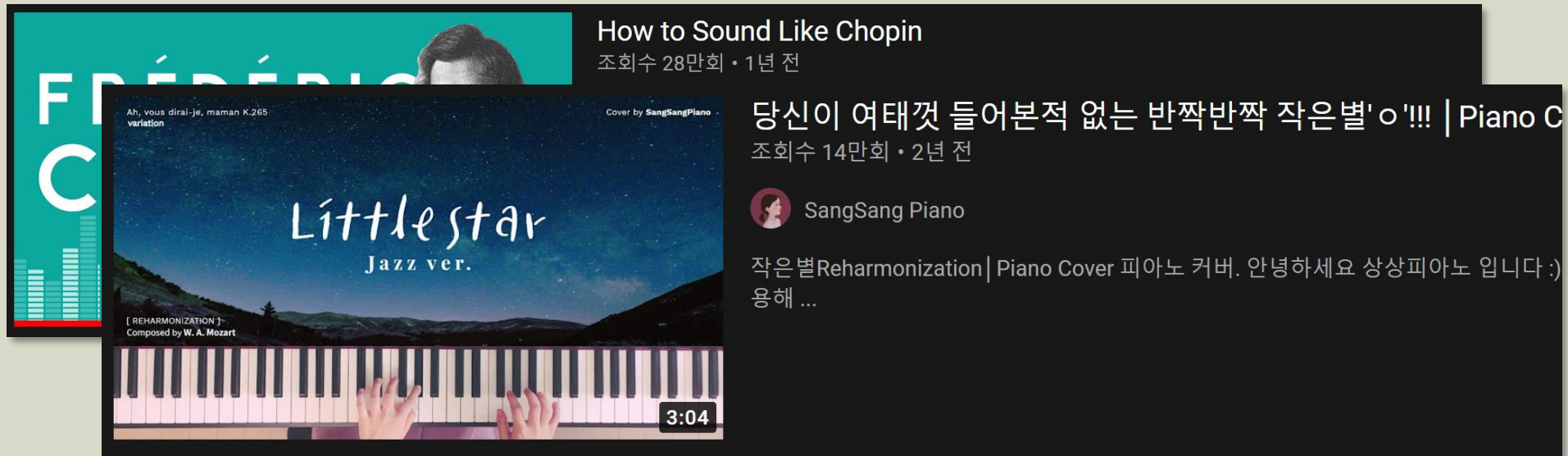


전기정보공학부
김진호
2020-91783

인공지능 편곡 모델

목표

- 음악 데이터를 학습하는 모델 구현
- 원곡의 느낌을 보존하는 편곡



A black and white photograph of a computer keyboard, viewed from a low angle looking down the rows of keys. The keys are slightly raised, and the lighting creates soft shadows. Overlaid on the left side of the image is a semi-transparent white rectangular box containing the Korean word '데이터' (Data) in a bold, black, sans-serif font. The word is split by a vertical line, appearing as '데|이|터'.

