DC GAN – GO GAME

Deep Learning Final Project

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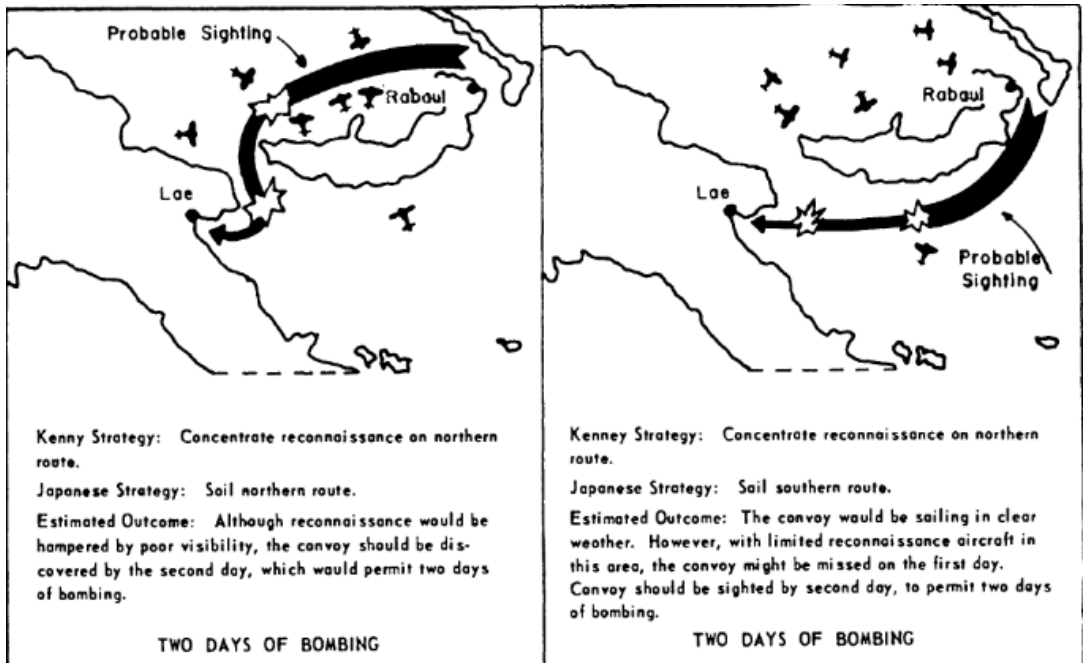
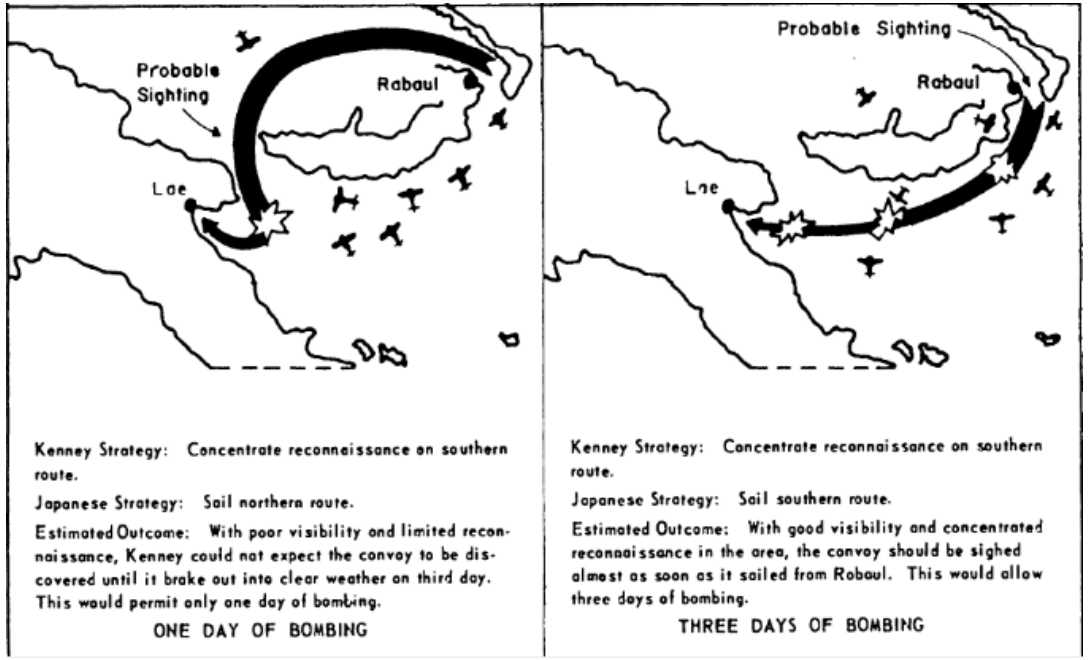




