

DeepComposer Lab

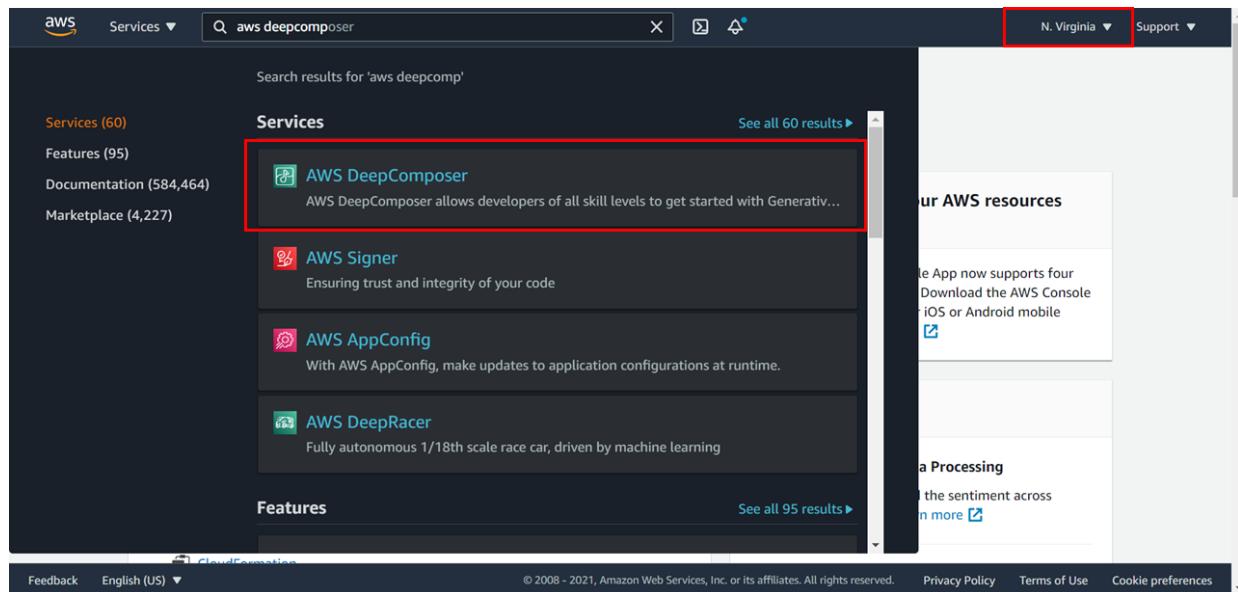
Last modified: March 2021

Note: Please use a Chrome or Edge web browser for this exercise for best experience.

This lab assumes that you already have an Amazon Web Services account/have been provided with a lab account. If you don't have either, you can sign up for a free account [here](#). DeepComposer provides a 12-month free tier for first time users, and for more information, you can view the pricing [here](#).

DeepComposer Music Studio

1. To get started, sign-in to your AWS console, and ensure you are on in the us-east-1 (N.Virginia) region. On the search bar at the top, type in 'DeepComposer' to view the service and click on the link to access the DeepComposer console.



2. Click on 'Get Started'

Screenshot of the AWS DeepComposer landing page:

The page features a dark header with the AWS logo, a search bar, and navigation links for Services, Marketplace, and Support. Below the header, a banner highlights "Machine learning" and the service's name, "AWS DeepComposer". The main heading is "Press play on Machine Learning". A sub-section titled "How it works" includes three small icons representing a keyboard, a waveform, and musical notes.

A central callout box titled "Get started" contains the text: "Learn how to use machine learning to compose music." It includes a prominent orange "Get started" button.

On the right side, there is a "Pricing" section with a note about usage charges and a "Privacy Policy" link at the bottom.

At the bottom of the page, there are links for Feedback, English (US), and cookie preferences.

3. Click on 'Launch Music studio' from the landing page, or use the menu on the left to access the music studio.

Screenshot of the AWS DeepComposer service page:

The page has a sidebar with "Getting started" sections: "Music studio" (which is selected and highlighted with a red box), "Models", "Compositions", "Chartbusters", and "Learning capsules". Below this are links for "Use the classic music studio" and "Link AWS DeepComposer keyboard", along with a "AWS DeepComposer Forum" link.