데|이|터

데이터 형식

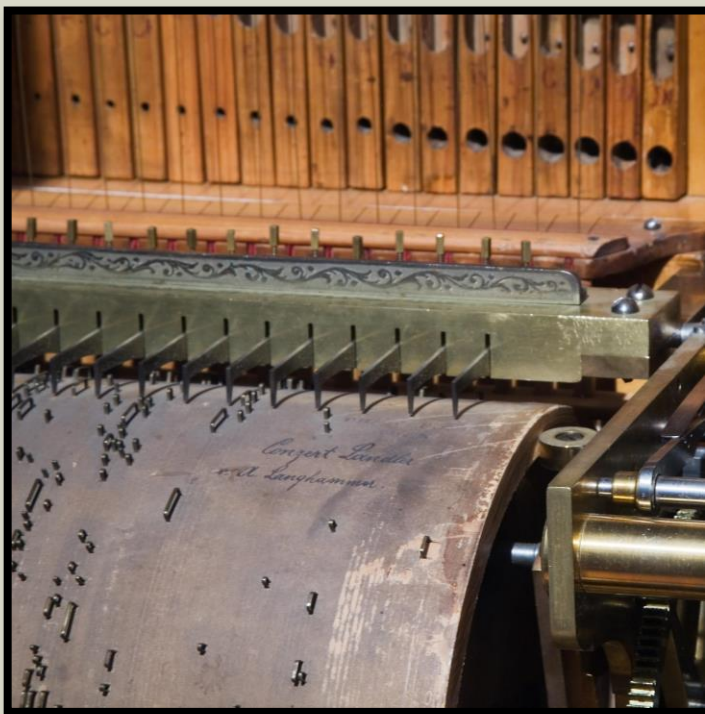
- 자료들을 Track으로 구분
 - 악기가 여러 개인 악보도 존재
 - 멜로디와 베이스가 한 트랙에 같이 저장된 악보도 존재

```
mid[1].tracks
```

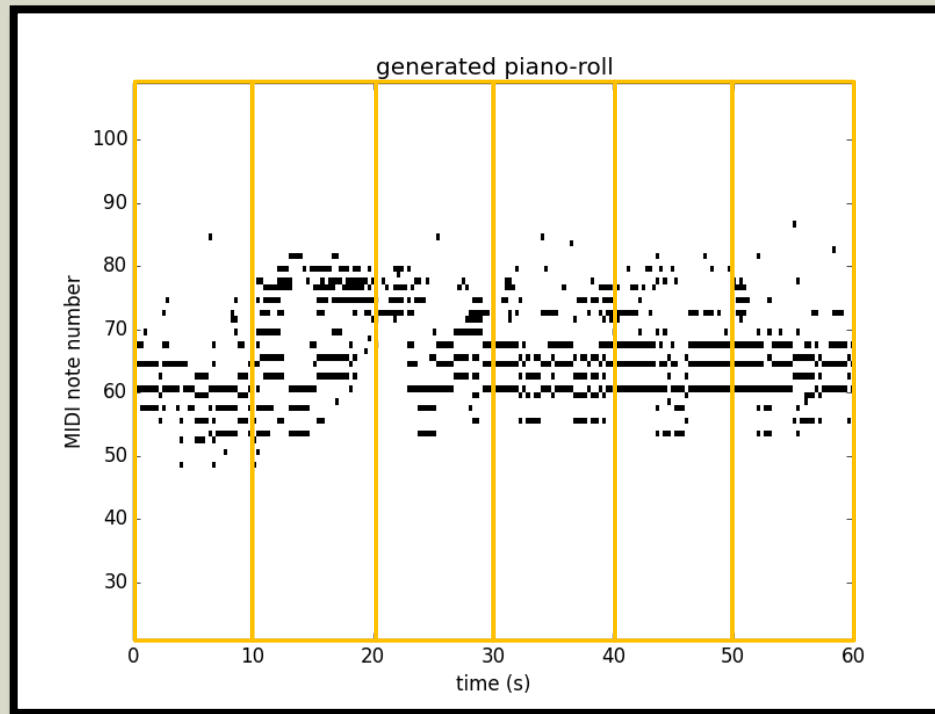
```
: [<midi track 'Chopin Prelude No. 3, Opus 28' 505 messages>,  
  <midi track 'Piano right' 326 messages>,  
  <midi track 'Piano left' 1107 messages>,  
  <midi track 'Chopin: Prelude No.3 in G Major, Op. 28' 2 messages>,  
  <midi track 'Copyright © 2002 by Bernd Krueger' 2 messages>,  
  <midi track 'http://www.piano-midi.de' 2 messages>,  
  <midi track 'Edition: 2014-02-20' 2 messages>,  
  <midi track 'Spur 7' 4 messages>,  
  <midi track 'Spur 8' 4 messages>]
```

