
딥러닝 이론PBL

점자문자 이미지를 알파벳으로 변환

2018380605 백대환 - 데이터 수집, 코딩, ppt, 보고서
2018380719 김재훈 - 데이터 수집, 코딩, ppt, 보고서

점자문자를 알파벳으로 변환

데이터 점자문자 이미지(jpg) 1560개(Kaggle)



로마자표	대문자표	a	b	c	d	e	f	g	
									
h	i	j	k	l	m	n	o	p	
									
q	r	s	t	u	v	w	x	y	z
									

점자문자를 알파벳으로 변환

데이터 증강

전처리 된 이미지(1040)을 대비(3배수), 색상화(4배수),
흐림정도의 변경(3배수)을 통해 1개의 이미지를 10배수로 증가
1040 -> 10400 -> 11440 (원본데이터 1040추가)



1 Training, Validation, Test 데이터 셋 분할

내용

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test
    = train_test_split(images_list, name_list, test_size=0.15, random_state=42)
X_train, X_validation, y_train, y_validation
    = train_test_split(X_train, y_train, test_size=0.15, random_state=42)
# images_list 는 input, name_list는 output, test_size는 test사이즈,
random_state는 데이터 분할 시 셔플이 이루어지는데 이를 위한 시드 값
```

출력

- X_{train}, y_{train} : 훈련데이터 (8265)
