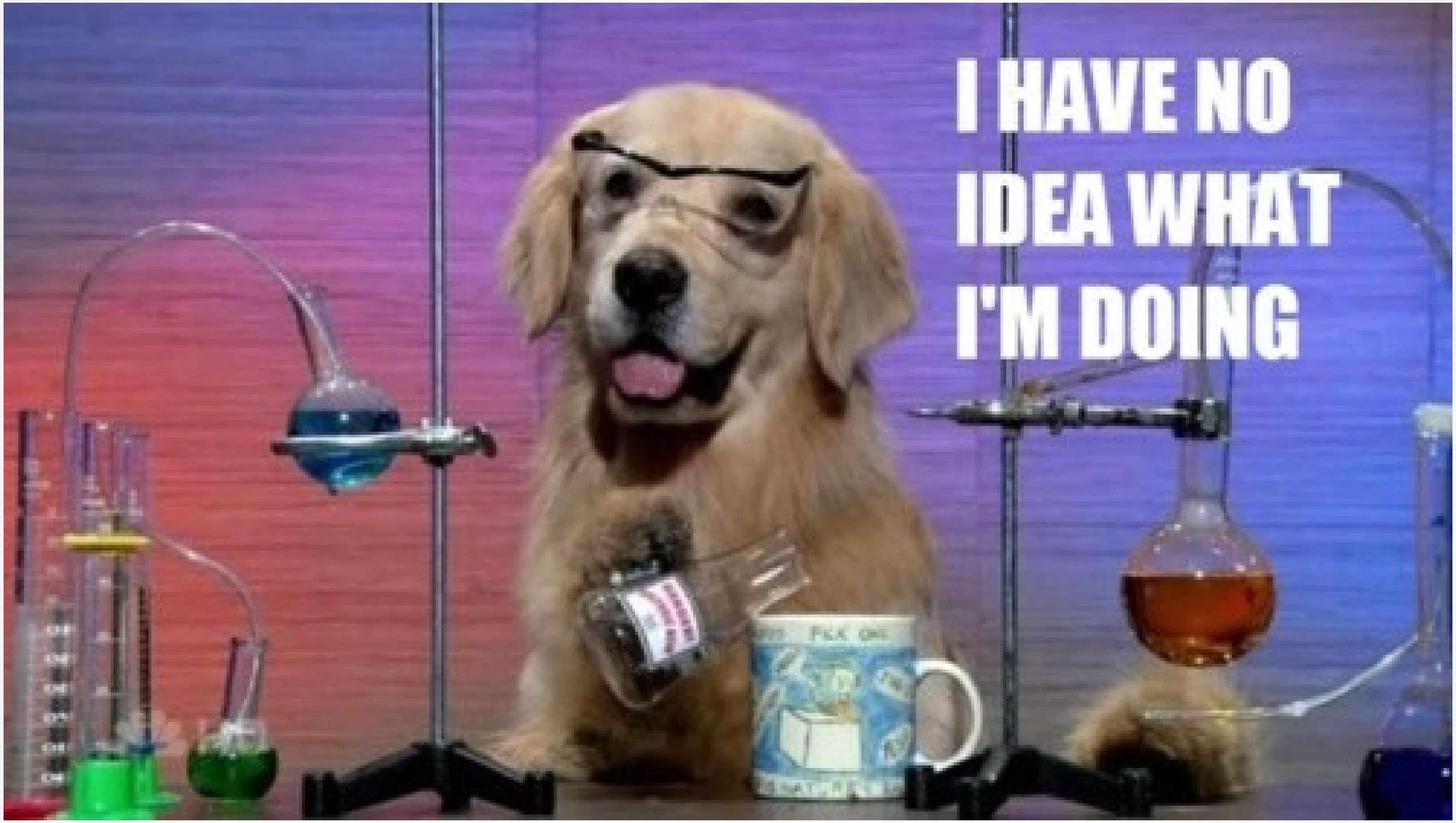


- Query Point
  - Search for the k nearest neighbors
  - Majority vote
    - Distance metric
- libann
  - Approximate Nearest Neighbors
  - Introduces some error
  - Large performance gains

Features

- Haystack Autoconfig
  - Scans your network
  - Builds a Haystack from it
- Multiple UIs
  - WebUI, Qt, Terminal
- Import / Export Training Data
- Highly Multithreaded
- Free Software

Demo



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