Powerful Generative Steganography With Generative Adversarial Networks

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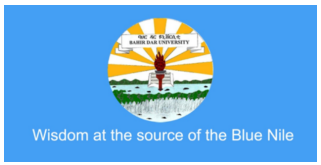

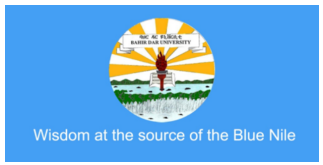

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- Steganography
  - Hiding Information in plain sight.
  - simmon's prisoners. (Simmons, 1984)

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- GAN

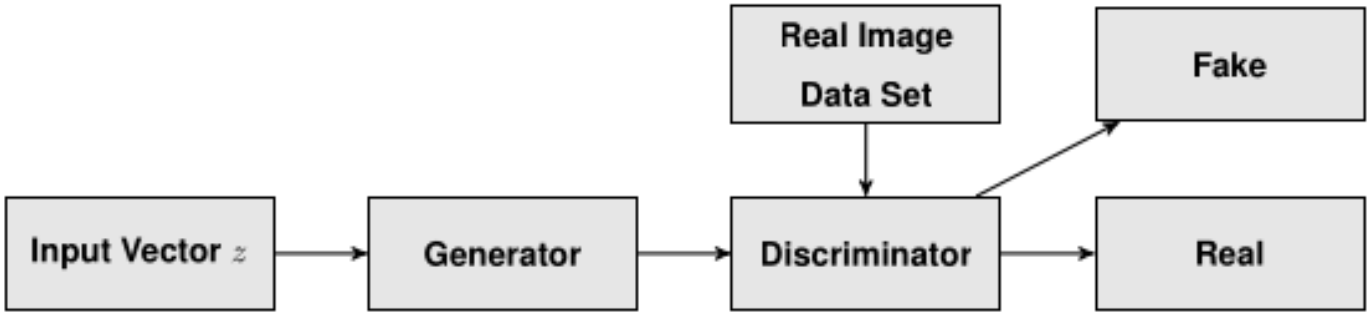

Figure: GAN

$$\min_G \max_D V(D,G) = E_{x\ p_{data}(x)}[logD(x)] + E_{z\ p_z(z)}[log(1-D(G(z)))].$$

Requirements for steganography

- Imperceptibility
- Robustness
- payload capacity

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Literature Review

Different approaches to steganography

- cover modification
- cover synthesis: (Fridrich, 2009)

GAN in Steganography.

- (Volkhonskiy et al., 2017)
- (Shi et al., 2017)
- And some more others (Tang et al., 2017),(Hayes & Danezis, 2017)

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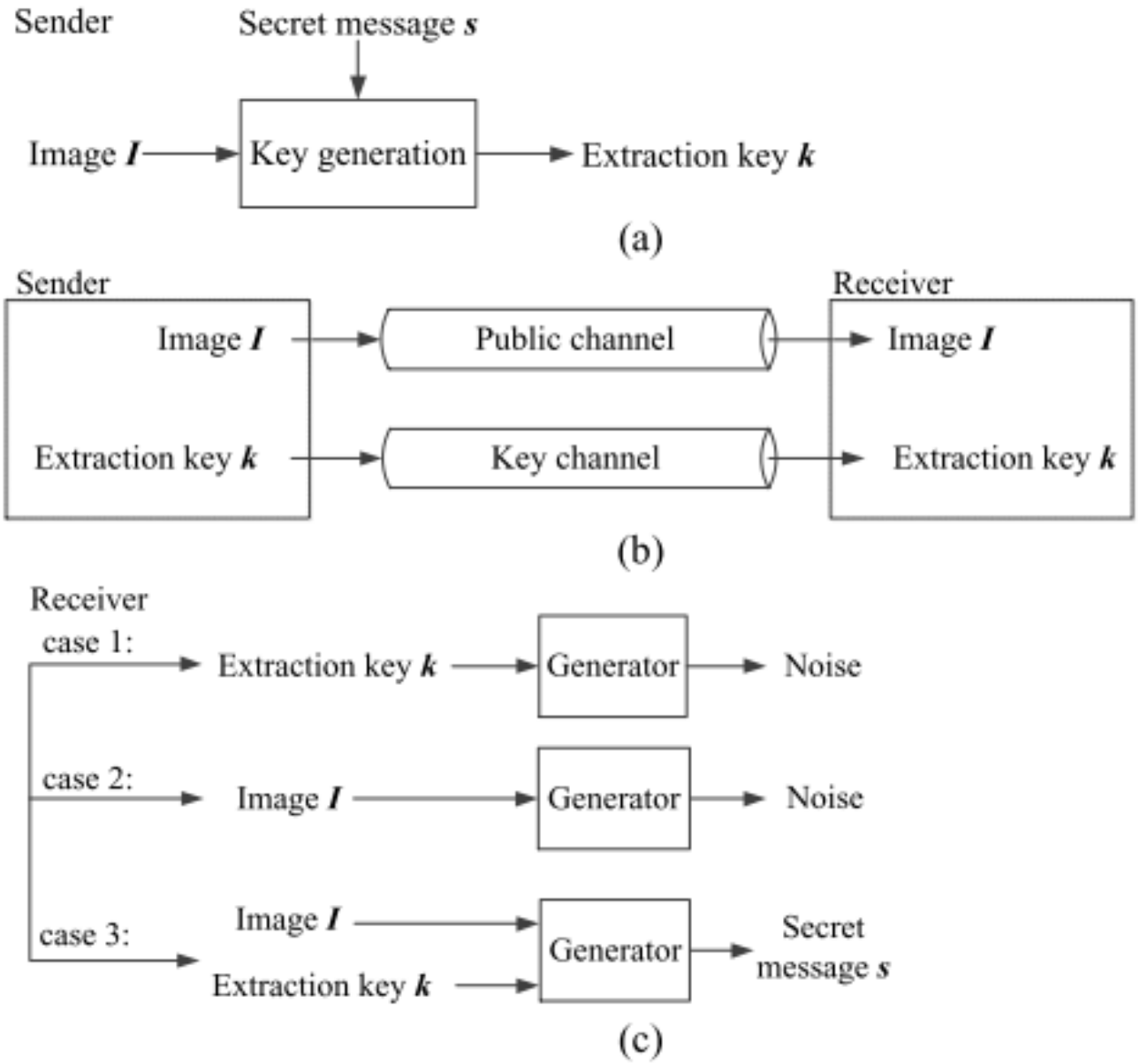

