



Mario Music

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Proposal Updates

- Mario music → unchanged
- rhythmic structure → notes
- GAN → unchanged

Sources of MIDI Files

Super Mario Bros (7)

- Overworld Main Theme
- Rescue Fanfare
- Starman Theme
- Underwater Theme
- Underworld Theme
- Castle Theme
- Ending Theme

Paper Mario 64 (6)

- Crystal Palace
- Koopa Village
- Starborn Valley
- Title Screen
- Tubba Blubba Battle
- Yoshi Island 2

Super Mario 64 (7)

- Cool Cool Mountain
- Dire Dire Docks
- Koopa Theme
- Lava Lava Island
- Title Theme
- Inside the Castle Walls
- Bob-omb Battlefield

Development Process

1. Tensorflow Deep Convolutional Generative Adversarial Network (DCGAN) tutorial
 - a. Issue: Convolutional Neural Network (CNN)
2. Towards Data Science Medium article about generating Pokemon music in 2 ways: LSTM, GAN
 - a. Issue: Bugs with hard-coded values in their code

Training Set-Up

- input: 100 notes (data), actual next note (label)
- output: predicted next note
- 50 epochs
- tracking loss values for generator and discriminator

Iteration 0: Tutorial w/ Bug Workarounds

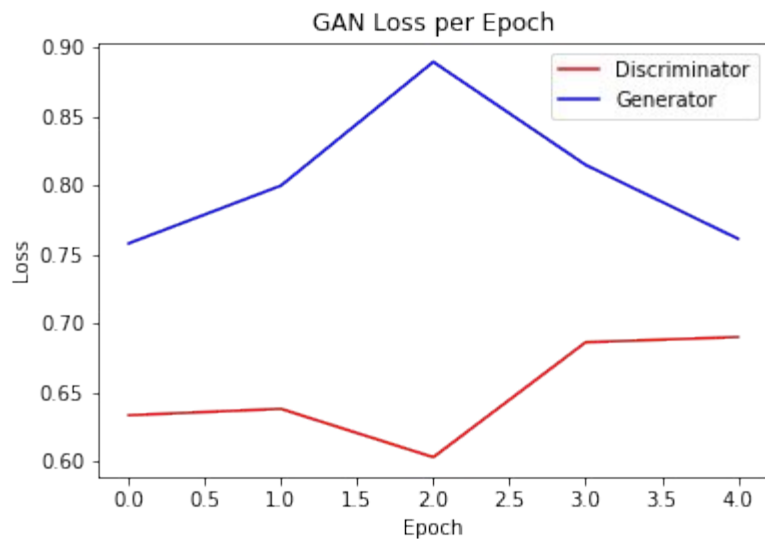
Generator

1. Dense(256)
2. LeakyReLU
3. BatchNormalization
4. Dense(512)
5. LeakyReLU
6. BatchNormalization
7. Dense(1024)
8. LeakyReLU
9. BatchNormalization
10. Dense
11. Reshape

Discriminator

1. LSTM
2. Bidirectional
3. Dense(512)
4. LeakyReLU
5. Dense(256)
6. LeakyReLU
7. Dense(1)

Results



Iteration 1: Add Dropout Layers to Generator

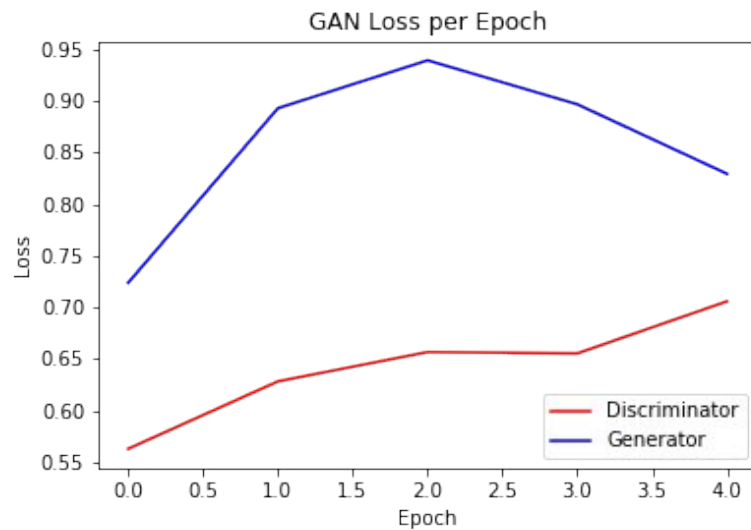
Generator

1. Dense(256)
2. LeakyReLU
3. BatchNormalization
- 4. Dropout(0.3)**
5. Dense(512)
6. LeakyReLU
7. BatchNormalization
- 8. Dropout(0.3)**
9. Dense(1024)
10. LeakyReLU
11. BatchNormalization
- 12. Dropout(0.3)**
13. Dense
14. Reshape