INTRODUCTION

Deep Convolutional Generative Adversarial Networks

“The underlying idea behind GAN is that it contains two neural networks that compete against each other in a zero-sum game framework, i.e. generator and a discriminator.”

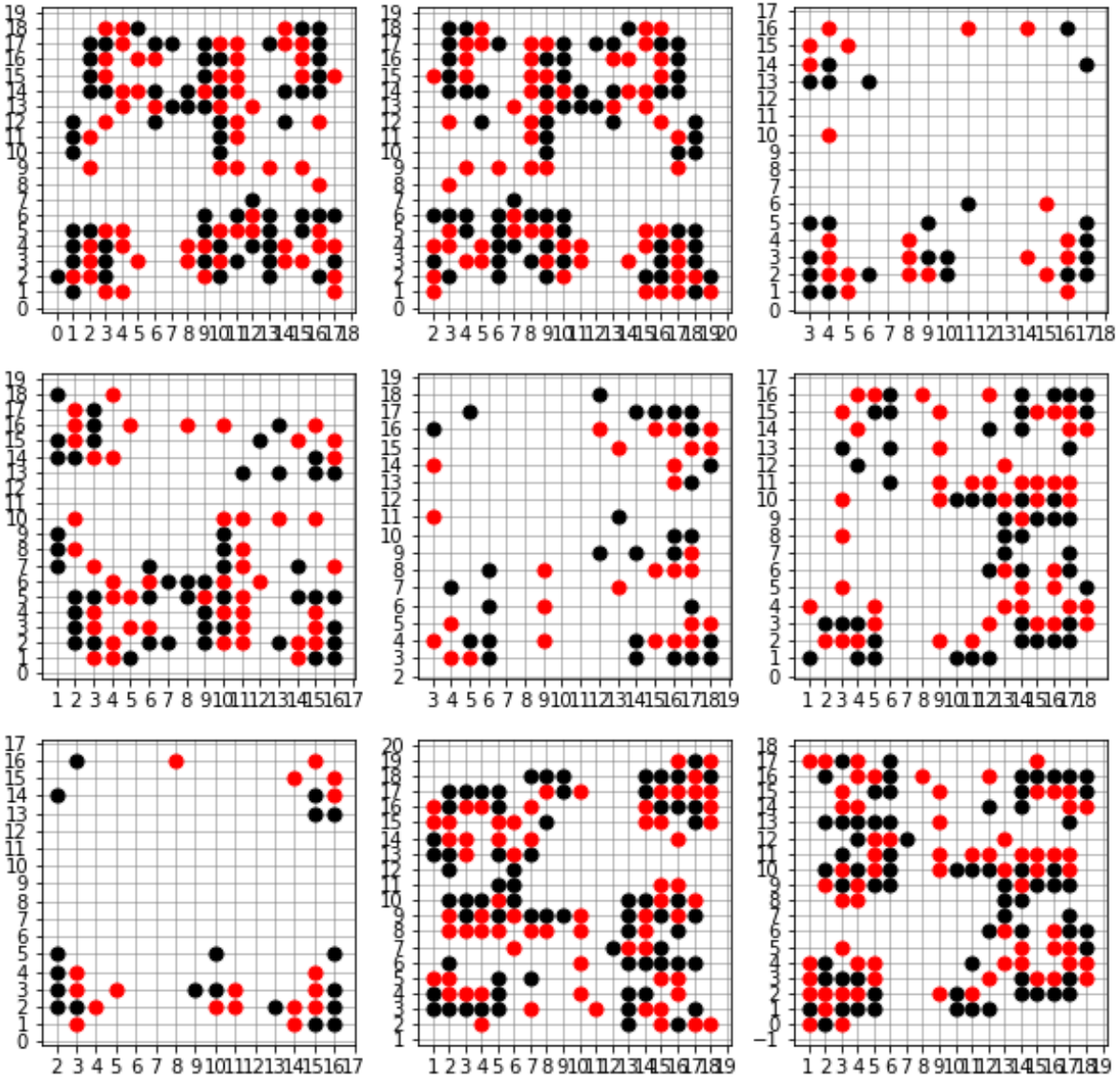
Game Theory (Minimax)

