# Intelligent malware detection and classification (Intelligent Malware Sandbox)

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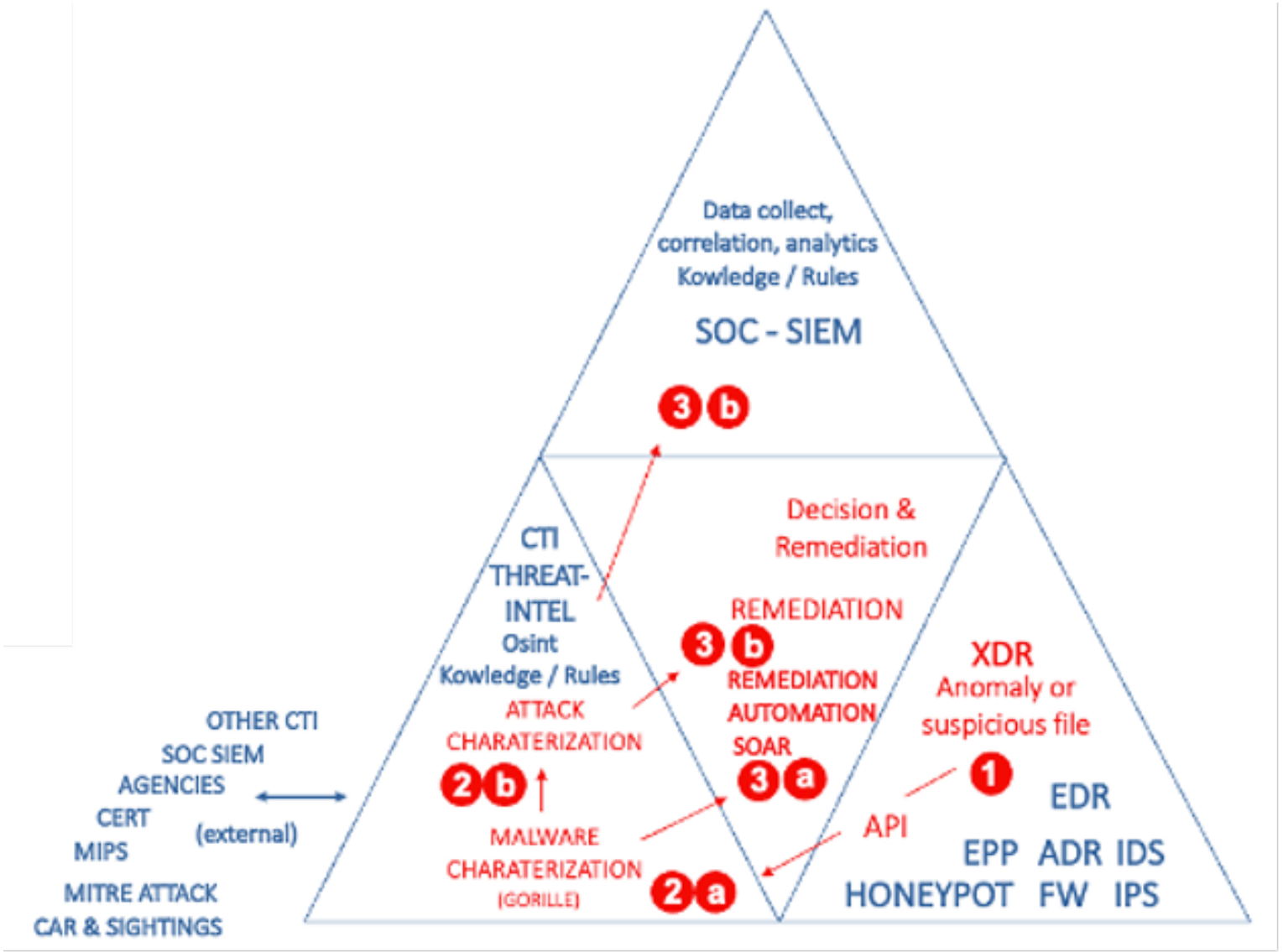
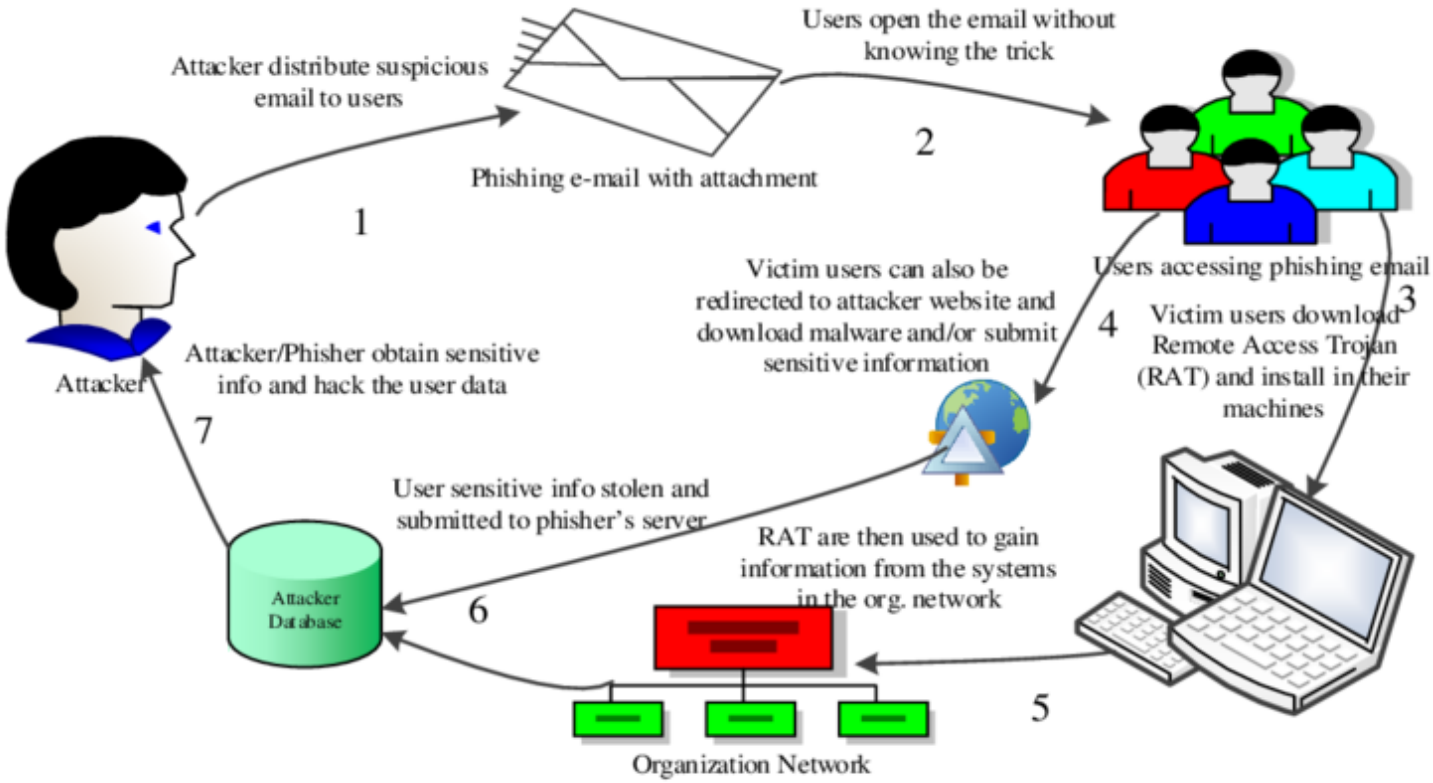
# Security Operation Workflow



