- Logistic Regression -

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Overview – Training Data (Diabetes.csv)

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-0.29412	0.487437	0.180328	-0.29293	0	0.00149	-0.53117	-0.03333	0
-0.88235	-0.14573	0.081967	-0.41414	0	-0.20715	-0.76687	-0.66667	1
-0.05882	0.839196	0.04918	0	0	-0.30551	-0.49274	-0.63333	0
-0.88235	-0.10553	0.081967	-0.53535	-0.77778	-0.16244	-0.924	0	1
0	0.376884	-0.34426	-0.29293	-0.60284	0.28465	0.887276	-0.6	0
.....								
-0.88235	0.899497	-0.01639	-0.53535	1	-0.10283	-0.72673	0.266667	0
-0.17647	0.005025	0	0	0	-0.10581	-0.65329	-0.63333	0
0	0.18593	0.377049	-0.05051	-0.45627	0.365127	-0.59607	-0.66667	0
-0.17647	0.075377	0.213115	0	0	-0.11774	-0.8497	-0.66667	0

759

9

Logistic Regression Example

```
import tensorflow as tf

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Flatten, Dense
from tensorflow.keras.optimizers import SGD, Adam
```

[1] 데이터 생성

```
import numpy as np

try:

    loaded_data = np.loadtxt('./diabetes.csv', delimiter=',')

    x_data = loaded_data[ :, 0:-1]
    t_data = loaded_data[ :, [-1]]

    print("x_data.shape = ", x_data.shape)
    print("t_data.shape = ", t_data.shape)

except Exception as err:

    print(str(err))
```

```
x_data.shape =  (759, 8)
t_data.shape =  (759, 1)
```

[2] 모델 구축

```
model = Sequential()

model.add(Dense(t_data.shape[1],
                input_shape=(x_data.shape[1], ),activation='sigmoid'))
```

활성화함수

[3] 모델 컴파일

학습 알고리즘

```
model.compile(optimizer=SGD(learning_rate=0.01),
              loss='binary_crossentropy', metrics=['accuracy'])

model.summary()
```

손실함수 측정지표

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
dense (Dense)                (None, 1)                 9
=================================================================
Total params: 9
Trainable params: 9
Non-trainable params: 0
```

Logistic Regression Example

training data로 부터 20% 비율로
validation data 생성 후 overfitting 확인

[4] 모델 학습

```
hist = model.fit(x_data, t_data, epochs=500, validation_split=0.2, verbose=2)
```

```
Epoch 1/500
19/19 - 0s - loss: 0.6041 - accuracy: 0.6689 - val_loss: 0.6042 - val_accuracy: 0.6250
Epoch 2/500
19/19 - 0s - loss: 0.6028 - accuracy: 0.6705 - val_loss: 0.6030 - val_accuracy: 0.6250
```

.....

```
Epoch 499/500
19/19 - 0s - loss: 0.4785 - accuracy: 0.7743 - val_loss: 0.4885 - val_accuracy: 0.7500
Epoch 500/500
19/19 - 0s - loss: 0.4785 - accuracy: 0.7743 - val_loss: 0.4885 - val_accuracy: 0.7500
```

[7] 모델 (정확도) 평가

```
model.evaluate(x_data, t_data)
```

기본 batch_size = 32 이므로 총 24회 반복 (759 / 24 = 23.7)

```
24/24 [==============================] - 0s 2ms/step - loss: 0.4825 - accuracy: 0.7655
[0.4825364351272583, 0.7654808759689331]
```

Logistic Regression Example

[5] 손실 및 정학도 추세

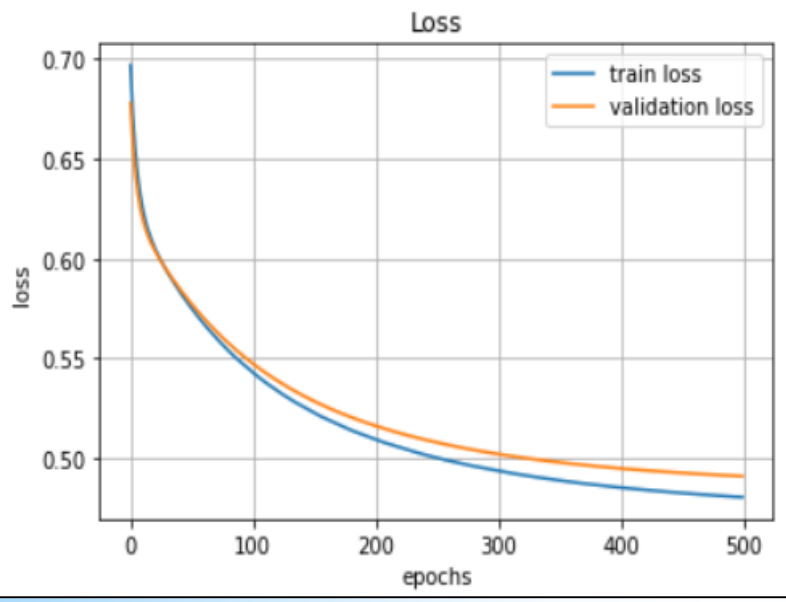
```
import matplotlib.pyplot as plt

plt.title('Loss')
plt.xlabel('epochs')
plt.ylabel('loss')
plt.grid()

plt.plot(hist.history['loss'], label='train loss')
plt.plot(hist.history['val_loss'], label='validation loss')

plt.legend(loc='best')

plt.show()
```




```
import matplotlib.pyplot as plt

plt.title('Accuracy')
plt.xlabel('epochs')
plt.ylabel('accuracy')
plt.grid()

plt.plot(hist.history['accuracy'], label='train accuracy')
plt.plot(hist.history['val_accuracy'], label='validation accuracy')

plt.legend(loc='best')

plt.show()
```