딥러닝 모델 설계하기

1. 환경 준비

```
# 텐서플로 라이브러리 안에 있는 케라스 API에서 필요한 함수들을 불러옵니다.
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense

# 데이터를 다루는 데 필요한 라이브러리를 불러옵니다.
import numpy as np
```

2. 데이터 준비

```
 # 준비된 수술 환자 데이터를 불러옵니다.
Data_set = np.loadtxt("./data/ThoracicSurgery3.csv", delimiter=",")
X = Data_set[:,0:16]    # 환자의 진찰 기록을 X로 지정합니다.
y = Data_set[:,16]      # 수술 1년 후 사망/생존 여부를 y로 지정합니다.
```

3. 구조 결정

```
# 딥러닝 모델의 구조를 결정합니다.
model = Sequential()
model.add(Dense(30, input_dim=16, activation='relu'))
model.add(Dense(1, activation='sigmoid'))
```

4. 모델 실행

```
# 딥러닝 모델을 실행합니다.
model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])
history=model.fit(X, y, epochs=30, batch_size=16)
```

```
Epoch 1/30
30/30 [==============================] - 1s 2ms/step - loss: 0.4039 - accuracy: 0.8489
Epoch 2/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3945 - accuracy: 0.8511
Epoch 3/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3910 - accuracy: 0.8489
Epoch 4/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3950 - accuracy: 0.8489
Epoch 5/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3995 - accuracy: 0.8532
Epoch 6/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3945 - accuracy: 0.8511
Epoch 7/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3917 - accuracy: 0.8489
Epoch 8/30
30/30 [==============================] - 0s 2ms/step - loss: 0.4018 - accuracy: 0.8574
Epoch 9/30
30/30 [==============================] - 0s 2ms/step - loss: 0.4106 - accuracy: 0.8511
Epoch 10/30
30/30 [==============================] - 0s 2ms/step - loss: 0.4025 - accuracy: 0.8468
Epoch 11/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3875 - accuracy: 0.8489
Epoch 12/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3878 - accuracy: 0.8532
Epoch 13/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3976 - accuracy: 0.8532
Epoch 14/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3897 - accuracy: 0.8489
Epoch 15/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3885 - accuracy: 0.8489
Epoch 16/30
30/30 [==============================] - 0s 2ms/step - loss: 0.4002 - accuracy: 0.8511
```

```
Epoch 17/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3917 - accuracy: 0.8447
Epoch 18/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3968 - accuracy: 0.8468
Epoch 19/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3887 - accuracy: 0.8489
Epoch 20/30
30/30 [==============================] - 0s 3ms/step - loss: 0.3845 - accuracy: 0.8511
Epoch 21/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3880 - accuracy: 0.8468
Epoch 22/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3829 - accuracy: 0.8532
Epoch 23/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3969 - accuracy: 0.8511
Epoch 24/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3875 - accuracy: 0.8489
Epoch 25/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3849 - accuracy: 0.8489
Epoch 26/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3891 - accuracy: 0.8511
Epoch 27/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3830 - accuracy: 0.8511
Epoch 28/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3922 - accuracy: 0.8511
Epoch 29/30
30/30 [==============================] - 0s 2ms/step - loss: 0.3950 - accuracy: 0.8447
```

```
print("₩n Accuracy: %.4f" % (model.evaluate(X, y)[1]))
```

```
15/15 [==============================] - 0s 2ms/step - loss: 0.3810 - accuracy: 0.8511

 Accuracy: 0.8511
```