데이터 형식

- Piano roll의 형태로 모델에 입력
 - 한 마디 단위로 학습 진행



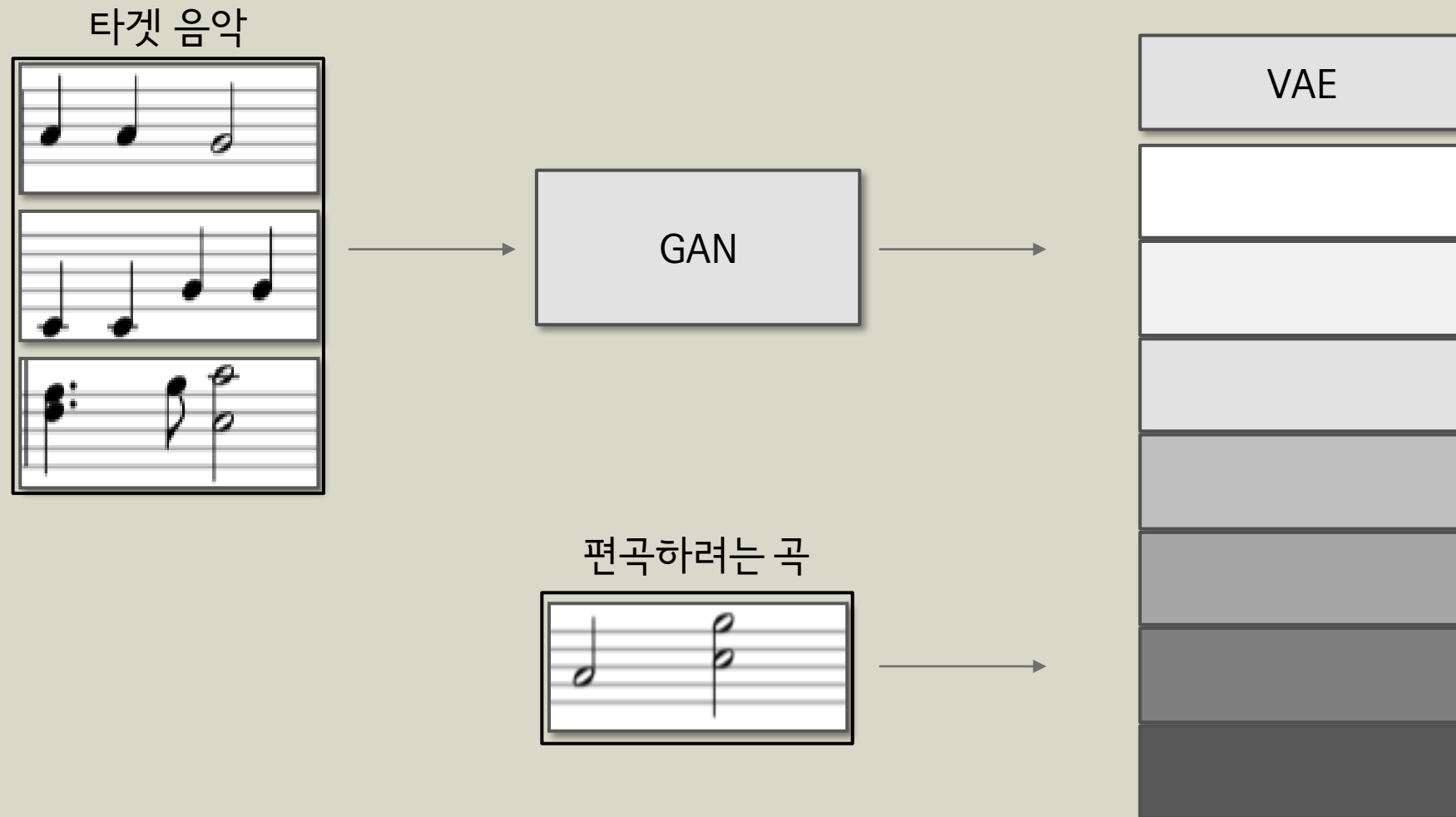
```
array([[0., 0., 0., ..., 0., 0., 0.],  
       [0., 0., 0., ..., 0., 0., 0.],  
       [0., 0., 0., ..., 0., 0., 0.]
```