The main content area is divided into two sections: "Music studio" (info: ~15 minutes) and "Train a model" (info: ~3 hours). The "Music studio" section features a thumbnail image of a person using a virtual keyboard interface. Below the thumbnail, the text explains that the studio allows users to create new music by recording melodies or choosing default ones, and using pre-trained or custom models. A red box highlights the "Launch Music studio" button.

The "Train a model" section shows a thumbnail of a hand interacting with a digital interface. The text describes training your own models using Generative Adversarial Networks (GANs).

At the bottom, there are links for Feedback, English (US), and cookie preferences.

4. Click 'Start composing'.

AWS DeepComposer

Welcome to the new AWS DeepComposer Music studio. Your feedback helped improve the experience of creating music using generative AI techniques.

Your compositions

Let's make beautiful music together.

Your compositions will appear here.

Start composing

News

Exit music studio

Feedback English (US) © 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use Cookie preferences

5. You have the options to Record a track (on the virtual keyboard or the DeepComposer keyboard), import the track, or use a pre-recorded track. For this lab, we will import a track. Note: For the event, if specific input tracks are provided to you, please upload them at this step.

AWS DeepComposer

1. Input track
To get started, choose an input track.
You can choose from available sample melodies, record a track, or import your own track.

Continue

2. ML technique
3. Inference output
4. Next steps

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New composition 1

Choose input track

- Record a track
- Record a track
- Import a track**

Recommended for Transformers technique

- Mozart in Vienna (1783)
- Beethoven's Jewel (1820)
- Chopin & Barcarolle (1845)
- Schumann's Arabesque (1839)
- 27 Y/O Beethoven (1798)
- Mozart's March (1783)
- Bach & The Minuets in G (1725)

Recommended for all techniques

00:00 Bar 1 Beat 1 Record Play Stop

begin recording your input track.
Choose an input track from the dropdown above.

Edit melody Download melody

Time signature Metronome in beats per minute Octave Settings

6. Click on 'Choose File'

1. Input track
To get started, choose an input track.
You can choose from available sample melodies, record a track, or import your own track.

Continue

2. ML technique
3. Inference output
4. Next steps

Edit melody Download melody

Feedback English (US) ▾

- Upload a midi file. Note that if your input is longer than the 8 bars, DeepComposer will automatically trim the input file. Click 'Save' to import the file.

1. Input track
To get started, choose an input track.
You can choose from available sample melodies, record a track, or import your own track.

Continue

2. ML technique
3. Inference output
4. Next steps

Edit melody Download melody

Feedback English (US) ▾

- Once the file is uploaded, you can listen to it using the 'Play' and 'Stop' buttons. You can also use 'Edit melody' to add, remove, shorten or extend notes, and use the 'Download melody' to download the midi file. Once done, click 'Continue'.

1. Input track
To get started, choose an input track.
You can choose from available sample melodies, record a track, or import your own track.

2. ML technique

3. Inference output

4. Next steps

Feedback English (US) ▾

8. In the 'ML technique' screen, click on AR-CNN. Note: You can use either the GAN or Transformer model after the AR-CNN technique has been applied. Alternatively, you can choose to use the original input melody (without AR-CNN) with GANs or Transformers.

1. Input track

2. **ML technique**
Select a generative AI technique.
Each technique uses inference to create a new composition.
To create a unique sound, you can change the available model parameters.
Choose Continue to generate and save your composition.

3. Inference output

4. Next steps

Feedback English (US) ▾

9. Leave the default parameters, and click 'Continue'

The screenshot shows the AWS DeepComposer interface. On the left, there's a sidebar with steps: 1. Input track, 2. ML technique, 3. Inference output, and 4. Next steps. Step 2 is expanded, showing 'ML technique' and 'AR-CNN parameters'. The 'AR-CNN parameters' section contains fields for 'Model' (AutoregressiveCNN Bach), 'Maximum input notes to remove' (100), 'Maximum notes to add' (100), 'Sampling iterations' (100), and 'Creative risk' (1). A note says: 'This autoregressive model was trained using a collection of Bach chorales divided into 8-bar segments that are represented as piano roll images. By using these images, the model can choose from all available notes, instead of being limited to notes that have previously occurred.' Below the parameters is a note: 'Use the parameters below to help create a unique sound by changing how many notes are added or removed.' At the bottom of the sidebar, the 'Continue' button is highlighted with a red box.