- $X_{validation}, y_{validation}$: 검증데이터(1459)
- X_{test}, y_{test} : 시험데이터(1716)

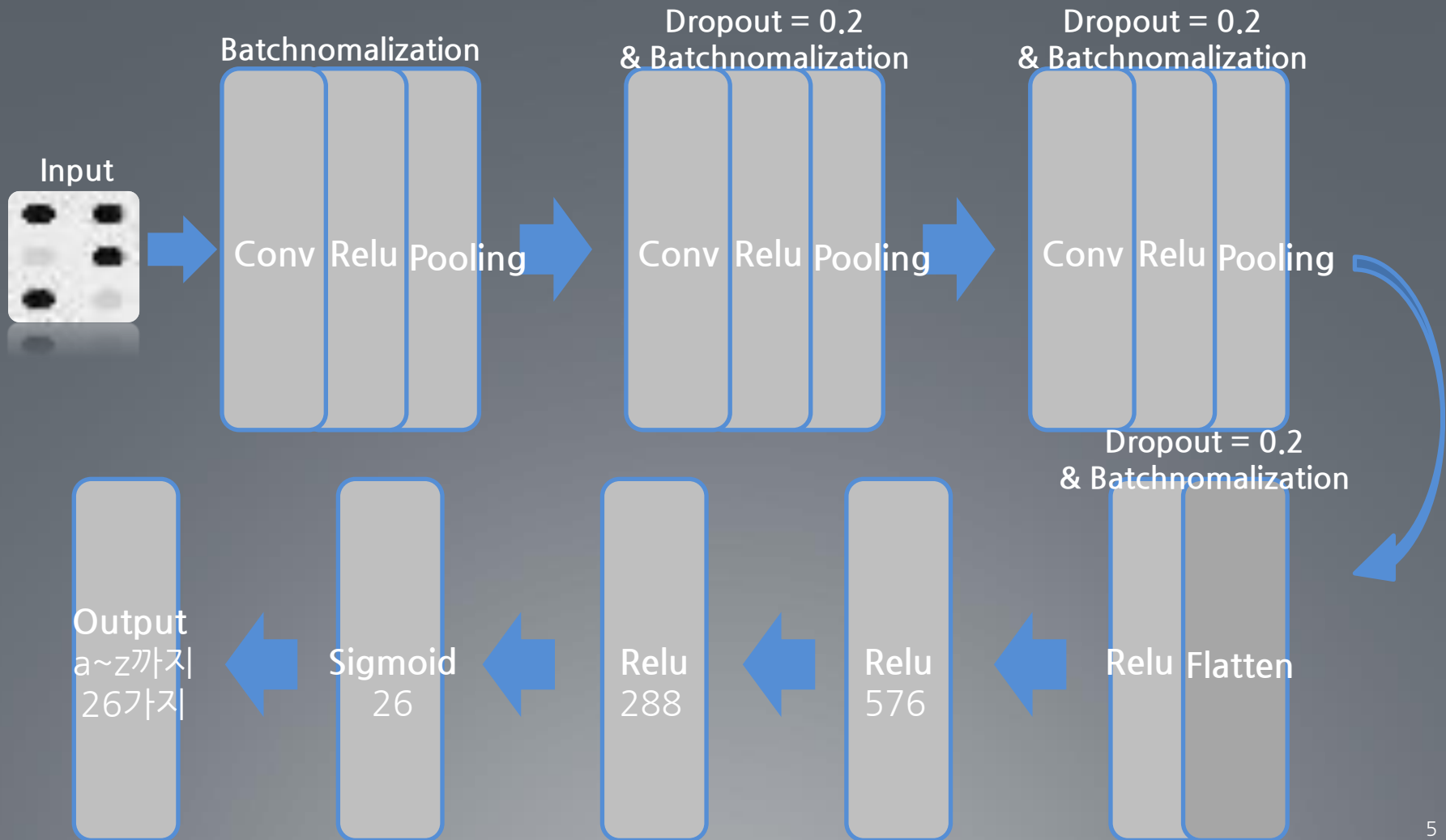
Test Dataset(15%)

Training Dataset(85%)

validation
Dataset(15%)

Training Dataset(85%)

2 모델구성



03-1

하이퍼파라미터 최적화

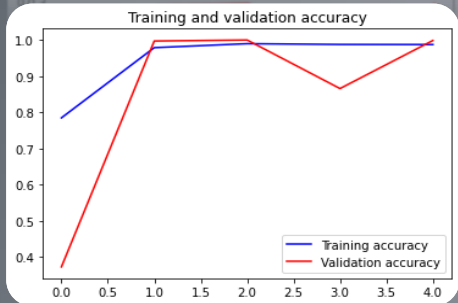
3-1 에폭 = 5로 고정하고 배치사이즈 변경

ADAM

배치사이즈 32

Dropout 0.2

소요시간 1분25초



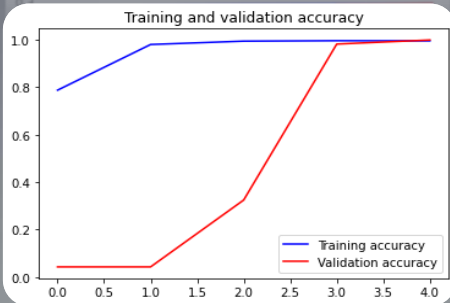
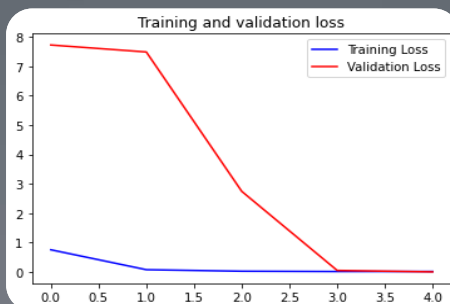
Training Accuracy: 99.92741 %
Validation Accuracy: 99.86292 %
Test Accuracy: 99.88345 %

ADAM

배치사이즈 64

Dropout 0.2

소요시간 1분20초



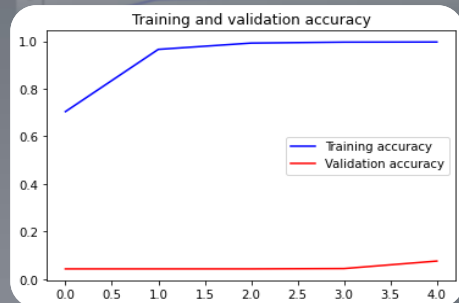
Training Accuracy: 99.9758 %
Validation Accuracy: 99.93146 %
Test Accuracy: 99.7669 %

ADAM

배치사이즈 128

Dropout 0.2

소요시간 1분15초



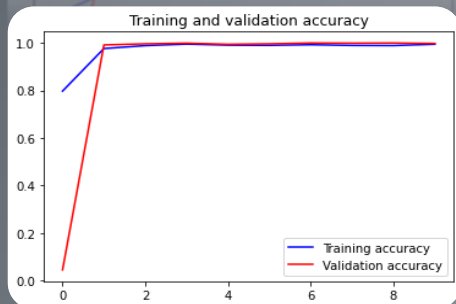
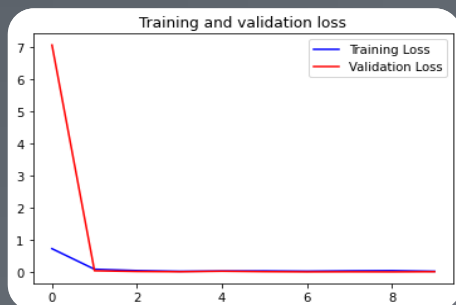