# Malware based Phishing Attacks




**Reference:** [KM22]

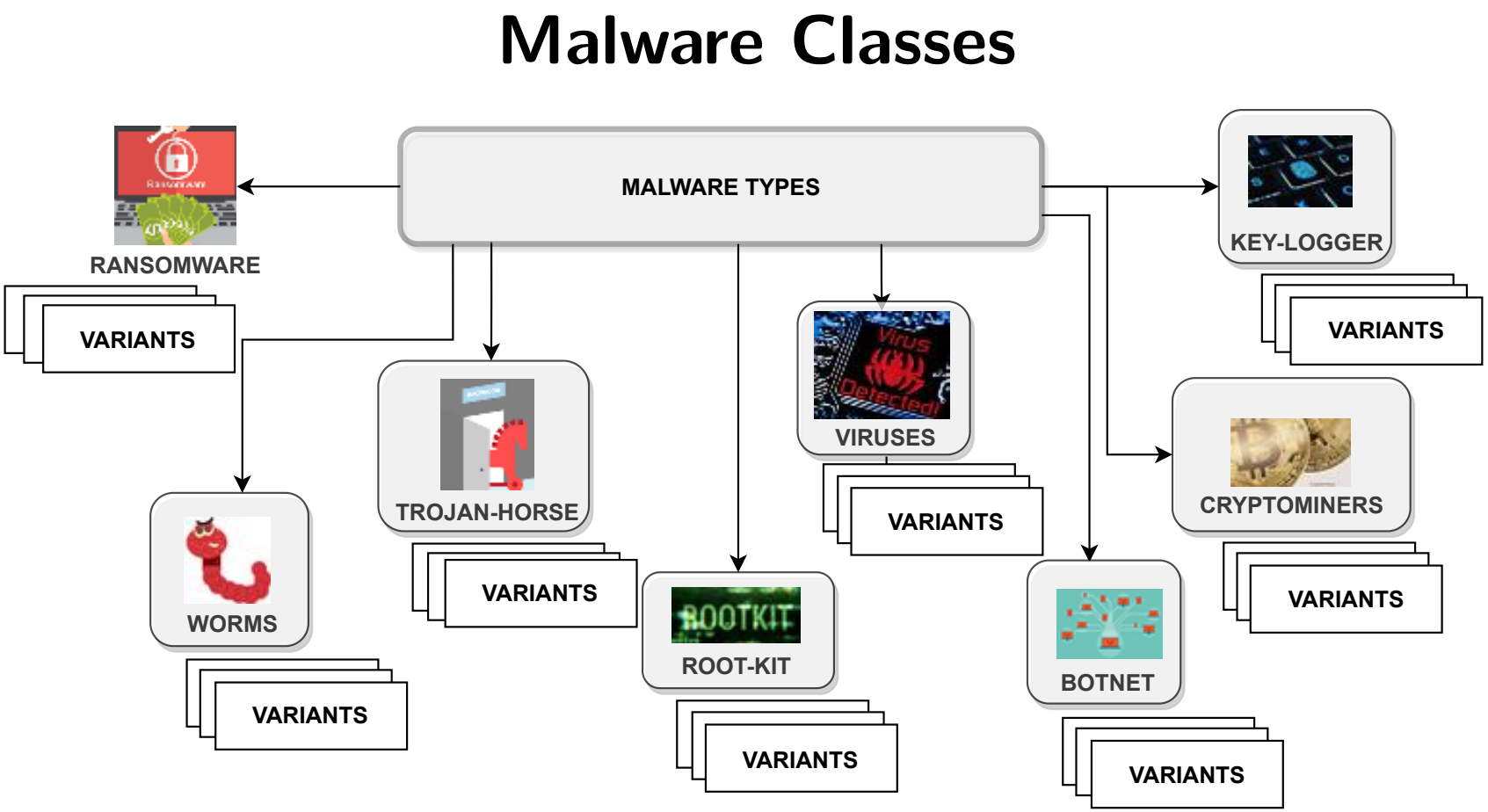
# What is Malware

- Malware, short for malicious software, refers to any intrusive software developed by cybercriminals (often called hackers) to steal data and damage or destroy computers and computer systems.
- Malware is malicious software and refers to any software that is designed to cause harm to computer systems, networks, or users.
- Malware includes various types of cyber threats such as Viruses, worms, Trojan viruses, spyware, adware, botnets, advanced persistent threats (APT), ransomware etc.
- Malware can take many forms. Individuals and organizations need to be aware of the different types of malware and take steps to protect their systems, such as using antivirus software, keeping software and systems up-to-date, and being cautious when opening email attachments or downloading software from the internet.