		Japanese strategies		Minimum of row
		#1	#2	
Kenney strategies	#1	2 days	2 days	2 days (maximin)
	#2	1 day	3 days	1 day
Maximum of column		2 days (minimax)	3 days	

How to Play GO

Data preparation

- Source
  - github https://github.com/timlyrics/gangengo
  - Download with git clone
- Format
  - Kifu formatted zipped text files
    `B[pd];W[dd];B[pp];W[dp];`
  - From old professional and AI games
- Extraction
  - Over 80,000 games
  - Remove bad characters
- Unrolling
  - Replay each step and record snapshot
  - Bitmap of 20x20 (padded from 19x19)
  - Two binary channels
  - Transpose and mirror

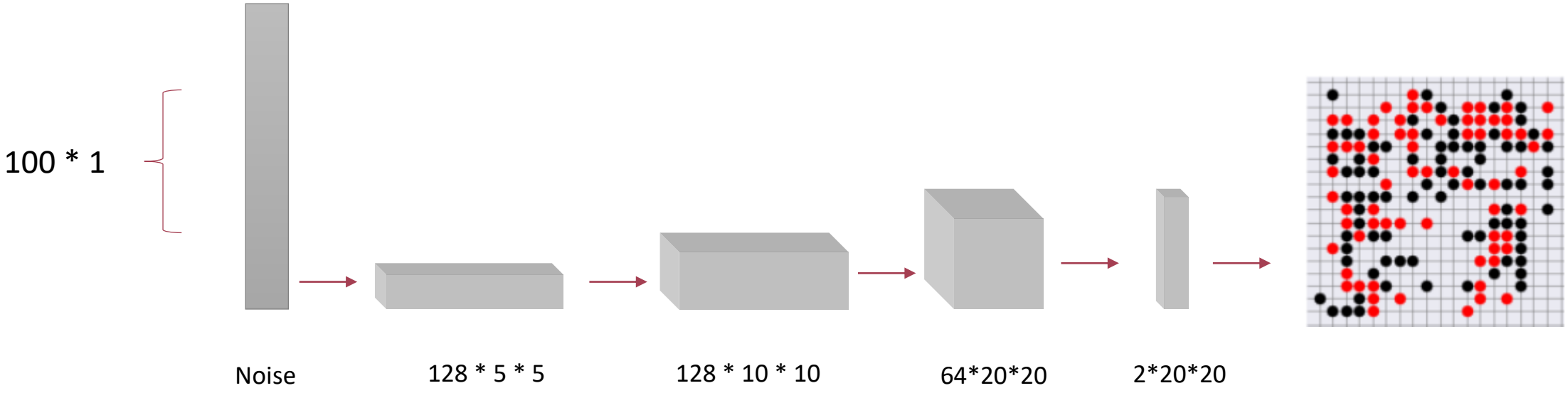


Data preparation

- Packaging
  - Over 512 GB of raw data
  - That’s too much! Even after zipping
  - Dynamically unroll kifu while training
- Unsupervised training
  - All data is considered real (1)
  - Random noise is considered fake (0)
- Testing & validation
  - No objective way to either test or validate
  - Observe loss function to have confidence
- Example snapshot