10. Your AR-CNN composition is ready!! Click on the 'Play' and 'Stop' buttons to hear your composition. Play around with the parameters to make the composition unique to you, by changing the number of notes to add/remove. Creative risk is an interesting one to try! You can 'Enhance again' until you feel the composition is ready. Once you are satisfied with your composition, click 'Continue'.

The screenshot shows the 'New composition 1' page. It features a piano-roll visualization of the composition. At the top right are 'Play' and 'Stop' buttons, with 'Play' highlighted with a red box. Below the visualization are controls for 'Instrument type' (Piano) and 'Instrument' (Acoustic grand piano), along with 'Edit melody' and 'Download melody' buttons. On the left, the sidebar shows step 3: 'Inference output' with a note: 'Great! You used the AR-CNN technique to change the notes in your input track. Choose Play to listen to your new track.' The 'AR-CNN parameters' section is highlighted with a red box, showing the same configuration as the previous step: Model (AutoregressiveCNN Bach), Maximum input notes to remove (100), Maximum notes to add (100), Sampling iterations (100), and Creative risk (1). A green 'Enhance again' button is at the bottom of this section.

11. Congrats on your first composition using AWS DeepComposer! Use the edit icon next to the name to give a unique name to your composition. You can click the 'Share composition' button to share your music on SoundCloud, or use the 'Download melody' button to save the midi file to your disk. Note: If the event includes an AI Judge and you would like to participate, download the final melody to disk for uploading to the pre-signed S3 URL.

New composition 1

Inference output from the AR-CNN technique
Last saved on 5/11/2021, 2:49 PM

00:00 Bar 1 Beat 1 Play Stop

Instrument type: Piano, Instrument: Acoustic grand piano

Edit melody Download melody

Next steps

- Generate accompaniment tracks using the GAN technique
- Extend your input track using the Transformers technique

Let us know what you think

We want to hear what you love and what you don't like about the new Music studio experience.

GANs

- Once you have completed the AR-CNN, click on 'Generate accompaniment tracks' to generate four tracks using generative AI based on your composition.

Instrument type: Piano, Instrument: Acoustic grand piano

Edit melody Download melody

Next steps

- Generate accompaniment tracks using the GAN technique
- Extend your input track using the Transformers technique

Let us know what you think

We want to hear what you love and what you don't like about the new Music studio experience.

- Use the MuseGAN generative algorithm, and select a pre-trained model of your choice. Click 'Continue'. Note: 1. If you selected 'GANs' directly in step 8, you will reach the same screen. 2. To use the U-Net generative algorithm, you need to train your own model. High level steps on training your model is shown in the 'Train your own model' section below.

The screenshot shows the AWS DeepComposer interface for creating a new composition. The main title is "New composition 2". On the left sidebar, steps 1, 2, and 3 are listed: "1. Input track", "2. ML technique", and "3. Inference output". Step 2, "ML technique", is currently active and displays three options: "AR-CNN", "GANs", and "Transformers". The "GANs" section is highlighted with a red border. It contains a sub-section titled "GANs parameters" which includes a dropdown menu for "Model" set to "Rock". Other options in the dropdown include "Pop", "Jazz", "Jonathan-Coulton", and "Symphony". Below this is a "Generative algorithm" dropdown set to "MuseGAN". At the bottom of the sidebar, there is a "Continue" button.

- Within a few seconds, AWS DeepComposer generates multiple tracks based on the input composition. Click 'Play' to listen to the generated music. You can also change the instrument type and instruments (for example, Additional instruments → Banjo, or Synth effects → goblins!), and mute individual tracks for your final melody. You can also repeat this process multiple times. When you are done, click 'Continue'.