Figure: Proposed System in (Ke et al., 2017)

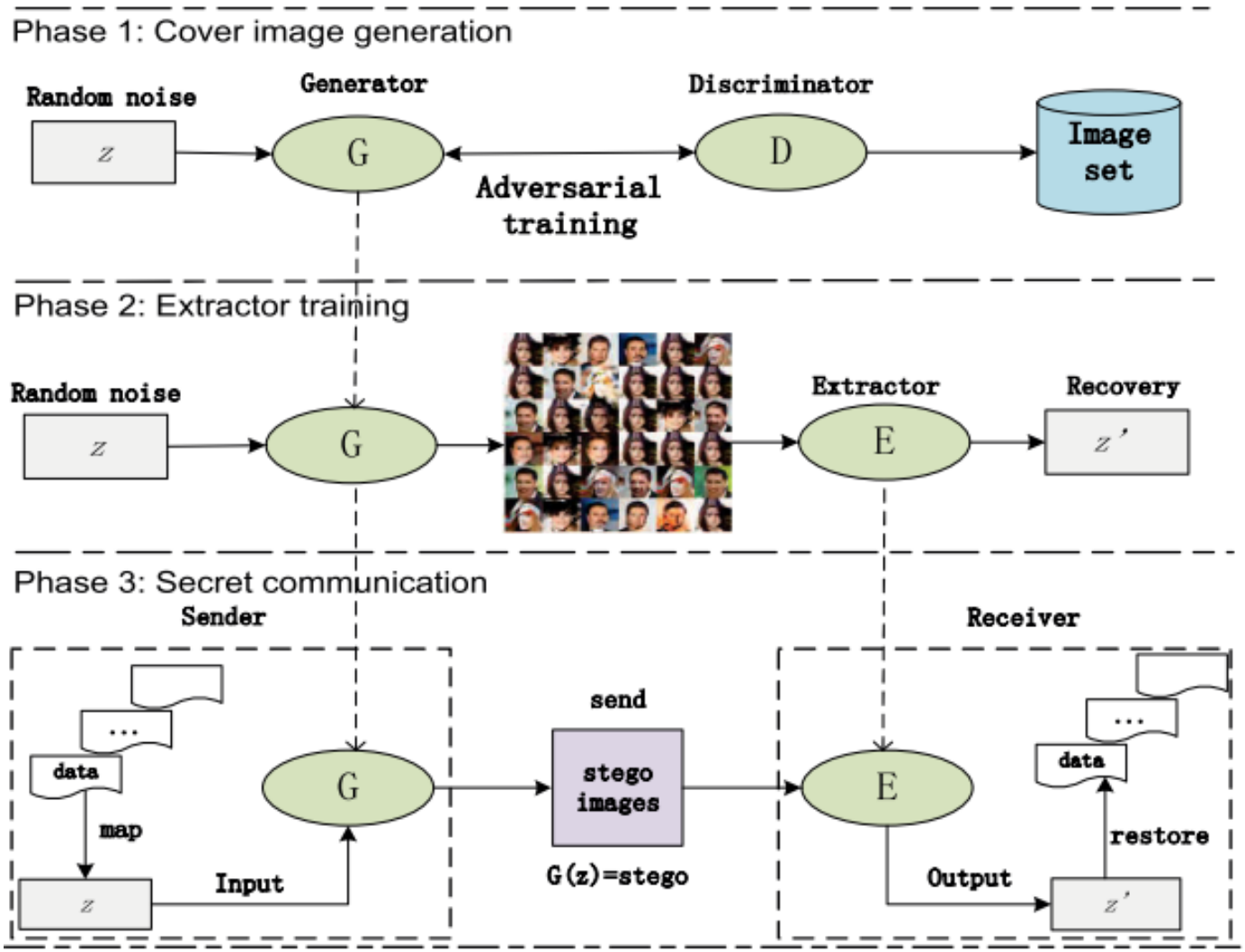

Figure: Proposed System in (Hu et al., 2018)

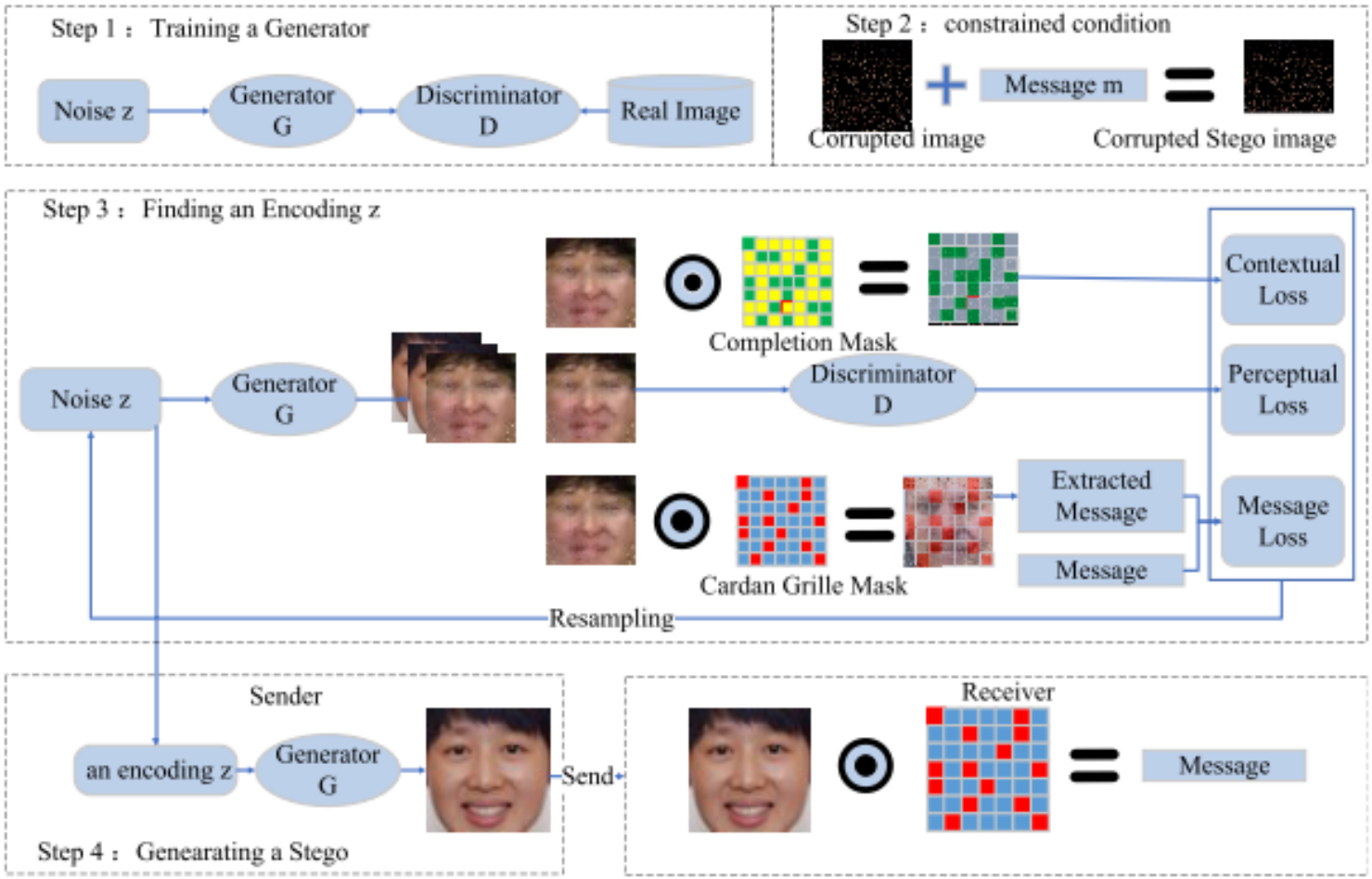

Figure: Proposed System in (Zhang & Yang, 2019)

Problem Statement

Observed problems:

- Instability of Training
- Slow convergence
- Inadequately realistic image generation

"This is mainly associated to the GAN technique used in the framework."

