- CNN Basic Architecture (Conv / Pool / Flat) -

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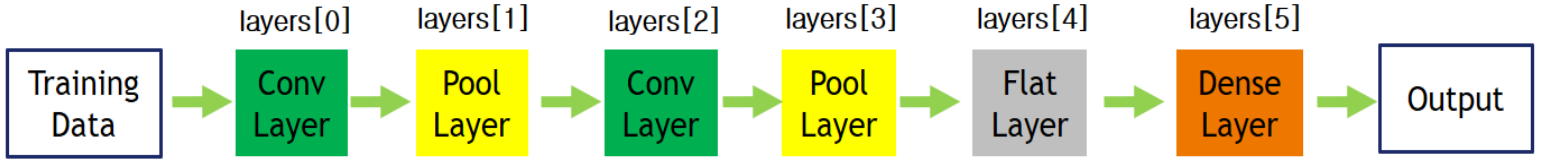
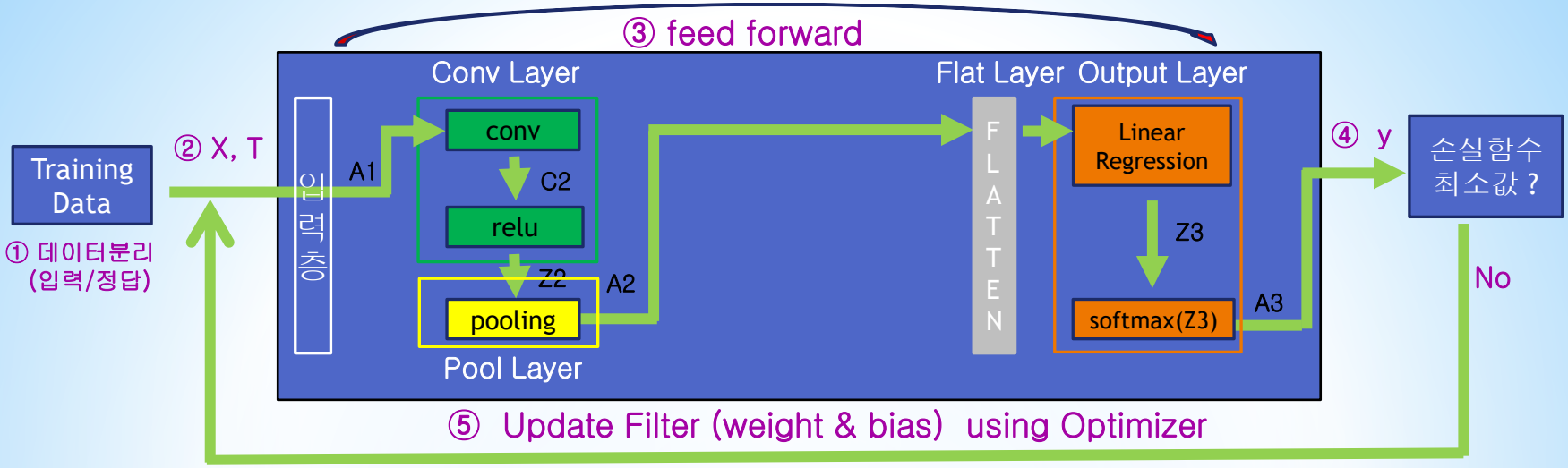


Layer	TensorFlow 2.x Layer API
Conv	Conv2D(input_shape=(28, 28, 1), kernel_size=3, filters=32, strides=(1, 1), activation='relu', use_bias=True, padding='SAME')
	Conv2D(kernel_size=3, filters=32, strides=(1, 1), activation='relu', use_bias=True, padding='SAME')
Pool	MaxPool2D(pool_size=(2, 2), padding='SAME')
Flat	Flatten()
Dropout	Dropout(rate=0.2)
Dense	Dense(10, activation='softmax')