Discriminator

1. LSTM
2. Bidirectional
3. Dense(512)
4. LeakyReLU
5. Dense(256)
6. LeakyReLU
7. Dense

Results



Iteration 2: Dropouts in Generator & Discriminator

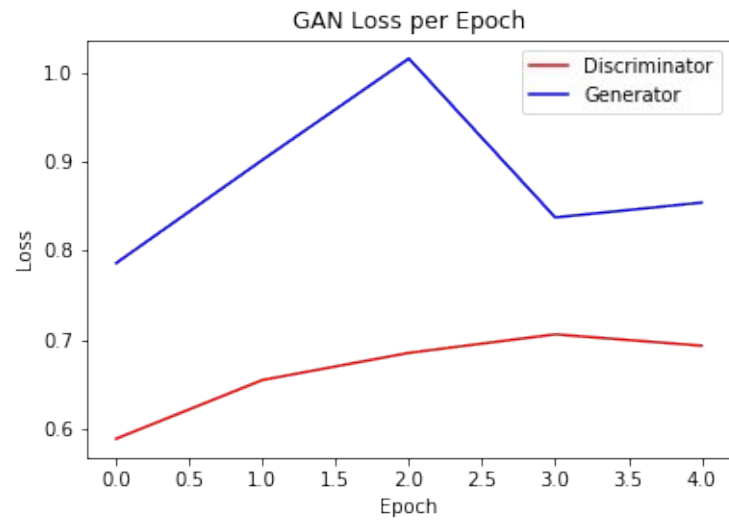
Generator

1. Dense(256)
2. LeakyReLU
3. BatchNormalization
- 4. Dropout(0.3)**
5. Dense(512)
6. LeakyReLU
7. BatchNormalization
- 8. Dropout(0.3)**
9. Dense(1024)
10. LeakyReLU
11. BatchNormalization
- 12. Dropout(0.3)**
13. Dense
14. Reshape

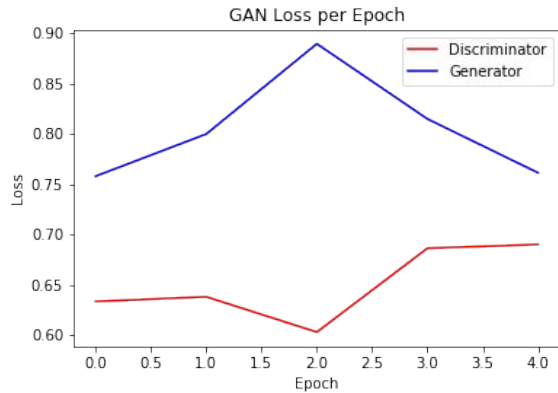
Discriminator

1. LSTM
2. Bidirectional
3. Dense(512)
4. LeakyReLU
- 5. Dropout(0.3)**
6. Dense(256)
7. LeakyReLU
- 8. Dropout(0.3)**
9. Dense

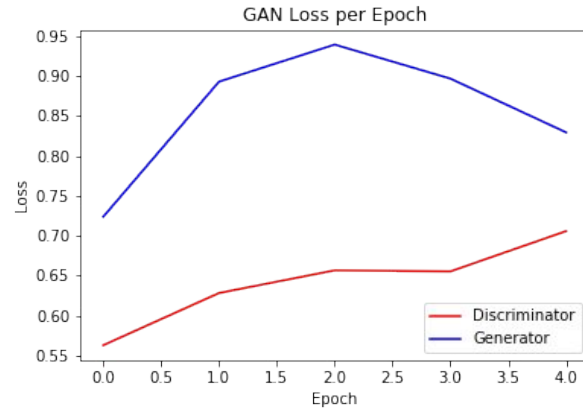
Results



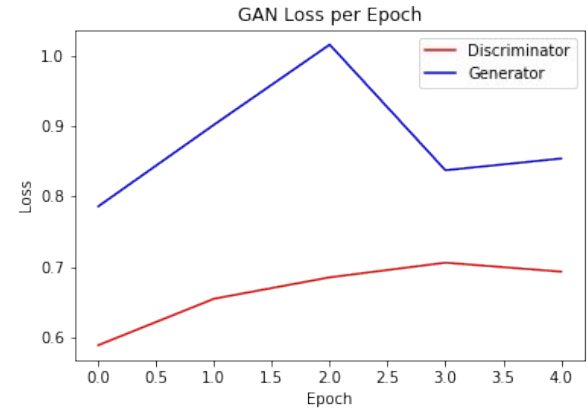
Summary



Iteration 0



Iteration 1



Iteration 2

Next Steps

- more MIDI files
- extracting single instruments from MIDI files
- separating Mario songs that have a similar mood
- different encoding to accounts for rhythm
- experimentation with different layer types
- explore other papers on generating music with GAN (e.g. [MuseGAN](#))