The screenshot shows the AWS DeepComposer interface after generating tracks. The main title is "New composition 2". The sidebar now includes "4. Next steps". The central area displays "Inference output from the GAN technique" last saved on 3/11/2021, 3:09 PM. It features a timeline at the top with "00:00 Bar 1 Beat 1" and "Play" and "Stop" buttons. Below the timeline is a grid of four tracks: Piano (Acoustic grand piano), Guitar (Electric guitar (clean)), Bass (Electric bass (pick)), and Drums. Each track has its own "Instrument type" and "Instrument" dropdown menus. A red box highlights these dropdowns for all four instruments. At the bottom of the screen, there is a "Generate tracks" button.

- Rename your composition and click 'Share composition' to upload it to SoundCloud.

Inference output from the GAN technique
Last saved on 3/11/2021, 3:15 PM

Instrument type: Piano, Instrument: Acoustic grand piano

Instrument type: Guitar, Instrument: Electric guitar (clean)

Instrument type: Bass, Instrument: Electric bass (pick)

Instrument type: Synth pad, Instrument: Pad 2 (warm)

Drums

Share composition

New composition...

Exit music studio

Feedback English (US) ▾

Next steps

15b (optional): Currently, there is no way to download the GAN melody to disk from the page above. To download to disk, exit music studio, click on ‘Compositions’ from DeepComposer menu, and download the melody.

AWS DeepComposer | AWS DeepComposer > Compositions

MyRockComposition | 00:00:00.00 | Play | Stop

Compositions (4)

Name	Creation time
MyRockComposition	Thu, 11 Mar 2021 21:14:49
New composition 3	Thu, 11 Mar 2021 21:14:49
New composition 2	Thu, 11 Mar 2021 21:09:57 GMT
New composition 1	Thu, 11 Mar 2021 20:49:44 GMT

Actions ▲ | Load into Music studio | Create composition

- Share on SoundCloud
- Download as MIDI
- Download as MP3
- Delete composition
- Manage tags
- Edit composition details

Feedback English (US) ▾

Transformers

16. Alternative to the GANs at Step 11, you can try the Transformers model to extend your composition by up to 20 seconds. Note: Instead, you can also choose to try the Transformers model without AR-CNN at Step 8.

Next steps

- Generate accompaniment tracks using the GAN technique
- Four genre-based accompaniment tracks will be generated.
- Generate accompaniment tracks
- Extend your input track

Let us know what you think

We want to hear what you love and what you don't like about the new Music studio experience.

Provide feedback

17. Update the parameters, such as sampling technique, creative risk, number of seconds to extend etc. and click 'Continue'

Transformers parameters

A Transformers model converts music into a sequence of tokens, and it generates new tokens during inference. The training process uses attention to map relationships between tokens in a sequence.

Use the parameters below to choose how tokens are selected and used to extend your track.

Model	Sampling technique	Sampling thresholds	Creative risk
TransformerXLClassical	Random	0.7 Valid values: 0.01-0.99	0.95 Valid values: 0.1-1.1
Input duration	10 Valid values: 5-30 seconds	Track extension duration	Maximum rest time
		20 Valid values: 5-20 seconds	Maximum note length
			3 Valid values: 2-11 seconds
			2 Valid values: 1-10 seconds

18. The Transformers model takes a few seconds longer than the other two models. Once the music is extended, click 'Play' to listen to the generated melody. You can repeat this process multiple times. Once you are done, click 'Continue'.

New composition 5

Inference output from the Transformers technique
Last saved on 3/11/2021, 3:26 PM

00:00 Bar 1 Beat 1 Play Stop

Instrument type: Piano, Instrument: Acoustic grand piano

Edit melody Download melody

Transformers parameters

Model: TransformerXLClassical Sampling technique: TopK Sampling thresholds: 0.7 Creative risk: 0.95

Input duration: 5 Track extension duration: 20 Maximum rest time: 2 Maximum note length: 2

Valid values: 5-30 seconds Valid values: 5-20 seconds Valid values: 2-11 seconds Valid values: 1-10 seconds

Extend again

Continue

Feedback English (US) ▾

19. You've now generated music using all three models! You can share the composition to SoundCloud and/or download the melody to your disk. Callout: For folks interested in diving deep, the 'Want to create your own model?' option takes you to a GitHub repository with the necessary code to train a new model from scratch on Amazon SageMaker.