# Key Trends of Malware Attacks

- Windows container malware
- Mobile Malware/Industrial IoT/ Linux
- Cryptojacking
- Malware disruption
- Malware as a business

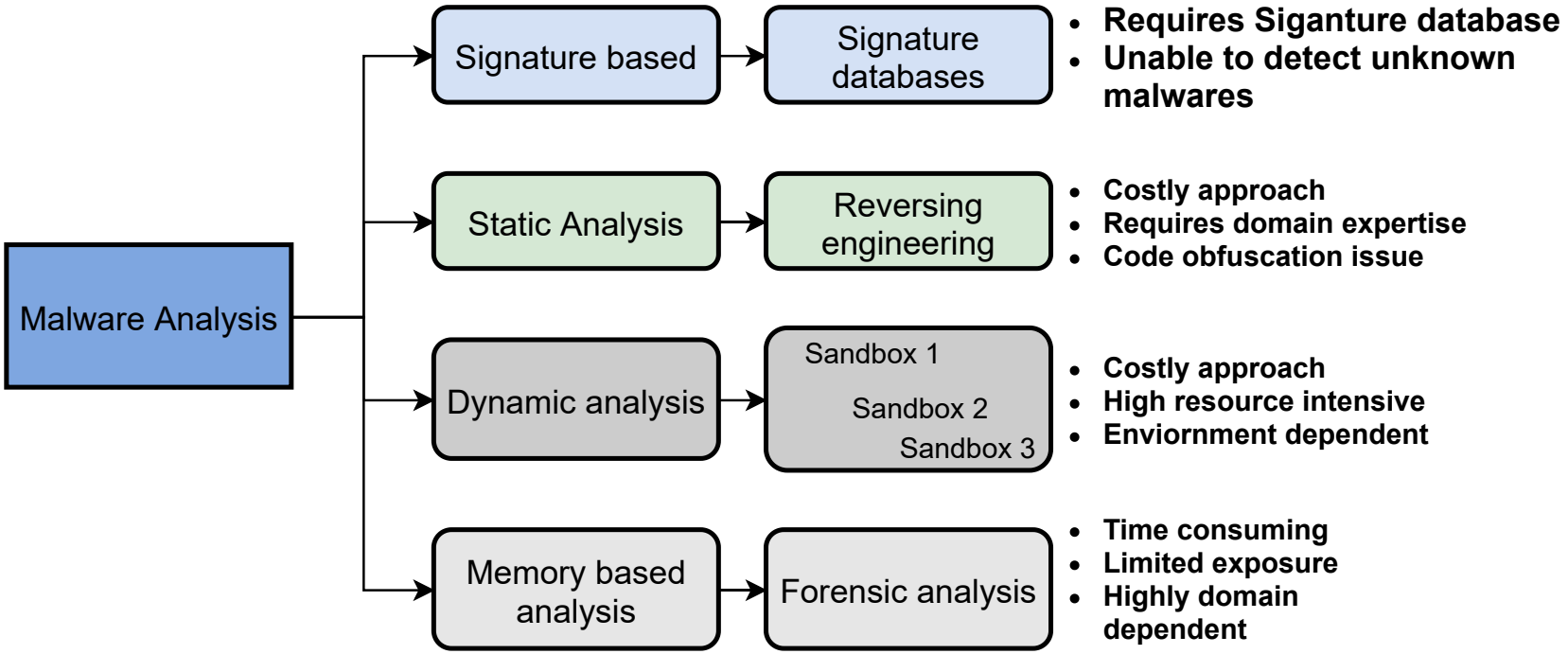
# Different Malware Threats



# What is Malware Analysis

- Malware analysis is the process of studying harmful software, or malware, to understand its characteristics, origins, and potential effects.
- The goal of malware analysis is to help security teams make informed decisions about how to detect and respond to malware.
- Malware analysis is the study of the unique features, objectives, sources, and potential effects of harmful software and code, such as spyware, viruses, malvertising, and ransomware. It analyzes malware code to understand how it varies from other kinds