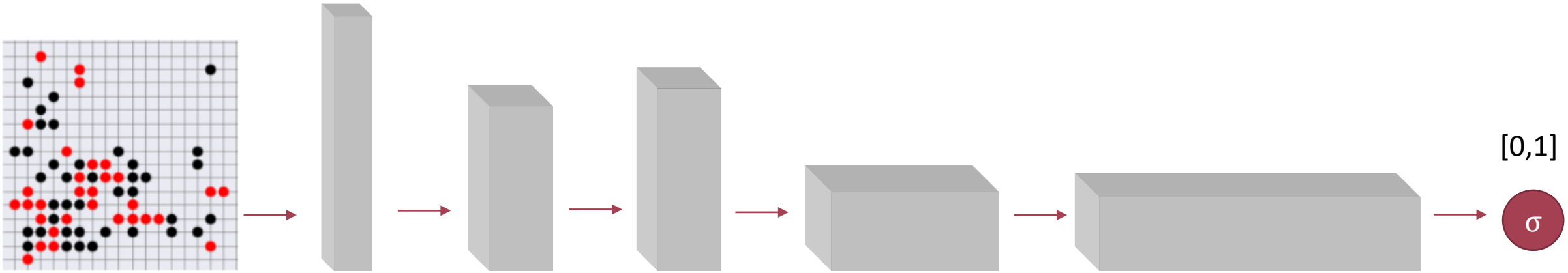
Generator

- Generative Model
- Selection of layers
- Regularization Method: Dropout
- Parameter
- Loss function