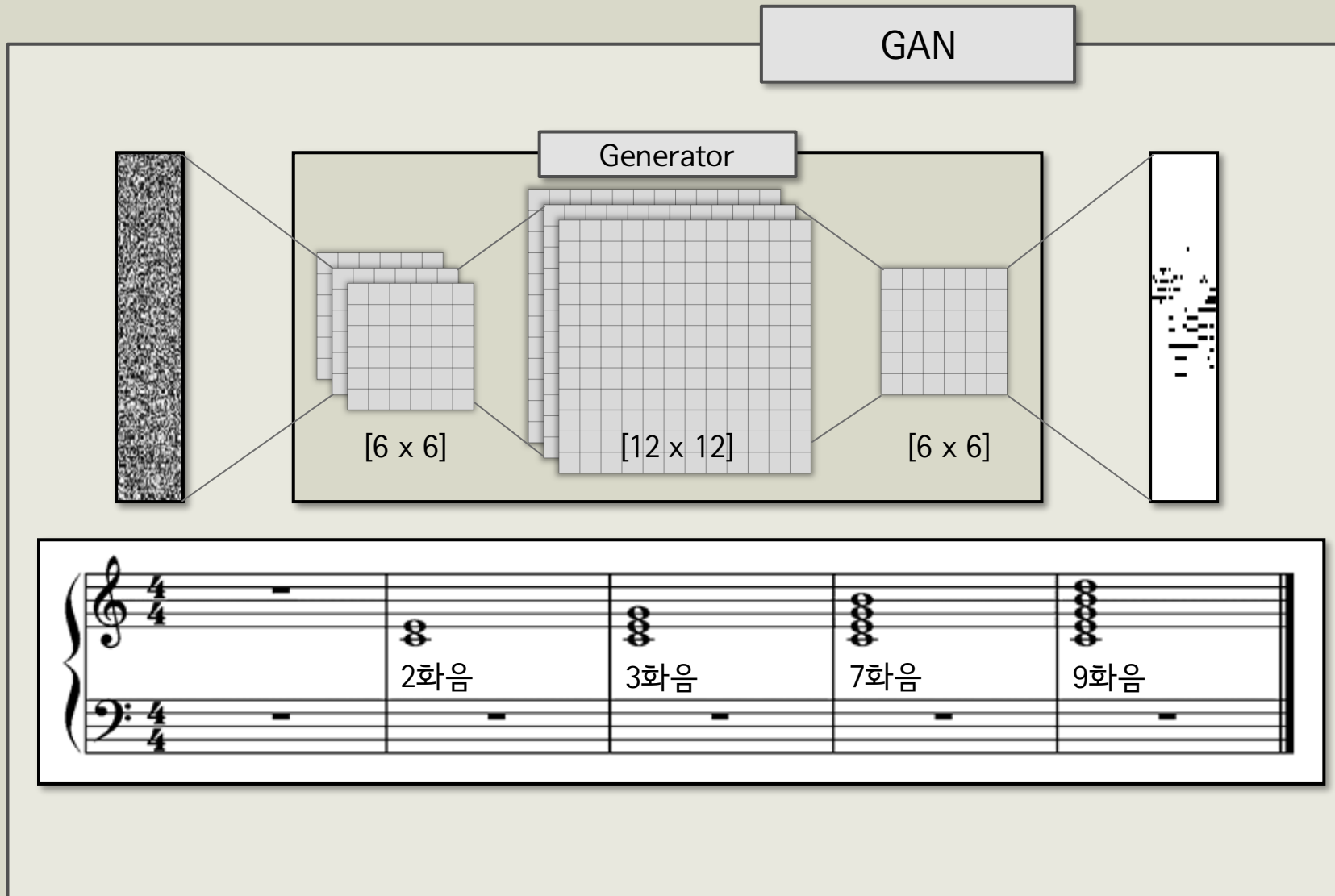


모델

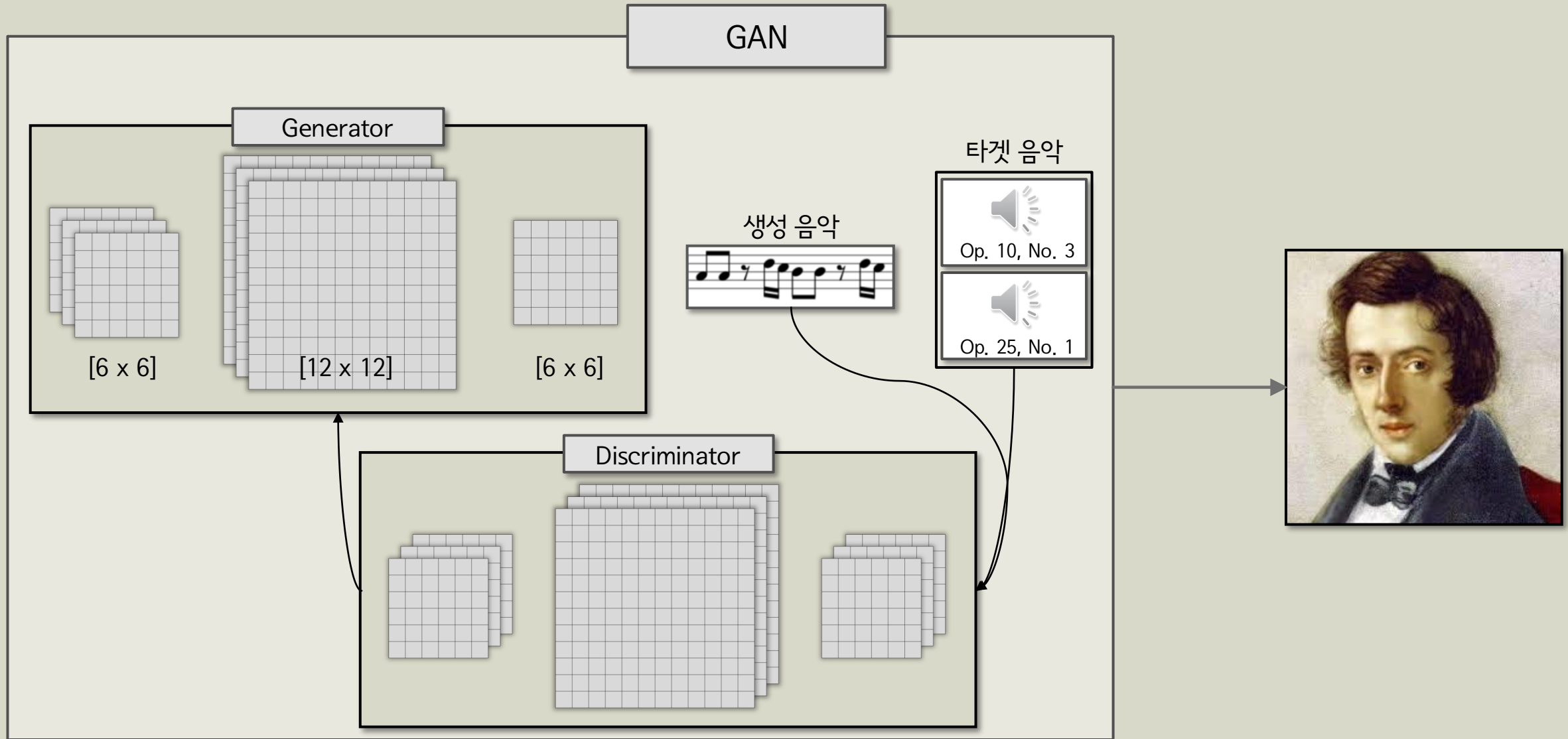
Model



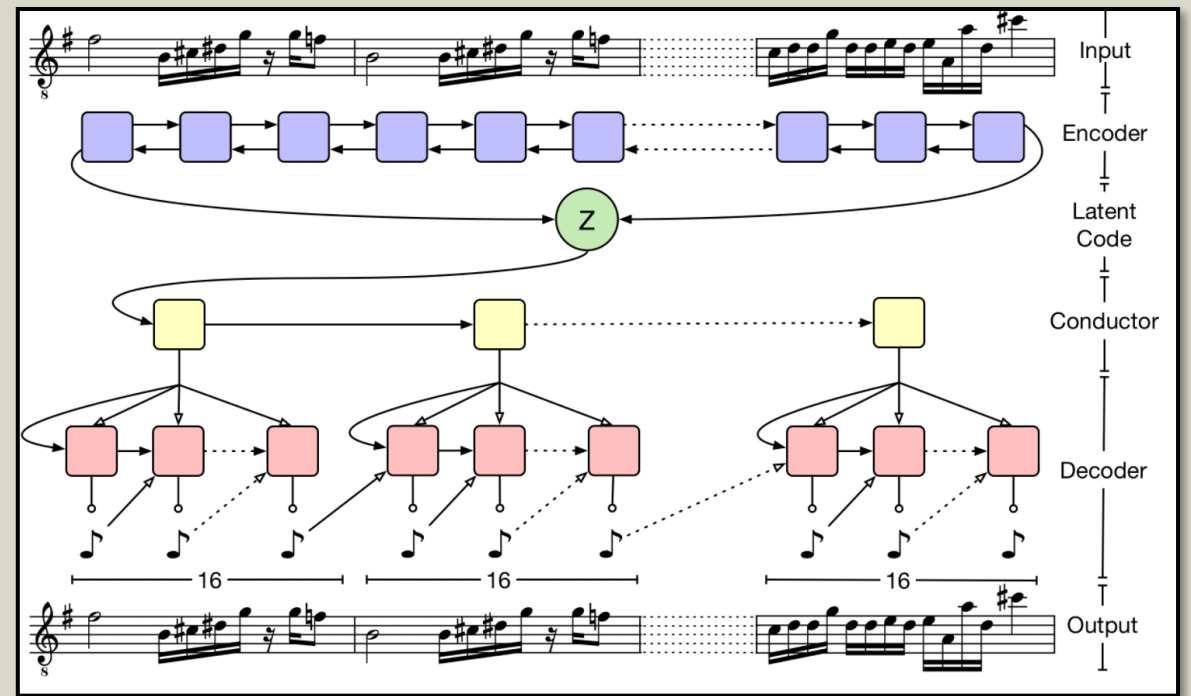
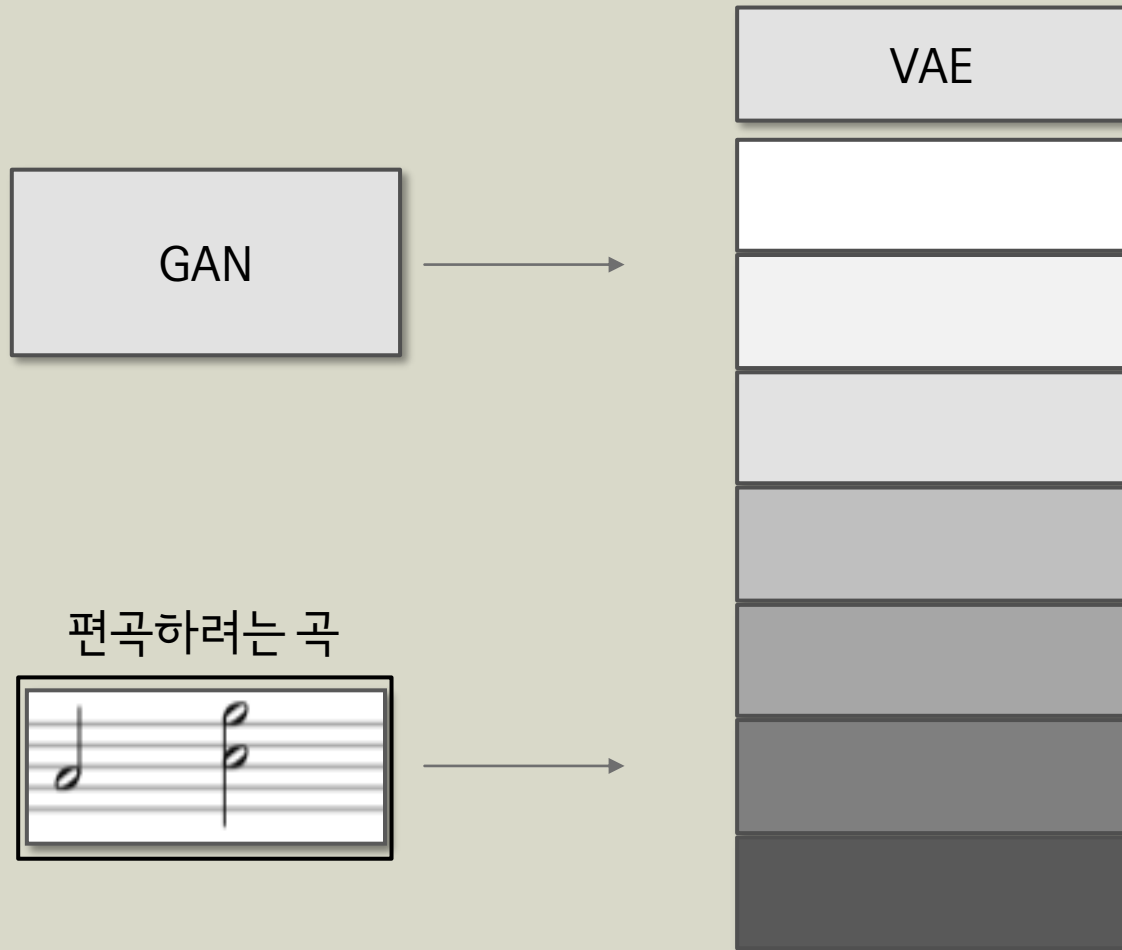
Model - GAN



Model - GAN



Model - VAE



A black and white photograph of a piano keyboard, viewed from a low angle looking down the length of the keyboard. The keys are in sharp focus in the foreground, with the background keys blurred. A semi-transparent rectangular box is overlaid on the left side of the image, containing the Korean word '결과' (Gyeol-gwa) in a bold, black, sans-serif font. A thin vertical white line is positioned to the left of this box.

결과

GAN Output



?



15 Epochs



??



100 Epochs

VAE Output



원곡



15 Epochs



100 Epochs

결론

- Conv. GAN 모델 학습이 진행은 됨
 - GAN 모델이 아직 과소적합 상태로 추정
 - GAN 20k steps vs VAE 300k steps
- VAE를 사용하면 화음이 사라져 멜로디가 단순해짐
 - VAE도 2D 데이터로 학습할 수 있도록 다시 설계
 - 또는 VAE 없이도 원곡 멜로디를 보존할 수 있는 방법 고려

A black and white photograph of a computer keyboard, viewed from a low angle looking down the rows of keys. The keys are illuminated, creating a sense of depth. Overlaid on the left side of the image is a semi-transparent white rectangular box containing the Korean text '감사합니다' (Thank you).

감사합니다