# Malware Analysis Techniques

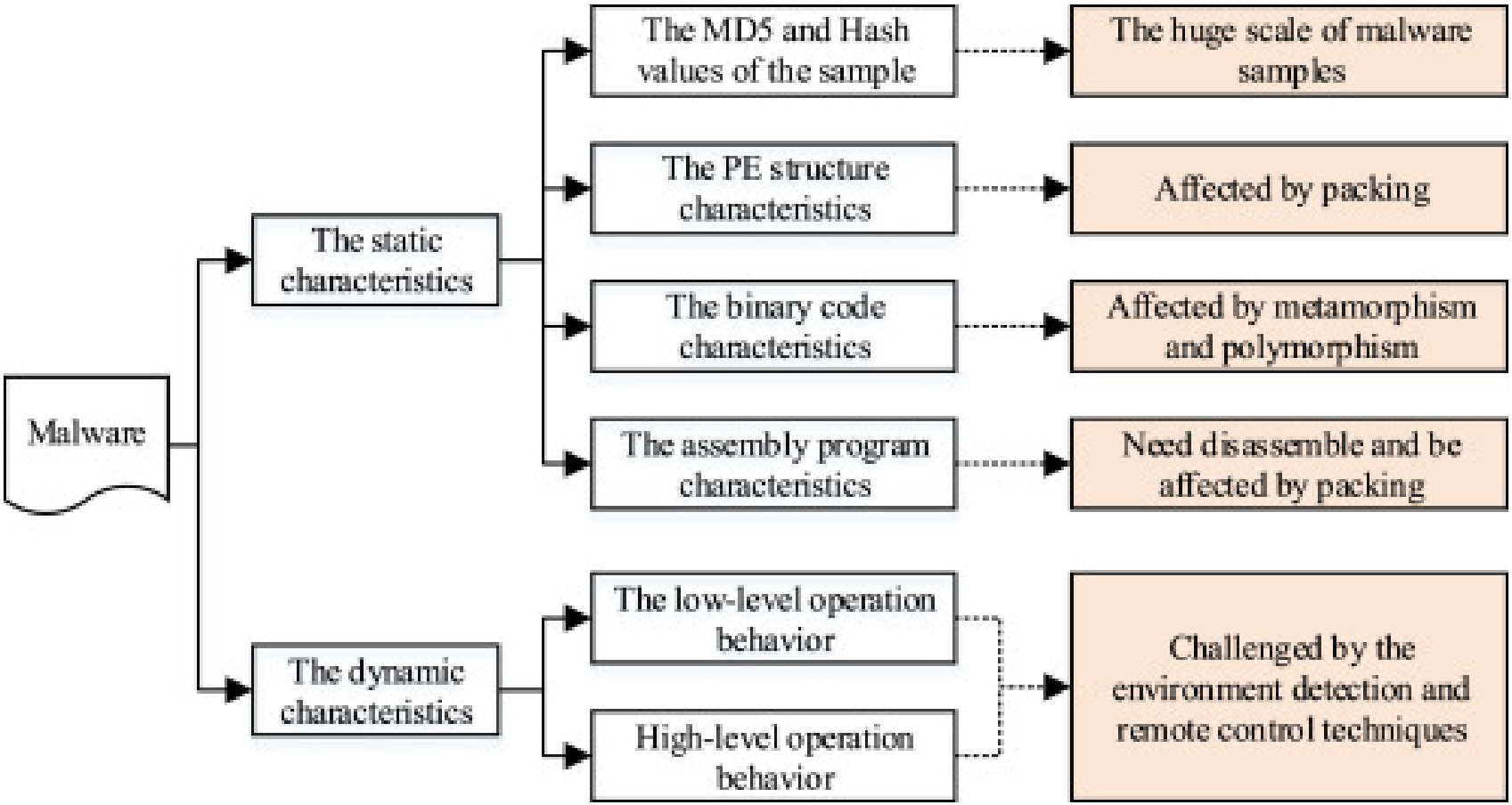



**Feature extraction through these approaches are highly dependence on domain knowledge**

# What are benefits of Malware Analysis

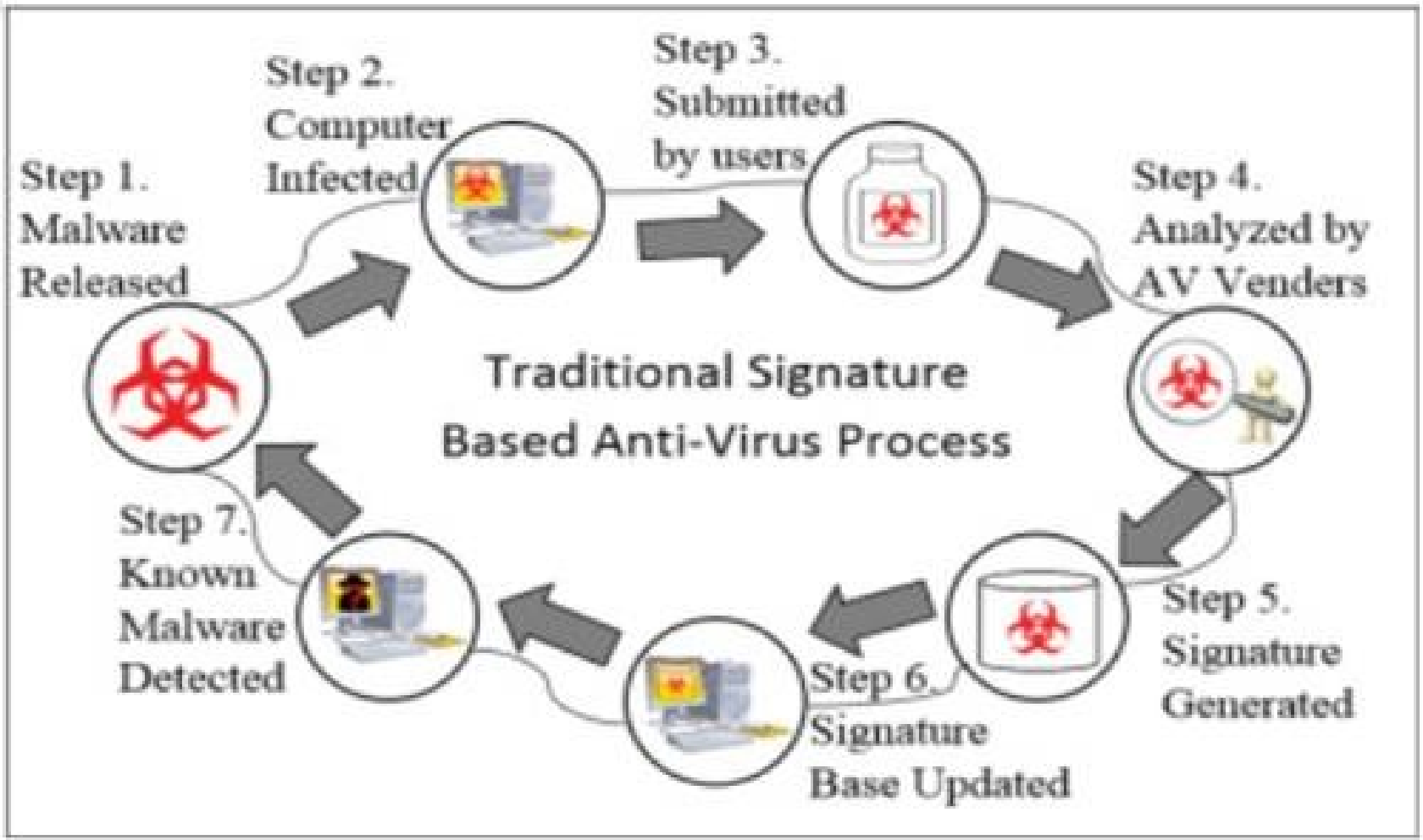
- Figure out how much damage an intrusion caused.
- Identify who may have installed malware inside the system.
- Determine the attack's level of sophistication.
- Pinpoint the exact vulnerability the malware exploited to access your system.