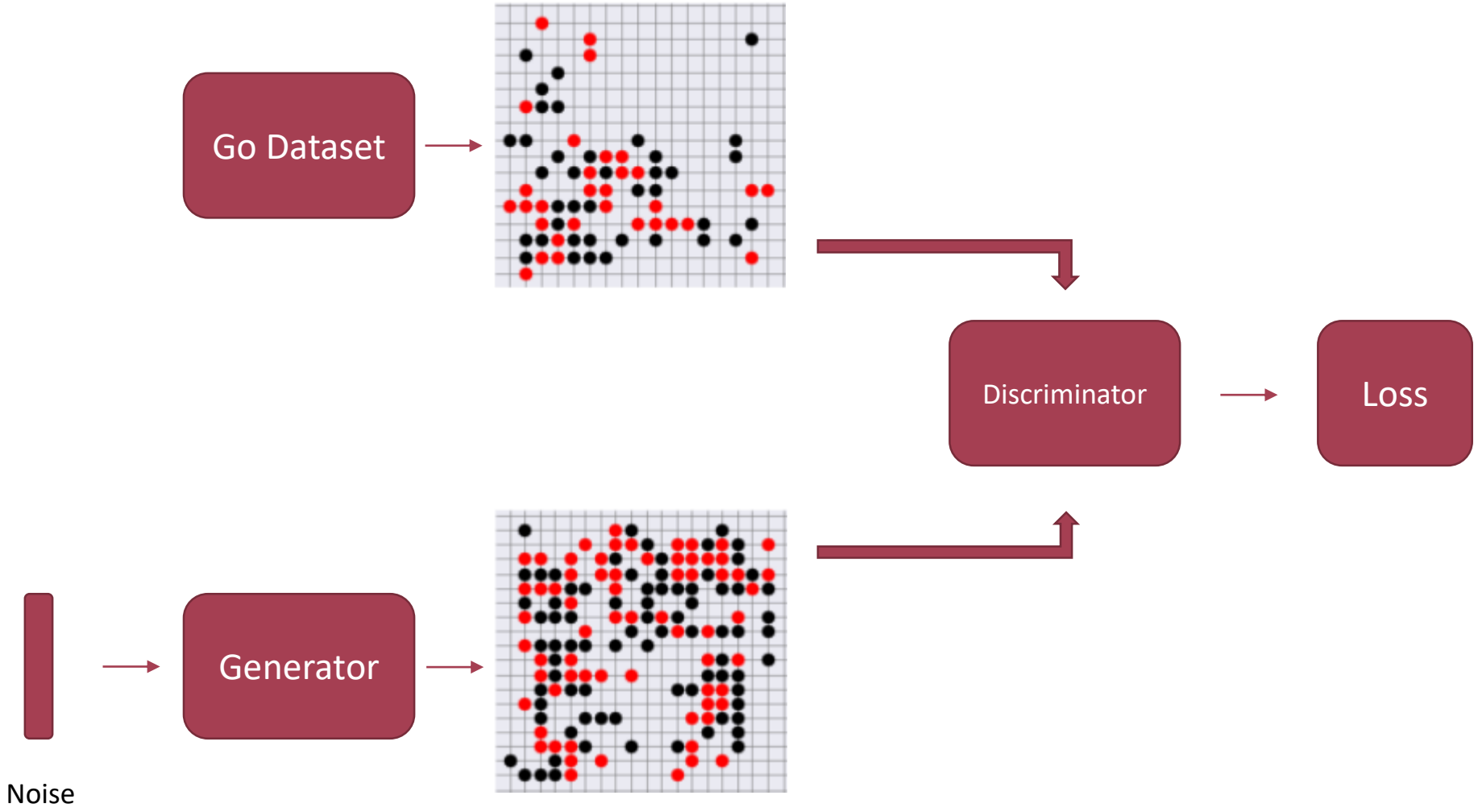


Discriminator

- Discriminator Model
- Selection of layers
- Regularization Method: Dropout
- Parameter
- Loss function



