AJUSTE DE HIPERPARAMETROS DE FORMA PRACTICA

En Machine Learning, la mayoría de los modelos tienen hiperparámetros que deben ajustarse para conseguir mejores predicciones.
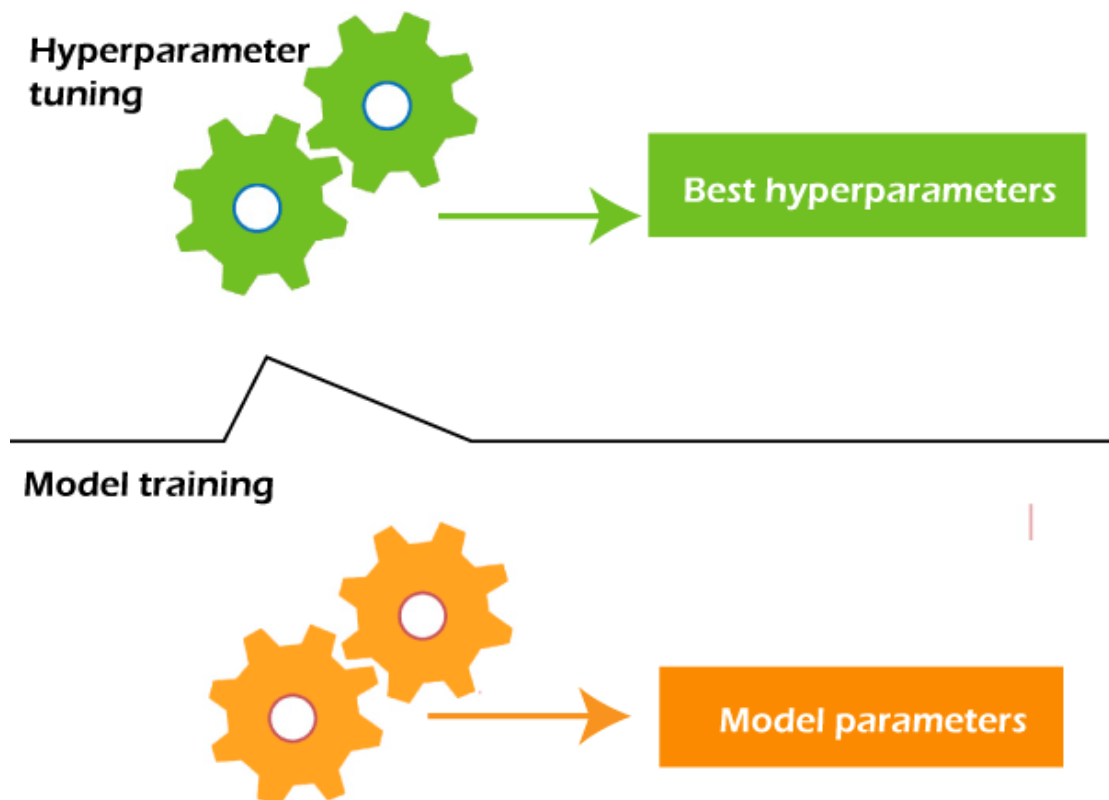
Por ejemplo, en el modelo de **Elastic Net**, teníamos la siguiente función de error:

$$Loss = \sum_{i=0}^{n} (y_i - (w_i x_i + c))^2 + \lambda_1 \sum_{i=0}^{n} |w_i| + \lambda_2 \sum_{i=0}^{n} w_i^2$$
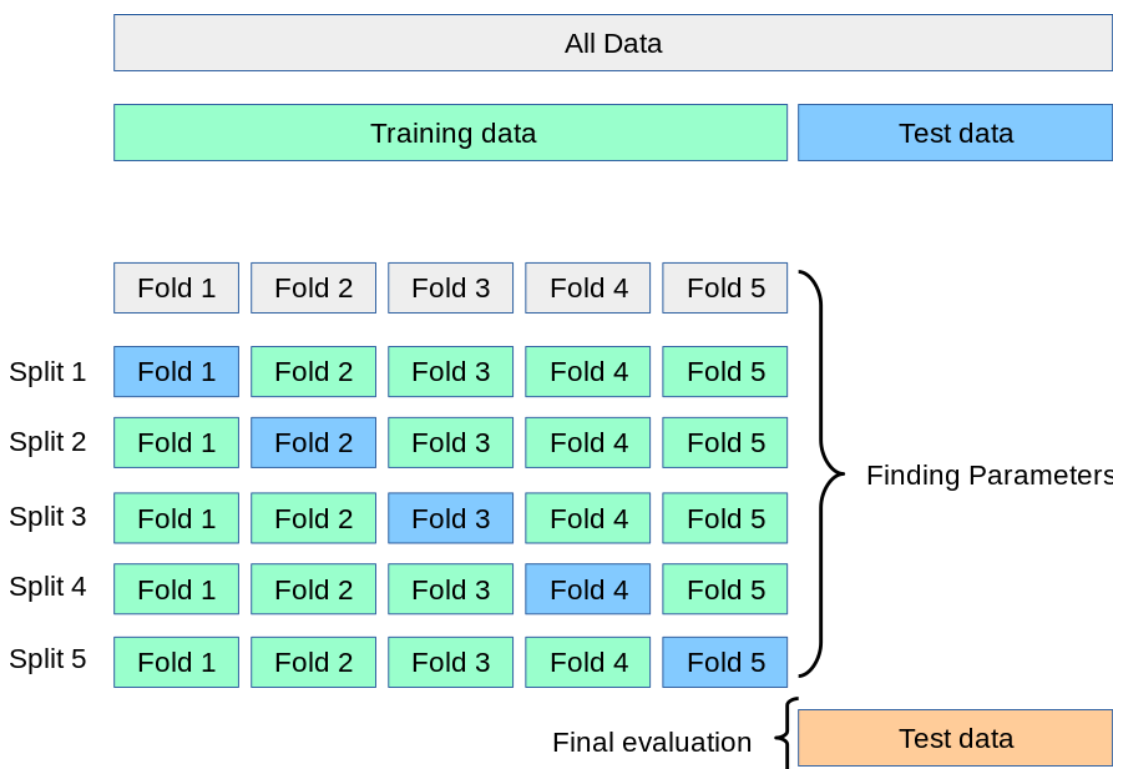
donde hay dos parámetros λ_1 y λ_2 que debemos optimizar para que el modelo ofrezca los mejores resultados posibles.

¿Por qué se llaman hiperparámetros y no parámetros? La diferencia es que los hiperparámetros hay que fijarlos antes de entrenar, mientras que los parámetros son aquellos que se ajustan en el entrenamiento. En el caso de Elastic Net, los hiperparámetros serían λ_1 y λ_2 mientras que los parámetros serían w_0, w_1, w_2...