# Malware Analysis Techniques cont.

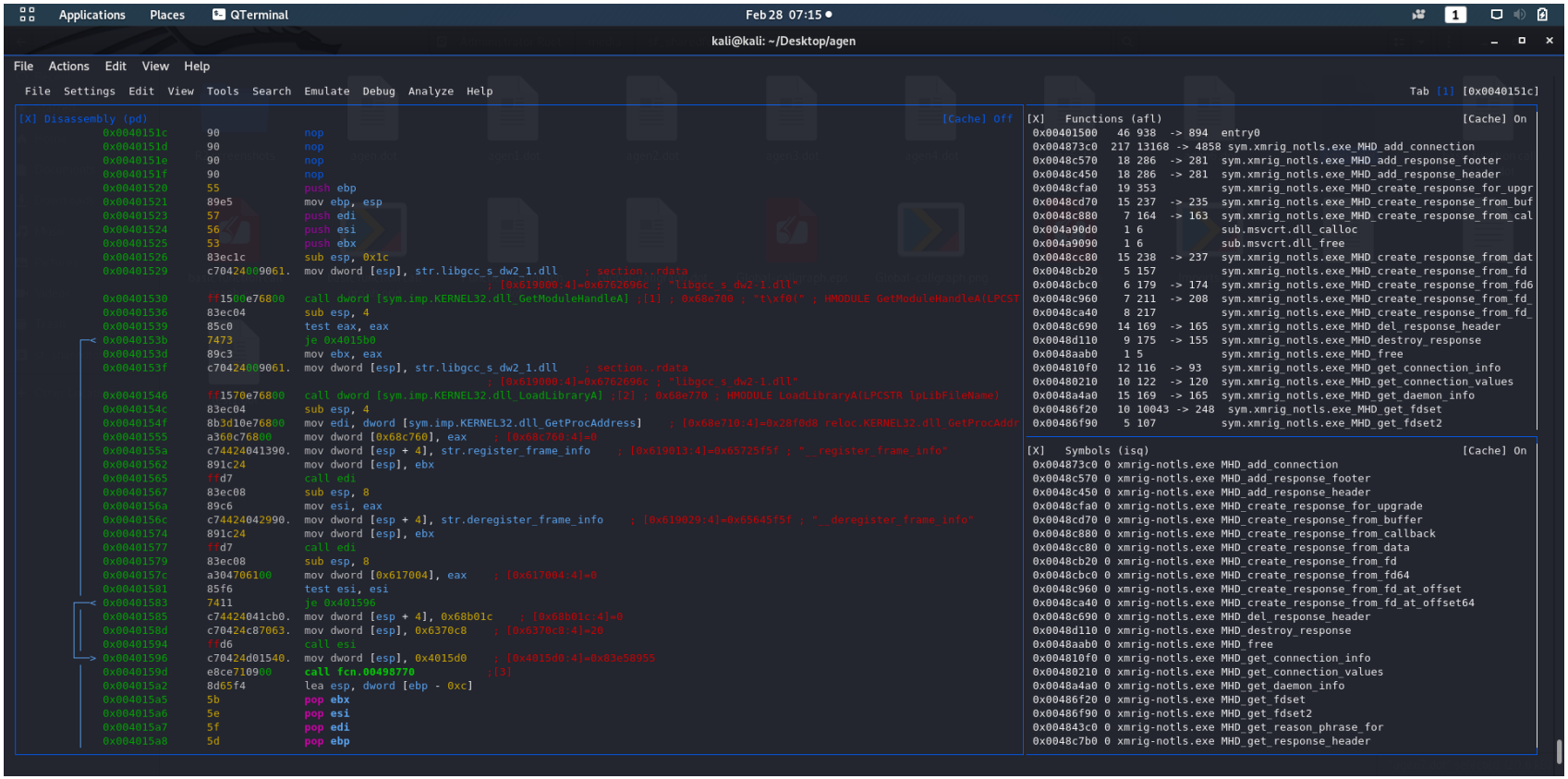


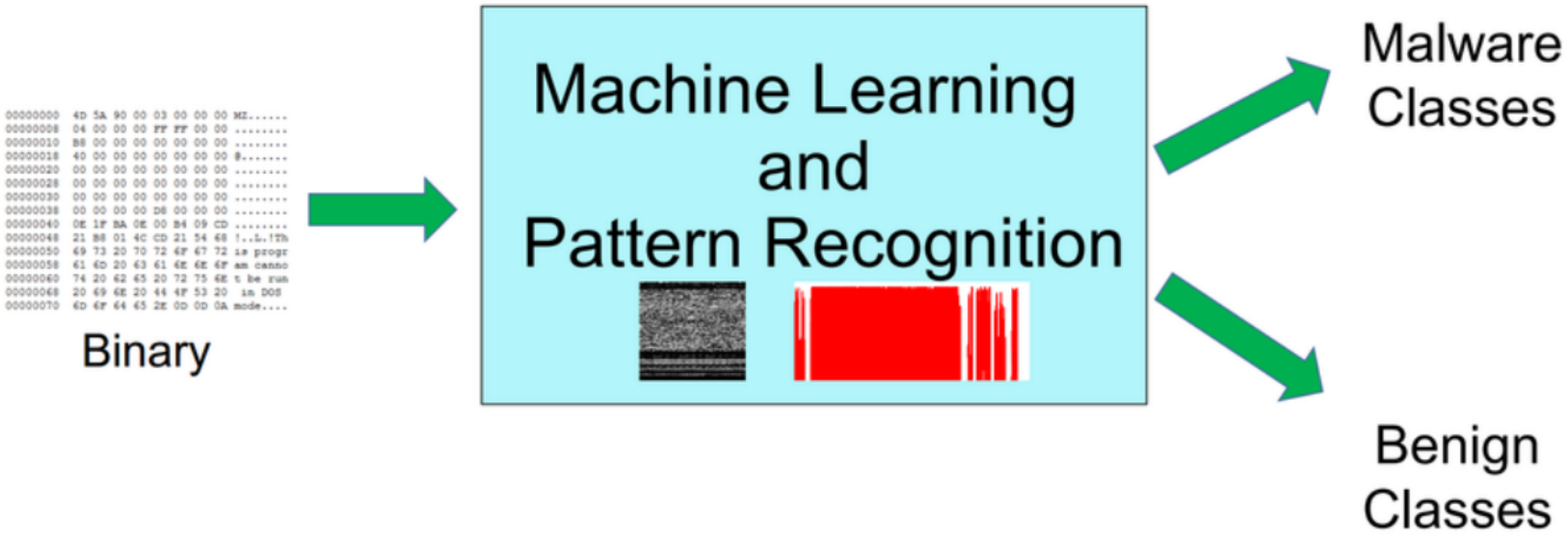

**Reference:** [Han+19]

# Traditional Signature-Based Malware Detection



# Malware Codes




Binary
Machine Learning
and
Pattern Recognition
Malware
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Classes

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# Pseudo-code for image conversion procedure.