Training Accuracy: 7.6951 %
Validation Accuracy: 7.60795 %
Test Accuracy: 8.56643 %

03-2

하이퍼파라미터 최적화

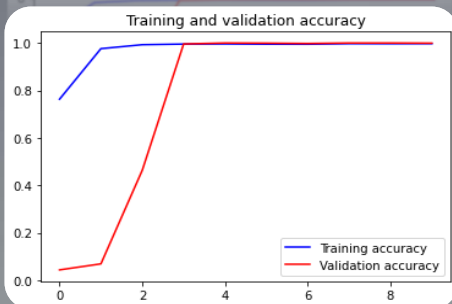
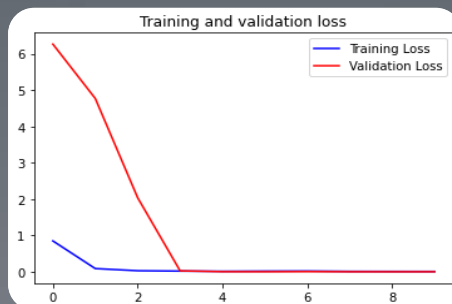
3-2 에폭 = 10으로 고정하고 배치사이즈 변경

ADAM
배치사이즈 32
Dropout 0.2
소요시간 2분40초



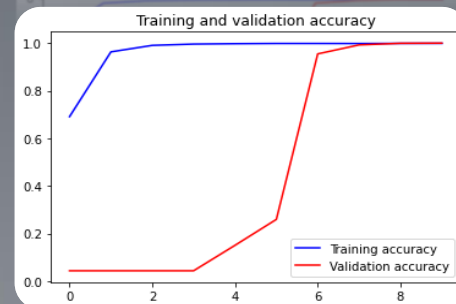
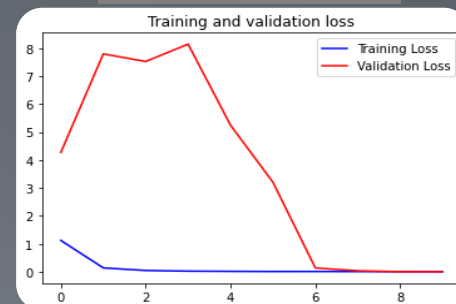
Training Accuracy: 99.87901 %
Validation Accuracy: 99.79438 %
Test Accuracy: 99.88345 %

ADAM
배치사이즈 64
Dropout 0.2
소요시간 2분30초



Training Accuracy: 100.0 %
Validation Accuracy: 99.93146 %
Test Accuracy: 99.94172 %

ADAM
배치사이즈 128
Dropout 0.2
소요시간 2분20초



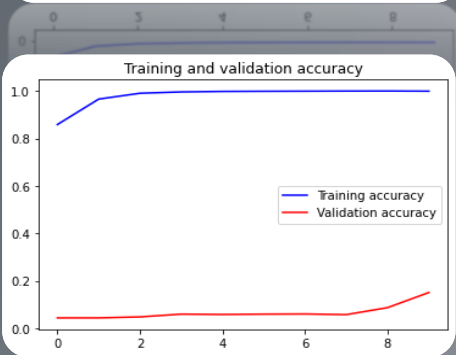
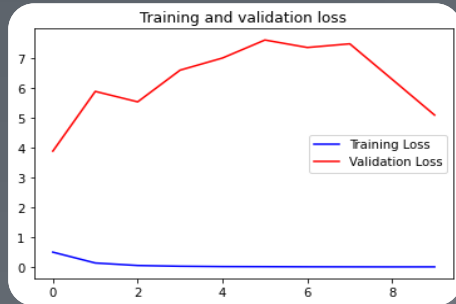
Training Accuracy: 100.0 %
Validation Accuracy: 100.0 %
Test Accuracy: 100.0 %

03-3

하이퍼파라미터 최적화

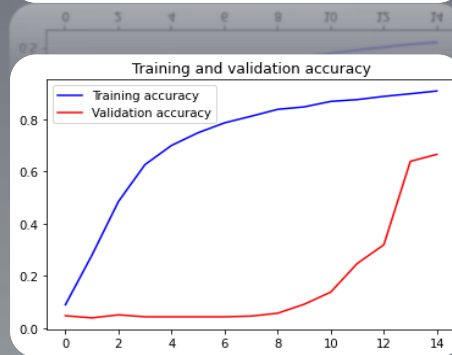
