TrueSeeing: Defensive software against text-encoding based invisible attacks

CAN304 Group 16 Presentation

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Introduction:
Do these two words look the same to you?

United states

United states

This happens because...

- Texts, like all other digital data, are stored in binary.
- We humans see texts visually.
- But some programs, like ChatGPT, compilers, search engines, see them in binary.
- And there are many ways to make texts that look the same but different in binary.

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State-of-the-art attack methods

Invisible Characters You cannot see some characters that a program can see.

Homoglyphs Different characters that look the same (the introduction).

Reordering Texts whose order looks different to you and to a computer program.

Deleteion Something you can see cannot be seen by a computer program.

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How to stop this...

- Make the programs see as you see (hard).
- Make you see the evil binary characters (easy).
- And remove them.

Therefore we present TrueSeeing

- It accepts texts from clipboard and files.
- It renders them in two ways simultaneously:
  1. What you would normally see.
  2. Expose all the evil characters.
- Then you are allowed to make modifications to the text until all evil characters are gone.

Prevent the text from being exploited again

TrueSeeing also allows you to give a digital signature to the neutralised text: RSA-FDH

- Gen: RSAGen: public key (N, e), private key (N, d)
- Sign: $\sigma = H(m)^d \bmod N$
- Vrfy:

$$Vrfy_{pk}(m, \sigma) = \begin{cases} 1, & \text{if } \sigma^e = H(m) \bmod N \\ 0, & \text{otherwise} \end{cases}$$

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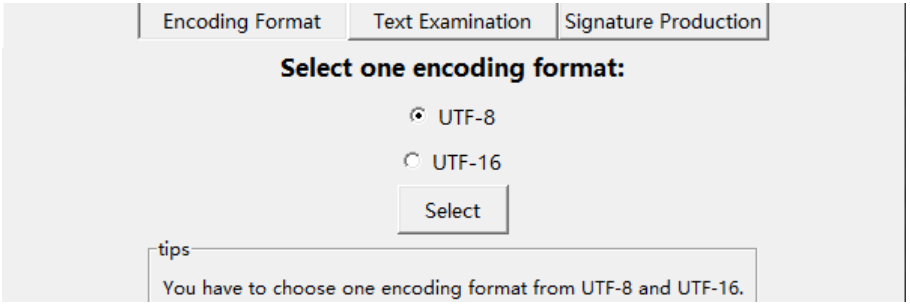
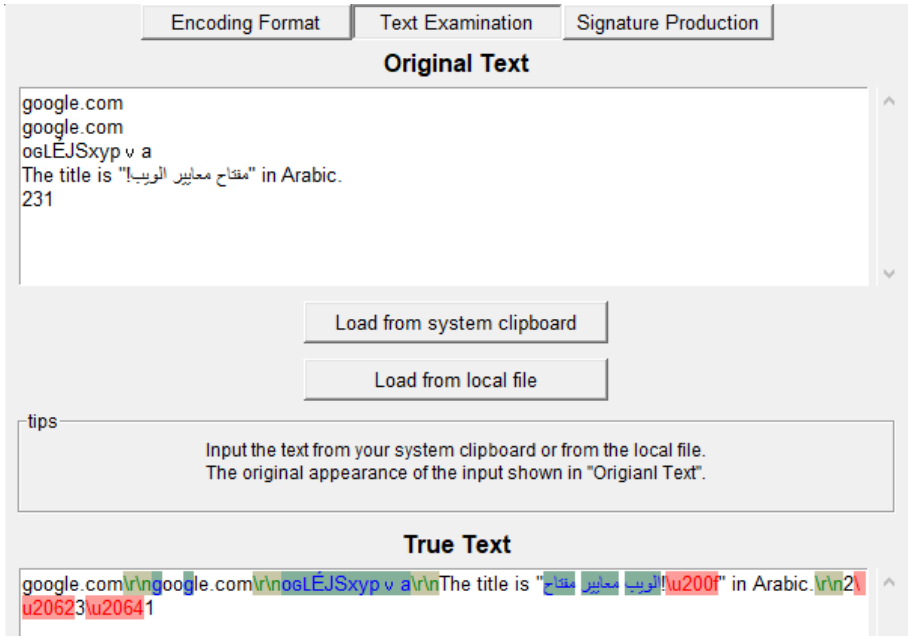
Demonstration: TrueSeeing - Encoding Format

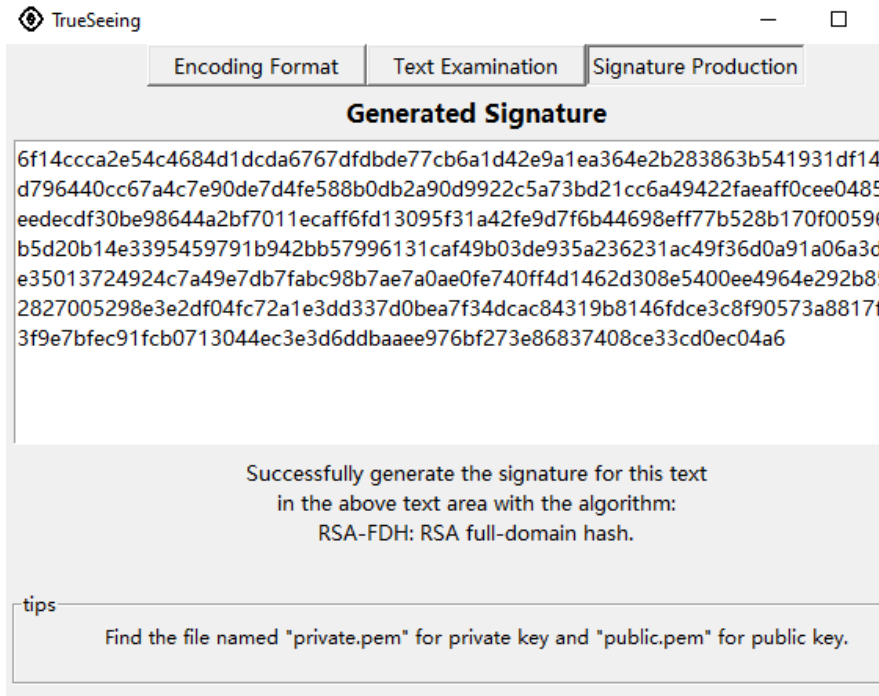
Choose Encoding format



Revealing Malicious Characters



Digital Signature



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Thank You

Feel free to ask Questions.

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