**Input:** Malware Image dataset $D_i | i = 1, 2....m$

**for** *each* $D_i | i = 1, 2....m$ **do**

Read file related to $D_i$

Calculate the size of the file.

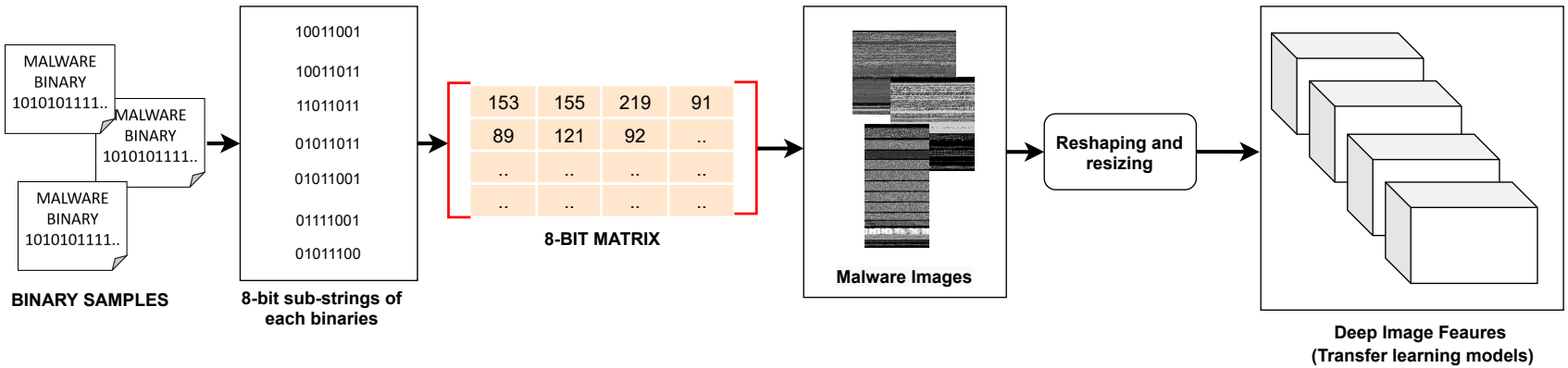
Initialize array,

Convert file into array of unsigned integer's $a$, between 0 and 255,

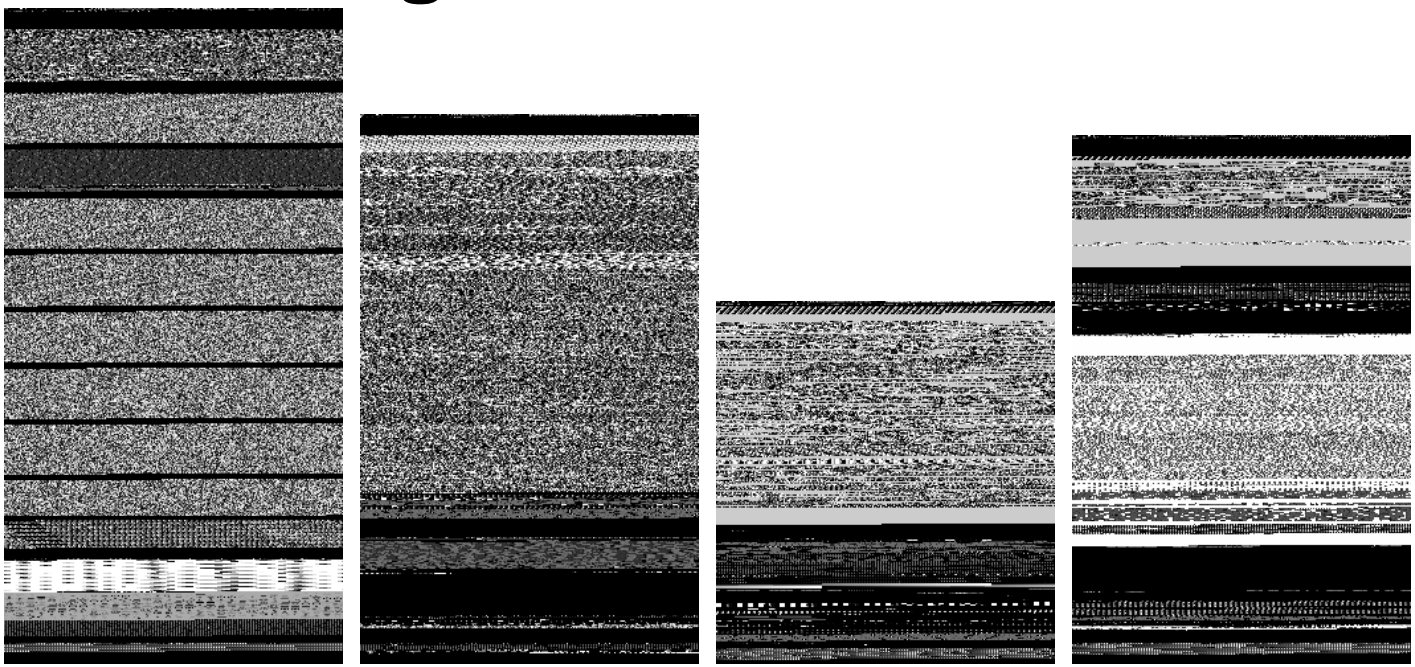
Convert array $a$ into $g$ as a 2-d array.