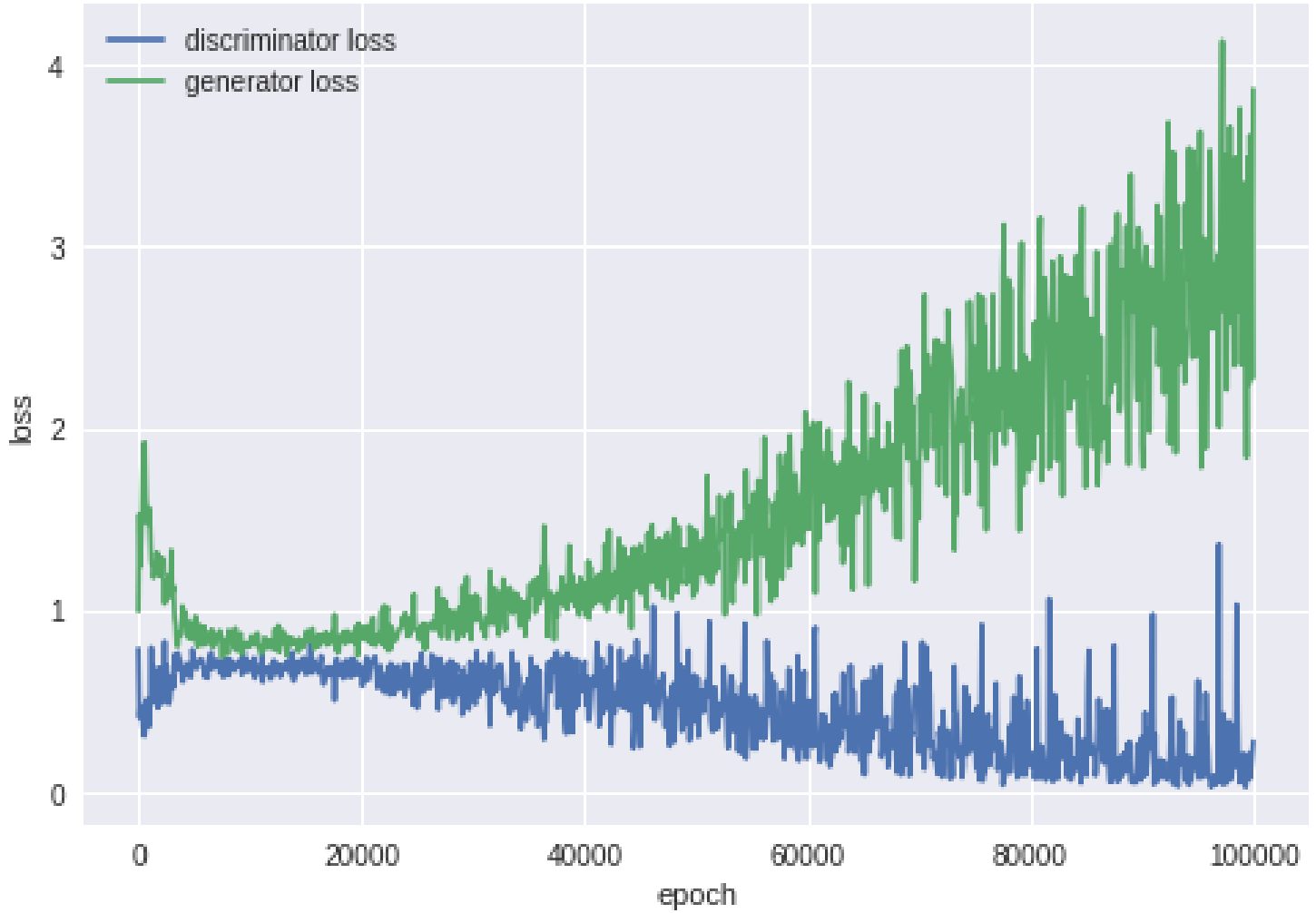
Loss Function



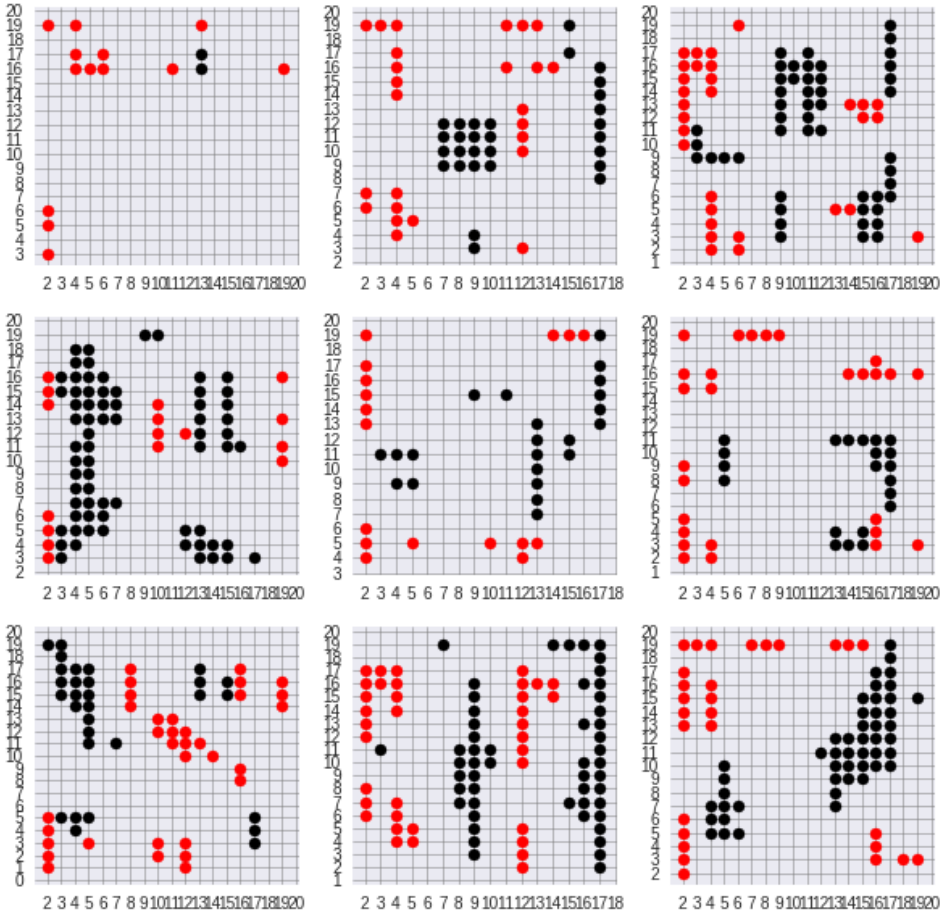
Fine Tune

- Deviated from DC Gan reference design
  - Each pixel carries two channel
  - Two channels do not coincide
  - Each channel is binary
  - Go has global and local logic
- Learning rate
  - Discriminator can easily overpower
  - gen=0.0001 disc=0.00002 (decay = 1e-6)