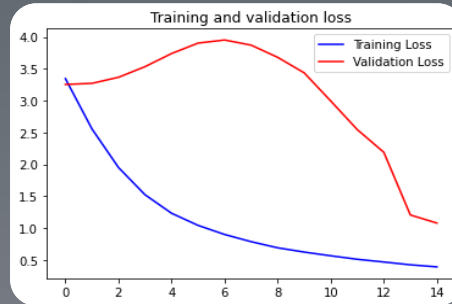
3-3 배치사이즈 256은 왜 안될까

ADAM, 에폭 10
배치사이즈 256
Dropout 0.2
소요시간 2분13초



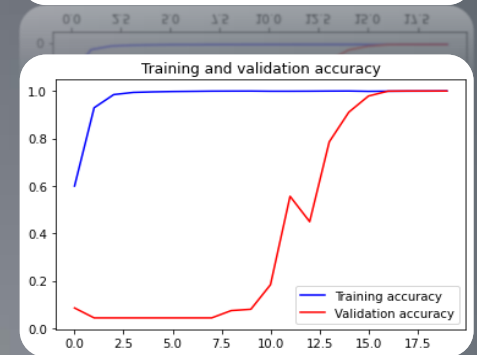
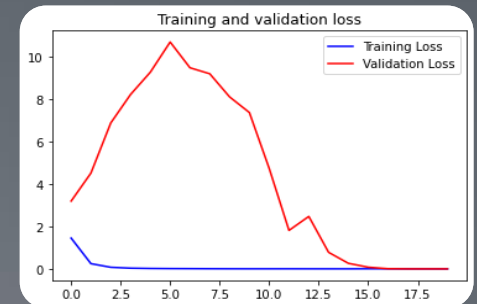
Training Accuracy: 14.70054 %
Validation Accuracy: 15.01028 %
Test Accuracy: 16.95804 %

ADAM, 에폭 15
배치사이즈 256
Dropout 0.2
소요시간 3분30초



Training Accuracy: 67.7556 %
Validation Accuracy: 66.48389 %
Test Accuracy: 68.70629 %

ADAM, 에폭 20
배치사이즈 256
Dropout 0.2
소요시간 4분40초



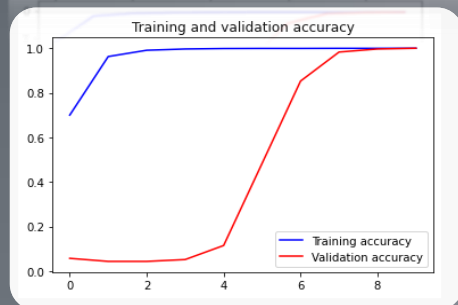
Training Accuracy: 100.0 %
Validation Accuracy: 100.0 %
Test Accuracy: 99.94172 %

03-4

하이퍼파라미터 최적화

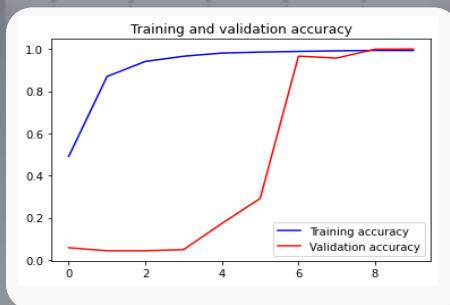
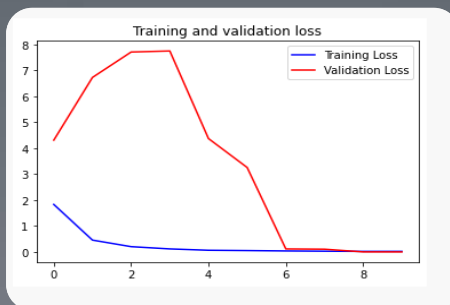
3-4 에폭 = 10, 배치사이즈 128로 고정하고 Dropout 변경

ADAM
배치사이즈 128
Dropout 0.2
소요시간 2분20초



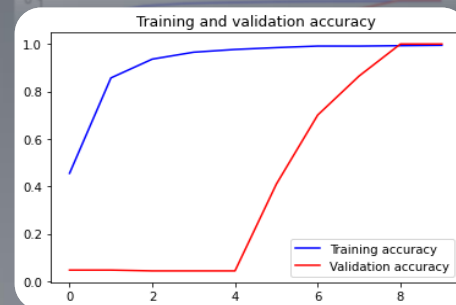