Convert the array $g$ into a grayscale image,

**end**

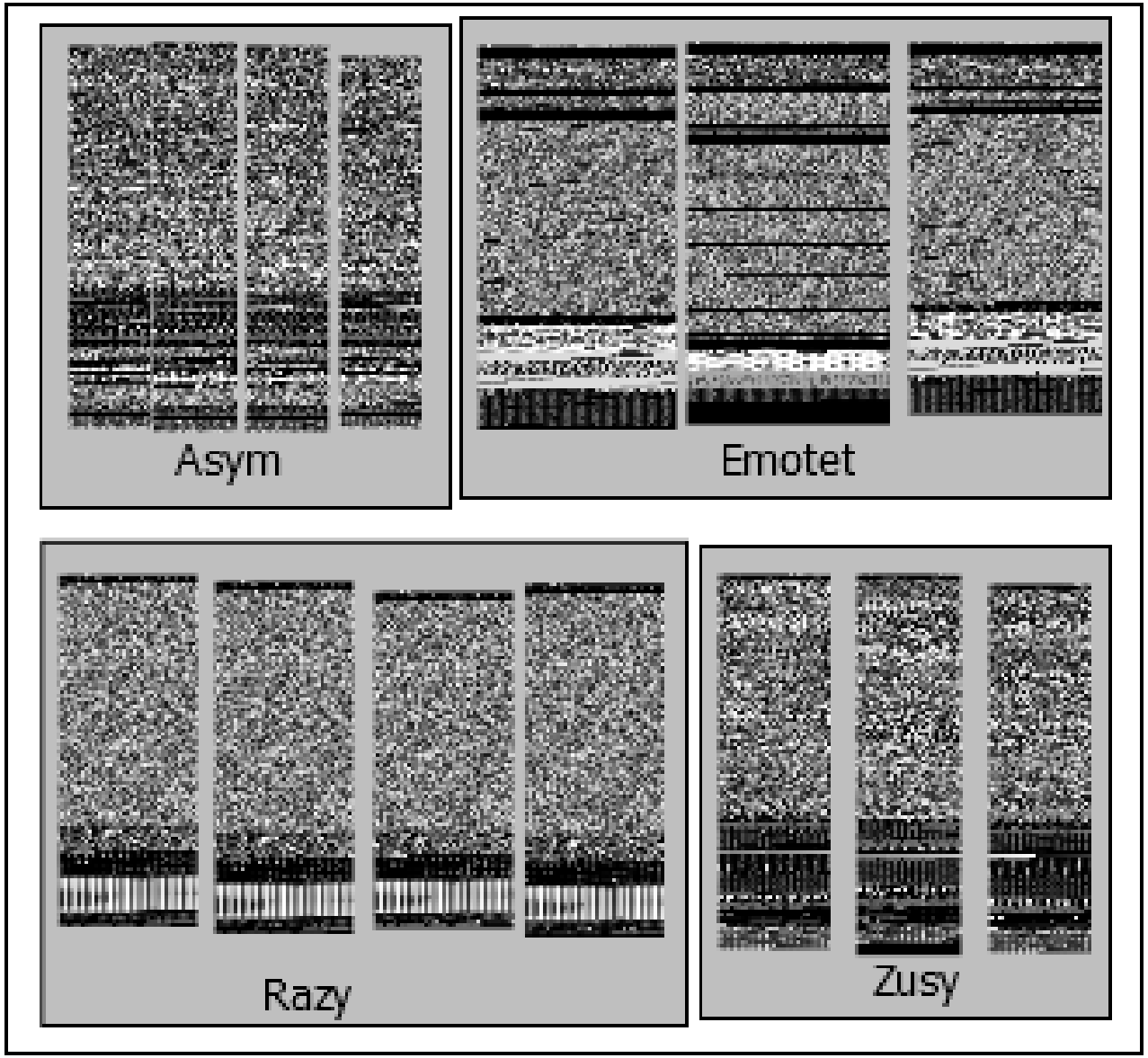


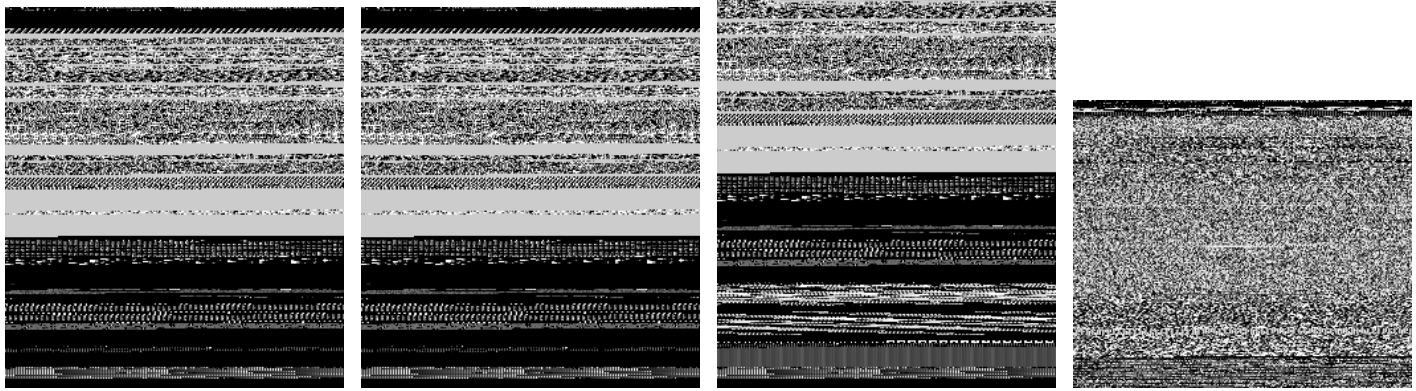
# Visualized images of a few real-world malware



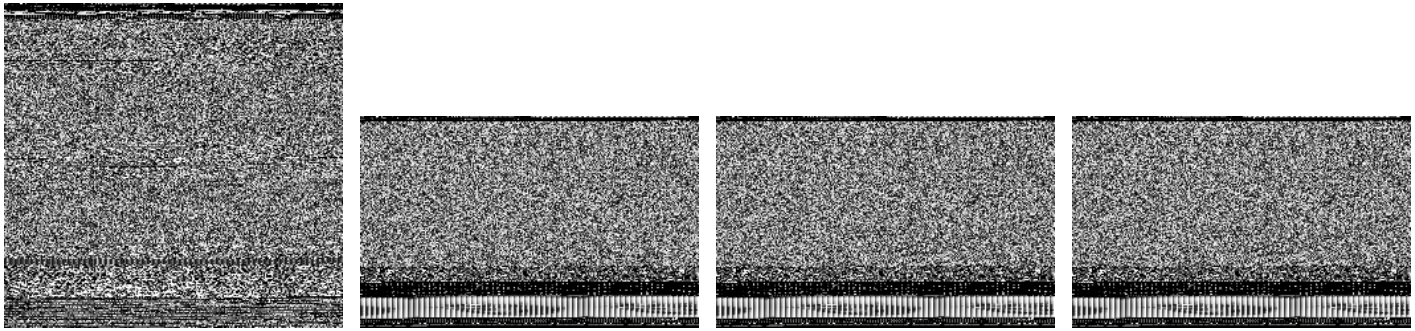
(a) Emotet. (b) Nitol. (c) Zusy. (d) Siscos.

