This homework is done by Tianwei Mo (Bill).

1. Screenshot:

文本

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Code:

*# a*

row\_tr, col = Xtr.shape

row\_ts, col = Xts.shape

Xtr\_f = np.zeros((row\_tr, 1))

Xts\_f = np.zeros((row\_ts, 1))

r2s = np.zeros(col)

for f in range(col):

    Xtr\_f = Xtr[:, f].reshape(-1, 1)

    Xts\_f = Xts[:, f].reshape(-1, 1)

    model = LinearRegression().fit(Xtr\_f, ytr)

    yhat = model.predict(Xts\_f)

    r2s[f] = r2\_score(yts, yhat)

print('best feature: ', np.argmax(r2s))

print('best r2: ', np.max(r2s))

1. Screenshot:

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描述已自动生成

Code:

*# b*

row\_tr, col = Xtr.shape

row\_ts, col = Xts.shape

Xtr\_f = np.zeros((row\_tr, 2))

Xts\_f = np.zeros((row\_ts, 2))

r2s = np.zeros((col, col))

for f1 in range(col):

    for f2 in range(col):

        if f1 == f2:

            r2s[f1, f2] = -np.inf

            continue

        Xtr\_f[:, 0] = Xtr[:, f1]

        Xts\_f[:, 0] = Xts[:, f1]

        Xtr\_f[:, 1] = Xtr[:, f2]

        Xts\_f[:, 1] = Xts[:, f2]

        model = LinearRegression().fit(Xtr\_f, ytr)

        yhat = model.predict(Xts\_f)

        r2s[f1, f2] = r2\_score(yts, yhat)

max = np.max(r2s)

max\_x, max\_y = np.where(r2s == max)

print('best feature 1: ', max\_x + 1)

print('best feature 2: ', max\_y + 1)

print('best r2: ', max)

1. I need to call the fit function Times. For and , I need to call the fit function times.
2. The scale of features varies largely, which will result in a bad regularization.

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文本

描述已自动生成

1. Assume .

Let ,

If , , exist.

1. Assume .

Let ,

Which contradicts to our assumption.

1. When , the only possibility of is .