Los dos métodos más utilizados para optimizar hiperparámetros son **Random Search** y **Grid Search**. Ambas técnicas se aplican con el método de **Cross Validation**.
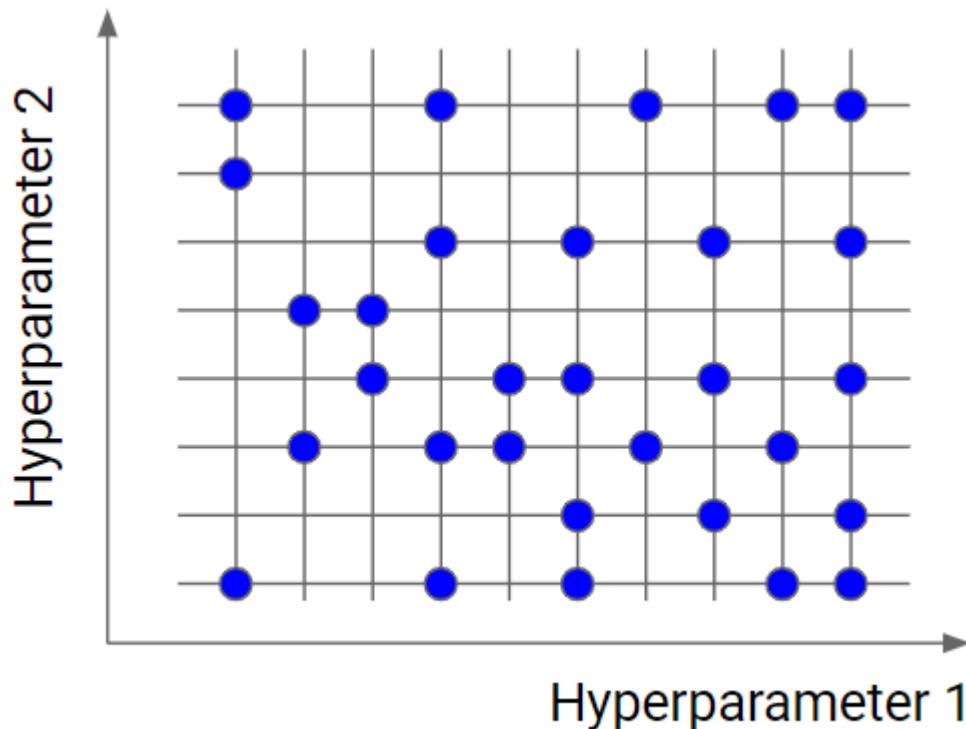

Random Search

Como su propio nombre indica, utiliza combinaciones aleatorias de los hiperparámetros. Esto implica que no se van a probar todos los posibles valores, sino algunos muestreados de forma aleatoria. En primer lugar, se divide el dominio de hiperparámetros en un grid.

Después, se seleccionan combinaciones aleatorias hasta llegar a un número máximo de iteraciones, quedándose con la mejor combinación de todas las evaluadas.

Esta opción es recomendable cuando tenemos muchos hiperparámetros con muchos posibles valores

In [2]:
```python
from sklearn.datasets import load_diabetes
from sklearn.model_selection import RandomizedSearchCV, train_test_split
from sklearn.linear_model import ElasticNet
import numpy as np
```

In [3]:
```python
X, y = load_diabetes(return_X_y=True)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
                                                    random_state=42)
```

In [4]:
```python
param_grid = {
    'alpha': [1e-10, 1e-4, 1e-2, 1, 5, 10, 20, 40],
    'l1_ratio': np.arange(0,1,0.01)
}

elastic = ElasticNet()

random_search = RandomizedSearchCV(elastic, # El modelo que quiero entrenar
                                   param_grid, # El grid de parámetros
                                   random_state=1, # Semilla
                                   n_iter=100, # Nº de iteraciones del random se
                                   cv=5, # Folds del cross validation
                                   scoring="neg_root_mean_squared_error", # Métr
                                   n_jobs = -1 # Paralelizar
                                   )

random_search.fit(X_train, y_train)
```

Out[4]:

```
 ▸ RandomizedSearchCV
 ▸ estimator: ElasticNet
     ▸ ElasticNet
```

In [5]:
```python
# Mejores parámetros del modelo
random_search.best_params_
```

Out[5]: {'l1_ratio': 0.01, 'alpha': 0.0001}

In [6]:
```python
# Mejor score (R2)
random_search.best_score_**2
```

Out[6]: 3119.8132776573457

In [7]:
```python
# random_search.best_estimator_ contiene el mejor modelo
random_search.best_estimator_.coef_
```

Out[7]:
```
array([  41.95188923, -227.26043042,  536.22030113,  333.70496   ,
       -208.95856276,  -32.17178006, -156.20483528,  169.91693151,
        448.88133911,   64.35253694])
```

In [8]:
```python
#R2
random_search.best_estimator_.score(X_test, y_test)
```

Out[8]: 0.45811580159405374

In [9]:
```python
# Es equivalente a hacer esto:
from sklearn.metrics import mean_squared_error

model = ElasticNet(alpha=0.0001, l1_ratio=0.01)
model.fit(X_train, y_train)
print(model.score(X_train,y_train))
print("RMSE_train", mean_squared_error(y_train, model.predict(X_train), squared
print(model.score(X_test, y_test))
print("RMSE_test", mean_squared_error(y_test, model.predict(X_test), squared = F
```

```
0.5240027096996049
RMSE_train 53.780563300949
0.45811580159405374
RMSE_test 53.581570649599115
```