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Objectives

Design and implement a powerful generative steganographic framework using a most suitable GAN.

Specific objectives:

- Improve stability of Training and convergence speed.
- Generate more realistic image.
- Maintain state of the art security.

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Methodology

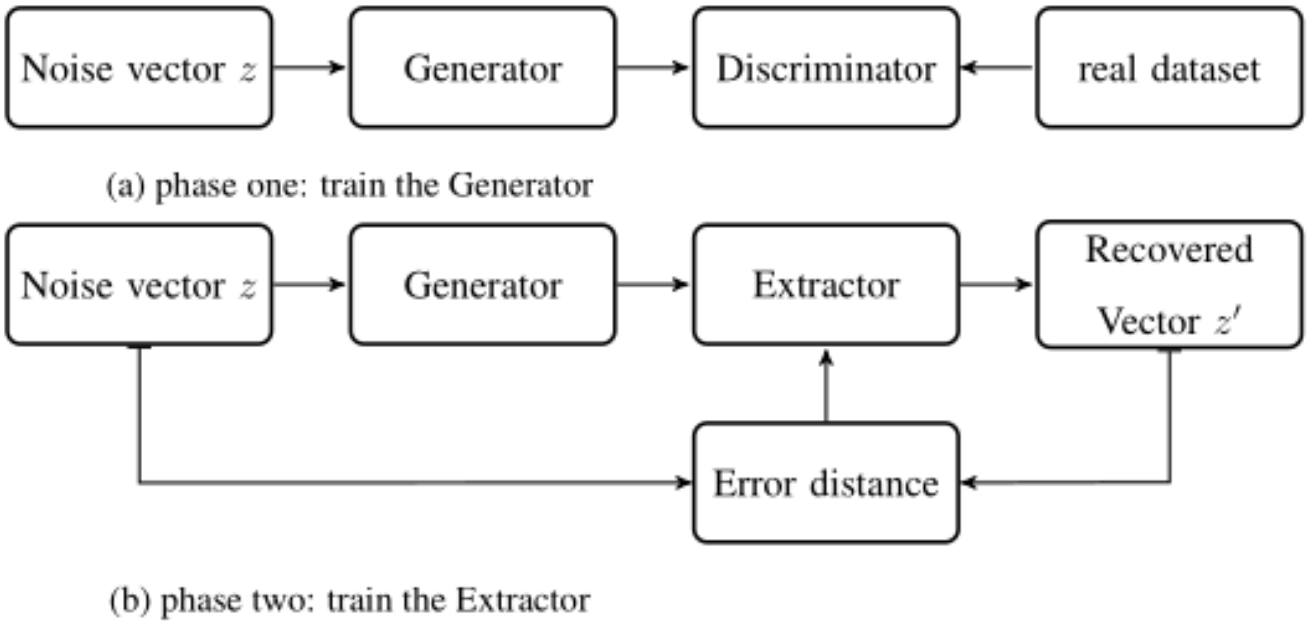

Figure: System Architecture

Choice of GAN:

- BEGAN
- RGAN
- WGAN-DIV
- WGAN-GP

Choice of dataset:

- CelebA
- LFW
- Food101
- MNIST

Choice of testing method:

- Visual instpection
- Inception score
- Visual Turing test
- MOS

Scope

- Robustness
- Passive Adversary
- Payload Capacity
- Imperceptibility

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Significance Of The Study

The main problem in generative steganography

Imperceptibility

Work Plan

Tasks	Month	December				January				February				March				April				May				June			
	Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Literature Review																													
2. Implementation																													
2.1 With BEGAN																													
2.2 With WGAN-DIV																													
2.3 With WGAN-GP																													
2.4 With RGAN																													
2.5. Extractor																													
3. Train Implementations																													
4. Run Tests																													
5. Analysis																													
6. Documentation																													
7. Draft Report submission																													
8. Final Report submission																													

Figure: Proposed work plan

Budget

Main cost of the project:

- Powerful GPU for training.
  - From the university
  - Amazon EC2
  - Google Cloud

Reference I

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THANK YOU