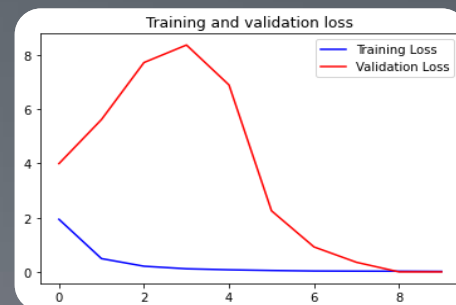
Training Accuracy: 100.0 %
Validation Accuracy: 100.0 %
Test Accuracy: 100.0 %

ADAM
배치사이즈 128
Dropout 0.4
소요시간 2분25초



Training Accuracy: 99.9879 %
Validation Accuracy: 100.0 %
Test Accuracy: 99.94172 %

ADAM
배치사이즈 128
Dropout 0.6
소요시간 2분25초



Training Accuracy: 99.9758 %
Validation Accuracy: 100.0 %
Test Accuracy: 99.94172 %

03-5

하이퍼파라미터 최적화

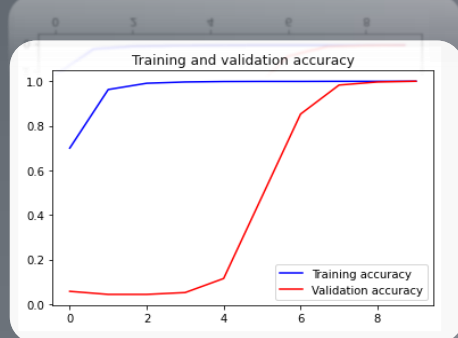
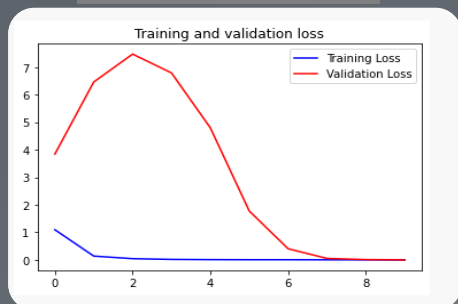
3-5 에폭 = 10, 배치사이즈 128, Dropout = 0.2 고정 Optimizer 변경

ADAM

배치사이즈 128

Dropout 0.2

소요시간 2분20초



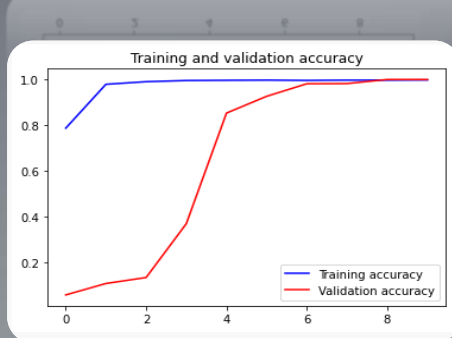
Training Accuracy: 100.0 %
Validation Accuracy: 100.0 %
Test Accuracy: 100.0 %

RMS

배치사이즈 128

Dropout 0.2

소요시간 2분30초



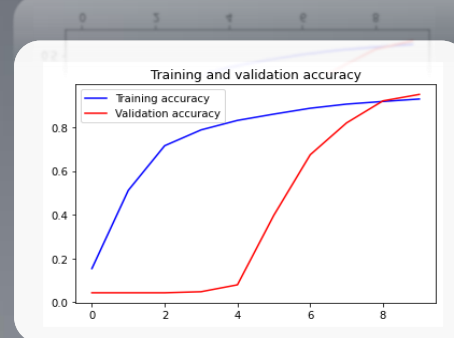
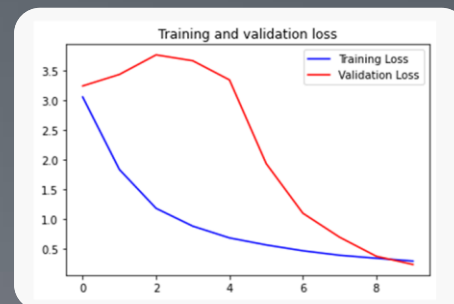
Training Accuracy: 99.9879 %