In [10]:
```python
# Compruebo que los coeficientes coinciden con el best_estimator_
model.coef_
```

Out[10]:
```
array([  41.95188923, -227.26043042,  536.22030113,  333.70496   ,
       -208.95856276,  -32.17178006, -156.20483528,  169.91693151,
        448.88133911,   64.35253694])
```

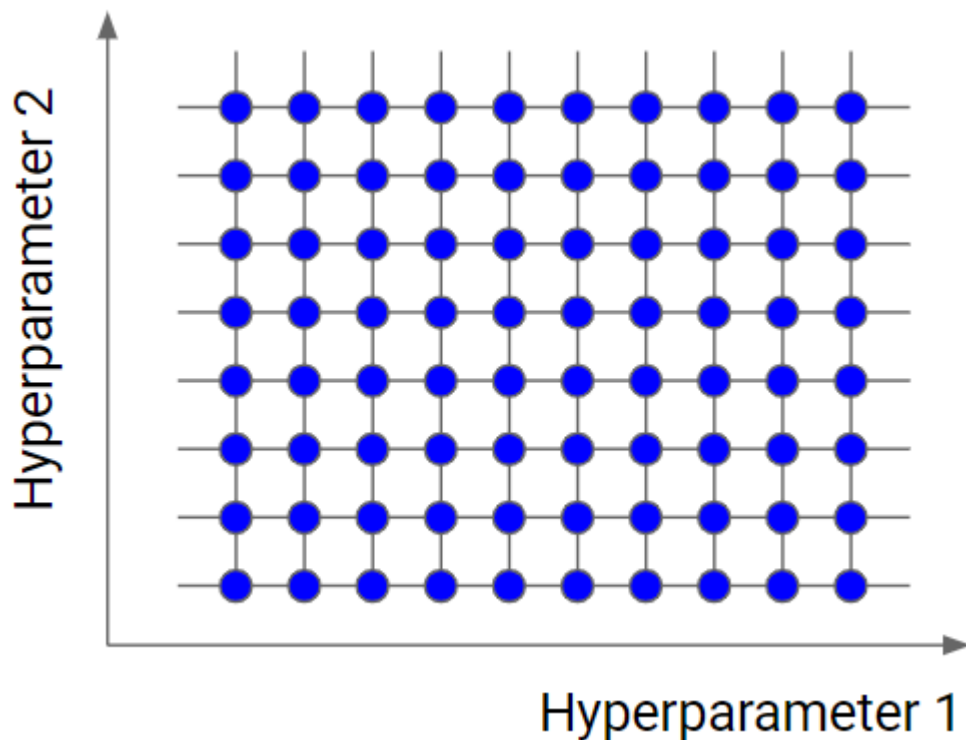¿Funciona mejor que una regresión lineal sin regularización?

In [11]:
```python
from sklearn.linear_model import LinearRegression
diabetes_model = LinearRegression()
diabetes_model.fit(X_train, y_train)
print(diabetes_model.score(X_train,y_train))
print("RMSE", mean_squared_error(y_train, diabetes_model.predict(X_train), squar
```

```
print(diabetes_model.score(X_test, y_test))
print("RMSE", mean_squared_error(y_test, diabetes_model.predict(X_test), squared
```

```
0.5279193863361498
RMSE 53.558843367230935
0.4526027629719195
RMSE 53.85344583676593
```

Grid Search

Este método prueba todas las combinaciones del grid y evalúa el modelo para cada combinación, también usando cross-validation para cada una. Es más lento que Random Search, ya que prueba todas las posibles combinaciones. La ventaja es que te aseguras haber encontrado la mejor de todas al finalizar el proceso, lo que no te garantizaba Random Search.