New composition 7

Inference output from the Transformers technique
Last saved on 3/11/2021, 3:28 PM

00:00 Bar 1 Beat 1 Play Stop

Instrument type: Piano, Instrument: Acoustic grand piano

Edit melody Download melody

Next steps

Try out a new ML technique in the Music studio

Want to create your own model?

Let us know what you think

Generate new tracks Train a model in Amazon SageMaker Provide feedback

Share composition

New composition... Exit music studio

Feedback English (US) ▾

Optional: Training a model on the console

You can also train your own MuseGAN or U-Net model for DeepComposer through the console. To train your own model, click on the 'Models' option from the DeepComposer console, and click on 'Create a model'. Choose the MuseGAN/U-Net architecture, training dataset, hyperparameters and specify a name for your model. Note:1. AWS DeepComposer allows training 4 models for free. 2. It may take up to 8 hours to train the model, please be aware of that if participating in a challenge.

AWS DeepComposer Services ▾

Search for services, features, marketplace products, and docs [Alt+S]

N. Virginia ▾ Support ▾

AWS DeepComposer > Models > Train a model

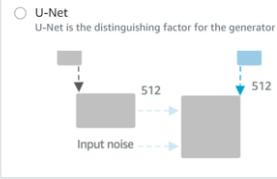
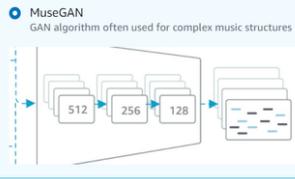
Getting started
Music studio
Models
Compositions
Chartbusters
▶ Learning capsules

Use the classic music studio
Link AWS DeepComposer keyboard
AWS DeepComposer Forum 

Train a model

Generative algorithm Info

Choose a generative algorithm to train a model

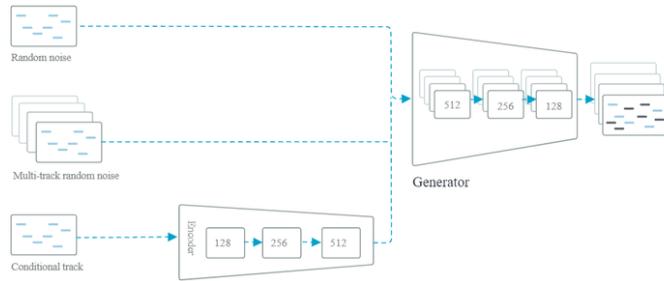


This architecture uses MuseGAN's generator. MuseGAN is an architecture specifically designed for generating music. The generator in MuseGAN is composed of a shared network to learn a high level representation of the song and a series of private networks to learn how to generate individual music tracks.

The main differences between U-Net and MuseGAN are:

- U-Net is a simpler architecture compared to MuseGAN and therefore easier for beginners to understand.
- U-Net has been extremely successful in the image translation domain while MuseGAN has been specifically created for the music domain.

Both architectures use a simple Convolutional Neural Network as the discriminator.



Training dataset

Generative models re-create patterns found in the training dataset.

Choose a genre of music as your dataset.
Choose a supported genre in your dataset.

- symphony
 jazz
 pop
 rock

▼ Hyperparameters

Info

Epochs

For each epoch, the model will be trained over the entire dataset once. Increasing epochs will allow the model to train for longer and may improve performance.

140

Input a value between 70 to 200

Learning rate

The learning rate controls how rapidly the weights and biases are updated during training. A higher learning rate might allow the network to explore a wider set of model weights, but might pass over more optimal weights.

0.001

Input a value between 0.0001 and 0.01

Update ratio

The update ratio controls the number of model weight updates to the discriminator per update to the generator. A stronger discriminator can provide more accurate and useful information to the generator, but increases training time.

5

Input a value between 1 and 5

Model details

Model name

Give your model a name

The model name must be no longer than 100 characters.

Model description - optional

Model description

▶ Tags

Training this model is free

You currently have 4 free model trainings that can be utilized before April 10, 2021.

[Learn more](#)

[Cancel](#) [Start training](#)

Feedback English (US) ▾

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