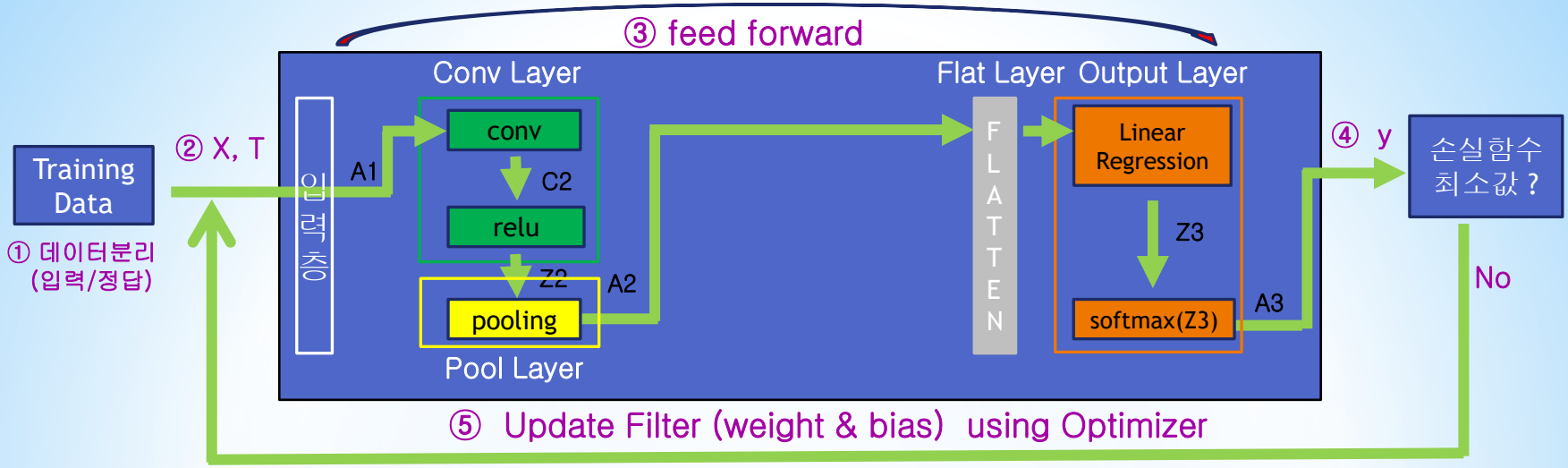



```
import tensorflow as tf

from tensorflow.keras.layers import Flatten, Dense, Conv2D, MaxPool2D
from tensorflow.keras.models import Sequential
from tensorflow.keras.optimizers import Adam
from tensorflow.keras.datasets import mnist

import numpy as np
from datetime import datetime
import matplotlib.pyplot as plt

print(tf.__version__)
```

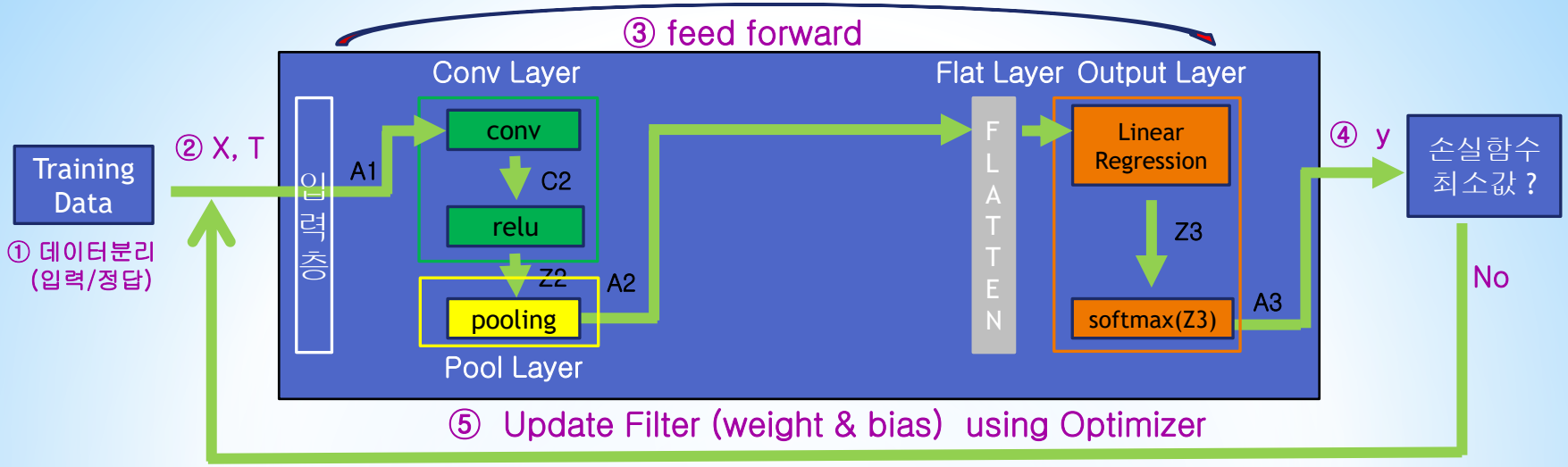
```
2.2.0
```

```
(x_train, t_train), (x_test, t_test) = mnist.load_data()

x_train = x_train / 255.0
x_test = x_test / 255.0

print('x_train.shape = ', x_train.shape, ' , x_test.shape = ', x_test.shape)
print('t_train.shape = ', t_train.shape, ' , t_test.shape = ', t_test.shape)
```

```
x_train.shape =  (60000, 28, 28)  , x_test.shape =  (10000, 28, 28)
t_train.shape =  (60000,)  , t_test.shape =  (10000,)
```

