Steganography Over Multiple Cover Images

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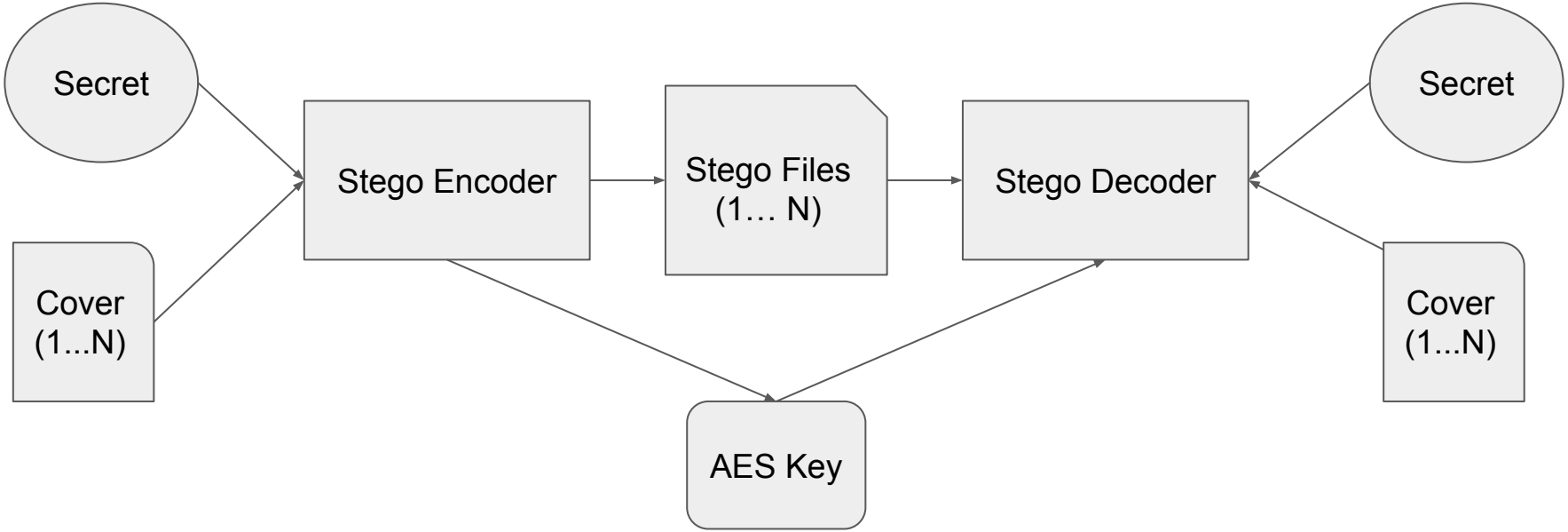
What is Steganography?

- From the Greek words “steganos” meaning covered and “graphien” meaning writing
- Hiding a secret message within another medium
- Different from encryption, where the message is clearly visible but unreadable
- Instead the fact that a message exists is concealed

Project Goals

- Develop a Steganographic algorithm that:
  - Securely encrypts the message payload using
  - Divides the encrypted message into smaller chunks
  - Embeds each chunk into separate cover files
  - Is able to recover the embedded data
- Measure the algorithm’s:
  - Robustness
  - Detectability
  - Practicality

Design


Secret
Cover
(1...N)
Stego Encoder
Stego Files
(1… N)
Stego Decoder
Secret
Cover
(1...N)
AES Key

What We Used

- Implemented in Python
  - Python Image Library (PIL) for image processing
  - PyCrypto for encryption
- Encryption algorithm
  - AES symmetric key encryption
  - Generates a 128 bit key for the user (represented in Hex)
- Steganographic technique
  - Least Significant Bit of Red channel
  - PNG and BMP cover files
- See the source at:
  - https://github.com/mm10ws/StegoPy

Demo

Results

- Performance
  - O(m*n) performance for encoding and decoding secrets
  - Can encode 2*m*n bit per image
- Flexibility
  - Can embed any type of secret file (txt, mp3, etc.)
- Security
  - Secure key generation instead of passwords
  - AES 128 bit symmetric encryption
- Steganalysis
  - revealed existence of secret
  - secret is not readable

Conclusion

- Lessons Learned
  - Steganography is useful for preserving receiver anonymity
  - Steganalysis detects LSB steganography
  - Distributed Steganography can prevent an attacker from having all the pieces
  - Good defense against casual observers
- Future Work
  - Add redundancy and checksums
  - Implement different steganography schemes
  - Compare implementation with other steganography software
  - Encode secret across the Green and Blue color channels

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