Validation Accuracy: 100.0 %
Test Accuracy: 99.94172 %

SGB

배치사이즈 128

Dropout 0.2

소요시간 2분30초



Training Accuracy: 95.46279 %
Validation Accuracy: 95.06511 %
Test Accuracy: 93.64802 %

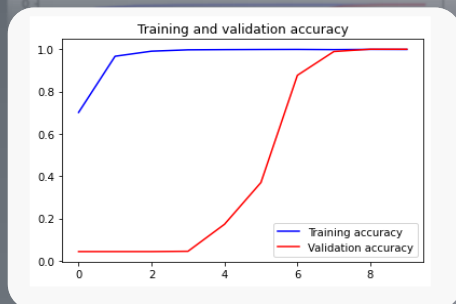
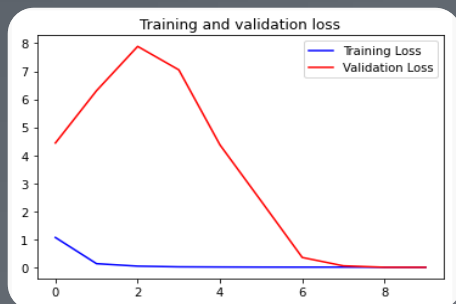
03-6

최적화된 모델 반복 시행(1~3)

3-6 최종 하이퍼파라미터: 에폭 = 10, 배치사이즈 128, Dropout 0.2, Optimizer 'Adam'

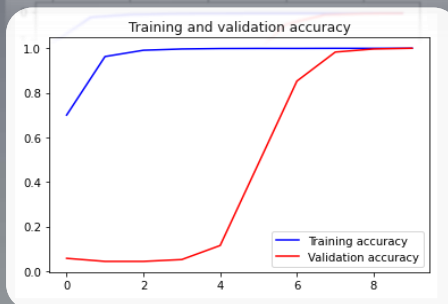
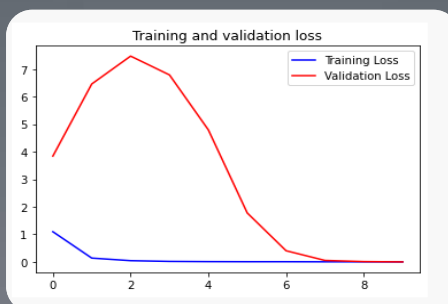
#모델을 시행할 때마다 데이터셋을 랜덤으로 뽑기 때문에 데이터 셋이 달라지므로
여러 번 반복하여 값이 일정하게 나오는지 확인함.

시행 1



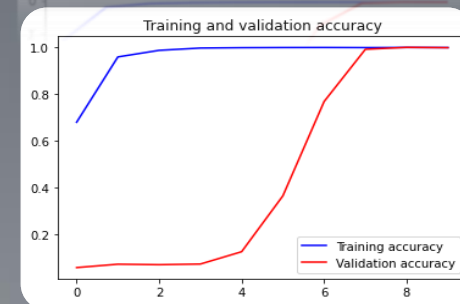
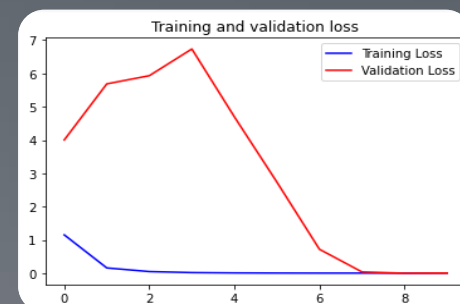
Training Accuracy: 100.0 %
Validation Accuracy: 100.0 %
Test Accuracy: 99.94172 %

시행 2



Training Accuracy: 100.0 %
Validation Accuracy: 100.0 %
Test Accuracy: 100.0 %

시행 3

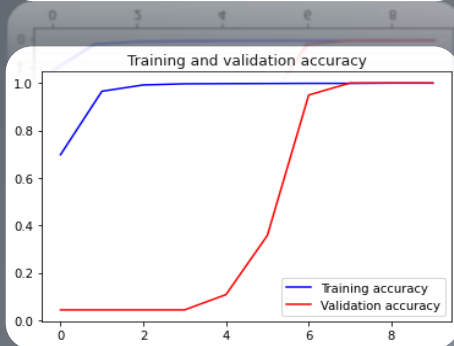