- Batch size
  - Must feed the beast slowly
  - Batch size = 128
- Generator
  - Output activation is sigmoid
  - Latent dimension is reduced to 32
- Discriminator
  - First CNN layer has no zero padding

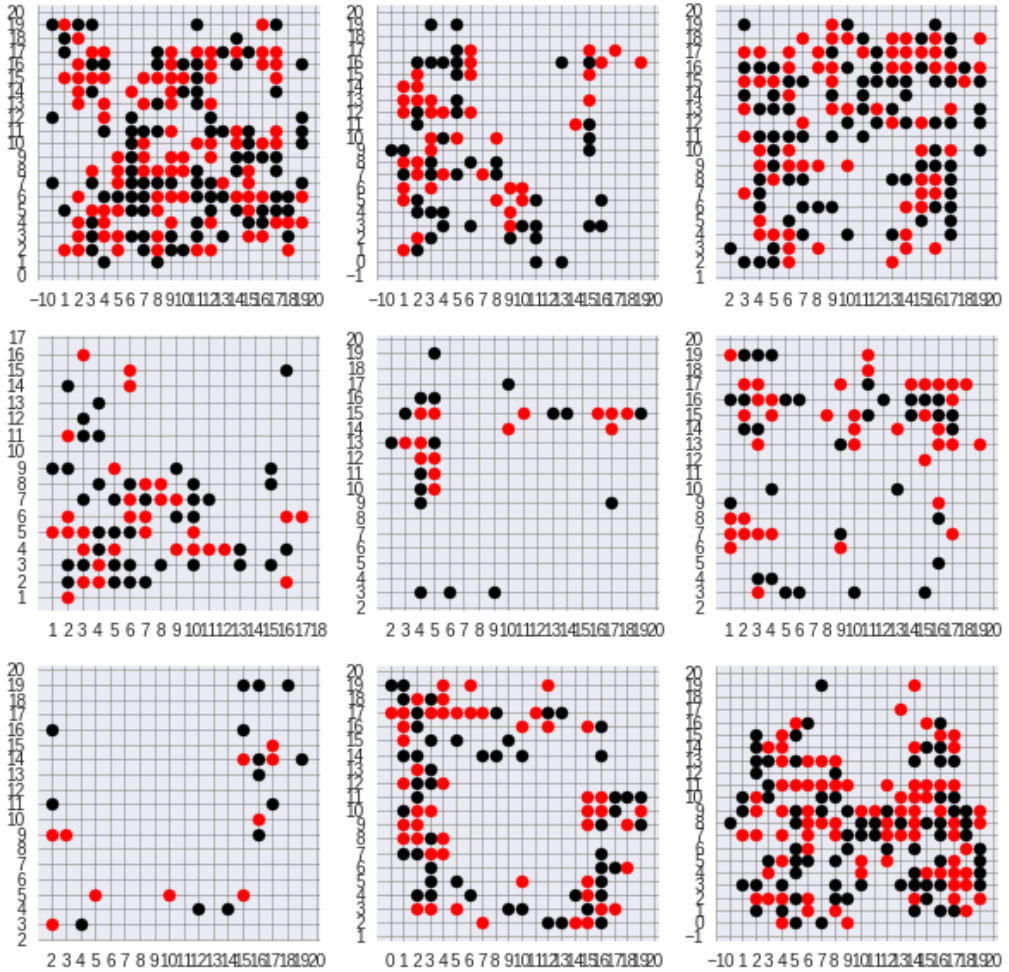
Result – Loss Function



Result - Output



500 Epochs



100,000 Epochs

Question


THANK YOU