Pratham Nagar 59 ML_EXP_3

ML_EXP_3_LogisticRegression

```
import numpy as np
from sklearn.datasets import load_diabetes
from sklearn.model_selection import train_test_split

class LogisticRegression:
    def __init__ (self):
        self.params = np.zeros(int(np.random.random()), float)[:, np.newaxis]

    def fit (self, X, y):
        bias = np.ones(len(X))
        X_bias = np.c_[bias, X]
        inner_part = np.transpose(X_bias) @ X_bias
        inverse_part = np.linalg.inv(inner_part)
        outer_part = inverse_part @ np.transpose(X_bias)
        least_square_estimate = outer_part @ y
        self.params = least_square_estimate
        return self.params

    def predict (self, X):
        y_hat = []
        bias_testing = np.ones(len(X))
        X_test = np.c_[bias_testing, X]
        z = X_test @ self.params
        sigmoid = 1 / (1 + np.exp(-z))
        for _ in range(len(sigmoid)):
            y_hat.append(1 if sigmoid[_] >= 0.5 else 0)
        return sigmoid, y_hat

if __name__ == '__main__':
    dataset = load_diabetes()
    X = dataset.data
    y = (dataset.target > dataset.target.mean()).astype(int)  # Convert regression target to classification
    print(X.shape)

    X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.1, random_state=42)

    model = LogisticRegression()
    parameters = model.fit(X_train, y_train)

    sig, y_pred = model.predict(X_test)
    print(f'The predicted outcome is {y_pred} and calculated sigmoid value is {sig}')

    print(f'First value of y_test: {y_test[5]} and first value of y_pred: {y_pred[5]}')
    print(f'The sigmoid probability for the tested value: {sig[5]}')
```

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(442, 10)
The predicted outcome is [1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1,
 0.70949249 0.65548139 0.54427382 0.55595615 0.55134699 0.62911255
 0.49335329 0.68017051 0.55176599 0.57400753 0.67945265 0.71018204
 0.65444876 0.67952921 0.67671155 0.52857146 0.51340554 0.65145623
 0.61386059 0.60968902 0.63947547 0.63761607 0.48695427 0.55842385
 0.61585201 0.53936519 0.57332006 0.64592152 0.62236776 0.66443778
 0.57589338 0.57406852 0.60588422 0.48735303 0.52107081 0.55381551
 0.61502608 0.59761849 0.64976534]
First value of y_test: 0 and first value of y_pred: 1
The sigmoid probability for the tested value: 0.5490987271244848
```