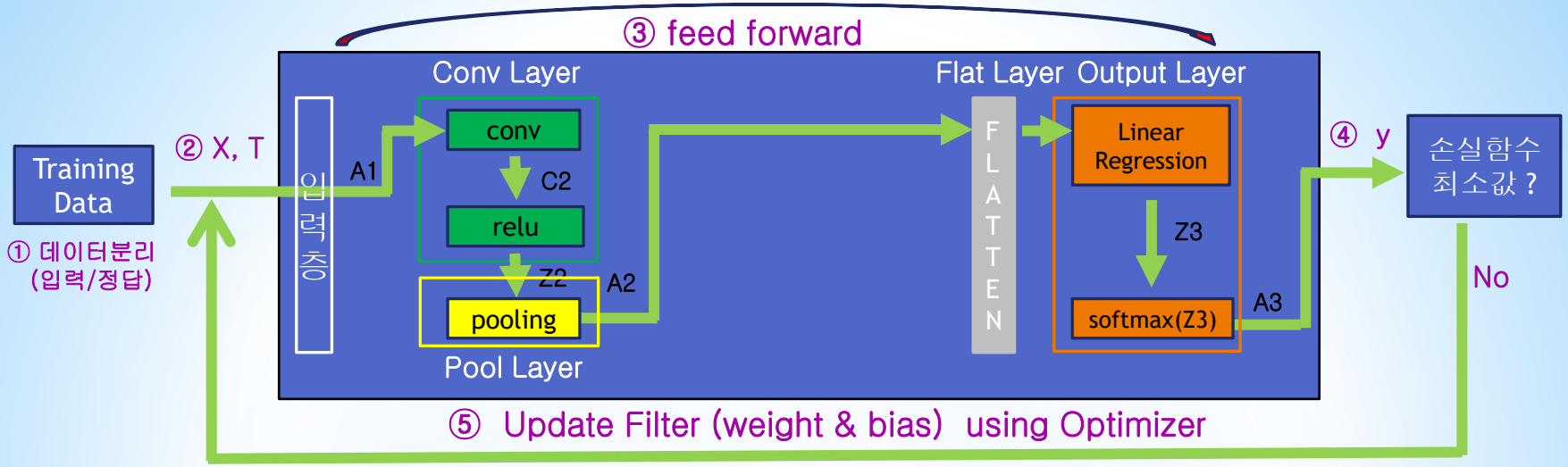



```
model = Sequential()

model.add(Conv2D(input_shape=(28,28,1),
                 kernel_size=3, filters=32,
                 strides=(1,1), activation='relu', use_bias=True, padding='SAME'))

model.add(MaxPool2D(pool_size=(2,2), padding='SAME'))

model.add(Flatten())

model.add(Dense(10, activation='softmax'))
```




```
model.compile(optimizer=Adam(learning_rate=0.001),
              loss='sparse_categorical_crossentropy', metrics=['accuracy'])

model.summary()
```

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 28, 28, 32)        320
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 14, 14, 32)        0
_________________________________________________________________
flatten (Flatten)            (None, 6272)              0
_________________________________________________________________
dense (Dense)                (None, 10)                62730
=================================================================
Total params: 63,050
Trainable params: 63,050
Non-trainable params: 0
```




```
hist = model.fit(x_train.reshape(-1,28,28,1), t_train,
                 batch_size=50, epochs=50, validation_split=0.2)
```

```
model.evaluate(x_test.reshape(-1,28,28,1), t_test)
```

```
313/313 [==============================] - 1s 2ms/step - loss: 0.1051 - accuracy: 0.9826
[0.10507538914680481, 0.9825999736785889]
```