# Similarity Analysis of same malware family



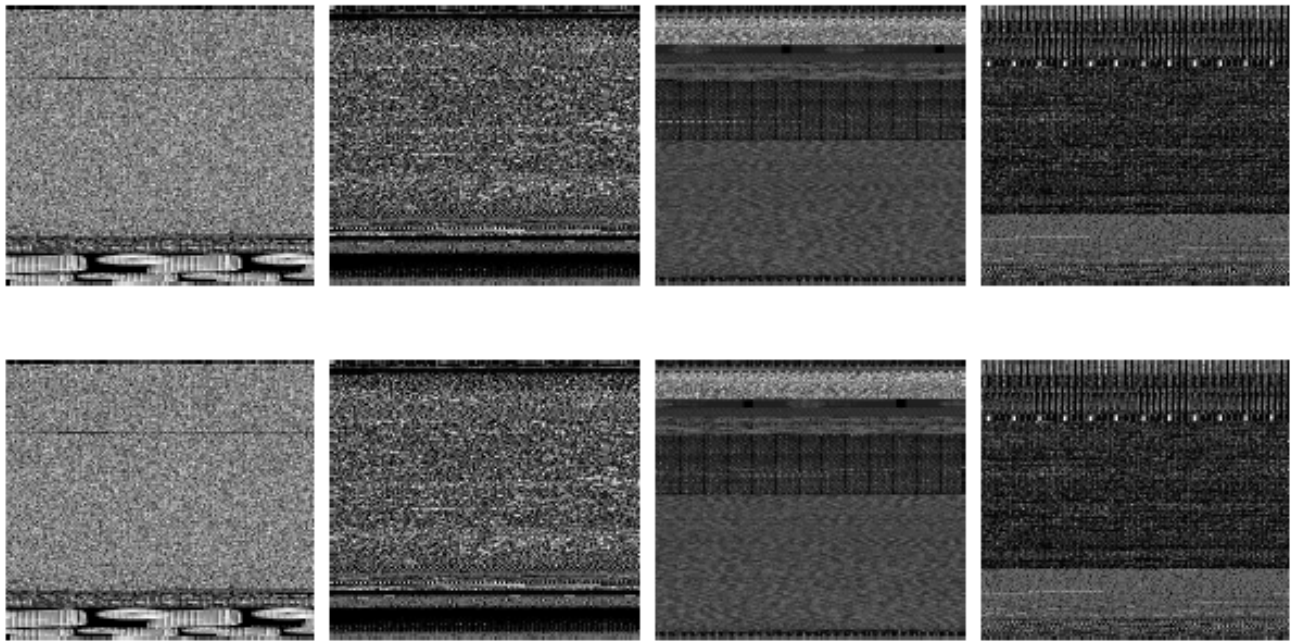


(a) UPX-farfli (b) UPX-farfli (c) UPX-farfli3 (d) UPX-nitol



(e) UPX-nitol (f) UPX-razy (g) UPX-razy (h) UPX-razy

# Examples of malware variants from different OS.



(a) Win (b) OS X (c) Linux (d) Android

Thank You!

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