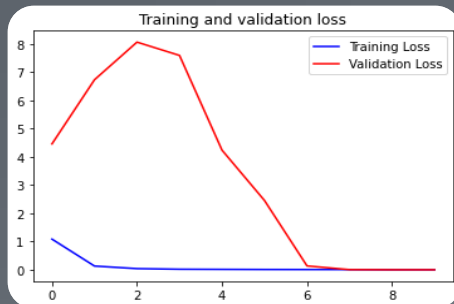


Training Accuracy: 99.9395 %
Validation Accuracy: 99.86292 %
Test Accuracy: 99.88345 %

3-6 최종 하이퍼파라미터: 에폭 = 10, 배치사이즈 128, Dropout 0.2, Optimizer 'Adam'

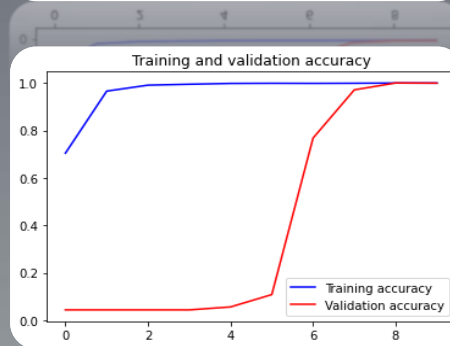
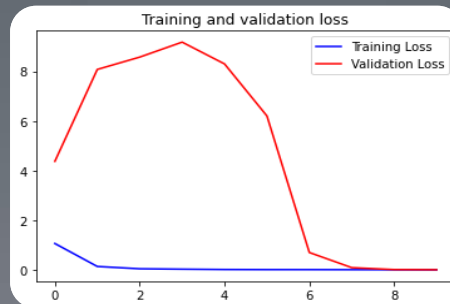
#모델을 시행할 때마다 데이터셋을 랜덤으로 뽑기 때문에 데이터 셋이 달라지므로
여러 번 반복하여 값이 일정하게 나오는지 확인함.

시행 4



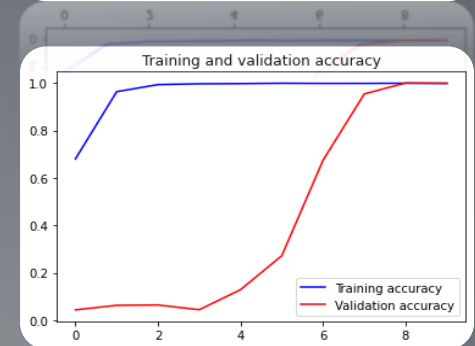
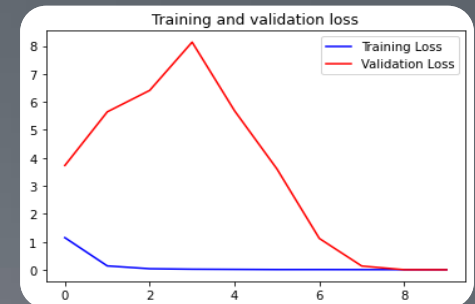
Training Accuracy: 100.0 %
Validation Accuracy: 100.0 %
Test Accuracy: 99.94172 %

시행 5



Training Accuracy: 99.9395 %
Validation Accuracy: 99.93146 %
Test Accuracy: 99.88345 %

시행 6



Training Accuracy: 99.9758 %
Validation Accuracy: 99.93146 %
Test Accuracy: 99.94172 %

점자문자를 알파벳으로 변환

결론

- 비슷한 패턴의 점자문자 이미지들만 사용하여 분석 능력이 뛰어났다.
- 새로운 패턴의 이미지를 불러올 경우 성능이 저하하고, 과적합의 문제가 있음을 파악함.