In [12]:
```python
from sklearn.model_selection import GridSearchCV

param_grid = {
    'alpha': [1e-10, 1e-4, 1e-2, 1, 5, 10, 20, 40],
    'l1_ratio': np.arange(0, 1, 0.01)
}

elastic = ElasticNet()

grid_search = GridSearchCV(elastic,
                           param_grid,
                           cv=5,
                           scoring='r2',
                           n_jobs=-1
                           )
```

```
grid_search.fit(X_train, y_train)
```

```
grid_search.fit(X_train, y_train)
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.118e+05, tolerance: 1.706e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.919e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.851e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.865e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.094e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.845e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.762e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.046e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.544e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.815e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.055e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
```

```
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.891e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.893e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.882e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.356e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.844e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.817e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.739e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.717e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.094e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.821e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.745e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.214e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
```

the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.940e+05, tolerance: 1.758e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.930e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.839e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.748e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.839e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.061e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.827e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.344e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.804e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.102e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.780e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.847e+05, tolerance: 1.755e+02

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.836e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.751e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.415e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.830e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.774e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.602e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.723e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.694e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.914e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.802e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.689e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.001e+05, tolerance: 1.559e+02 Linear regression mo
```

dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.687e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.614e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.030e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.014e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.896e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.983e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.887e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.952e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.743e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.872e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.849e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p

```
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.832e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.787e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.746e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.143e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.825e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.760e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.559e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.794e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.788e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.648e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.249e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.126e+05, tolerance: 1.755e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
```

```
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.925e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.635e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.915e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.911e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.326e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.998e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.409e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.798e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.972e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.868e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.891e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
```

```
regularisation. Duality gap: 2.992e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.769e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.788e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.647e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.728e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.193e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.774e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.608e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.147e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.655e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.651e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.857e+05, tolerance: 1.794e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.833e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.821e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.232e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.901e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.220e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.792e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.906e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.046e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.774e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.672e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.740e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.300e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.839e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.803e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.811e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.717e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.436e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.700e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.957e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.807e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.703e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.396e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.989e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.077e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.920e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.528e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.425e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.475e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.967e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.281e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.786e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.816e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.763e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.539e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.858e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.861e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.731e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.476e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.706e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.001e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.568e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.052e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.639e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.554e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.756e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.935e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.906e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.810e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.142e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.937e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.160e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.604e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.863e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.876e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.938e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.517e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.711e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.046e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.816e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.650e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.617e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.765e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.581e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.083e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.644e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.585e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.761e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.310e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.110e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.877e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.921e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.886e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.757e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.476e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.853e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.692e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.734e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.246e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.835e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.676e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.321e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.683e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.833e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.793e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.662e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.284e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.678e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.465e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.827e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.595e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.335e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.358e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.689e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.873e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.797e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.524e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.752e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.542e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.992e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.628e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.494e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.747e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.529e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.563e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.199e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.693e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.378e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.659e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.558e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.179e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.689e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.366e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.637e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.553e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.672e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.756e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.784e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.635e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.738e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.503e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.906e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.612e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.411e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.734e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.490e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.879e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.667e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.307e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.533e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.526e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.066e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.663e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.295e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.513e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.521e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.048e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.658e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.667e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.720e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.779e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.621e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.180e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.661e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.685e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.606e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.385e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.729e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.478e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.853e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.601e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.359e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.725e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.598e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.127e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.259e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.444e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.330e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.594e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.116e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.245e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.963e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.622e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.466e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.743e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.516e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.934e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.617e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.438e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.139e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.680e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.342e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.594e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.542e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.120e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.676e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.330e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.573e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.537e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.101e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.671e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.319e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.553e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.531e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.770e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.594e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.114e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.752e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.579e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.264e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.707e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.415e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.728e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.574e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.242e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.421e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.495e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.681e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.637e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.226e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.403e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.490e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.531e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.632e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.215e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.386e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.485e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.555e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.021e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.633e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.702e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.403e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.704e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.569e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.220e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.698e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.391e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.681e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.834e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.611e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.159e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.305e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.459e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.704e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.607e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.148e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.289e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.454e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.576e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.602e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.716e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.440e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.776e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.585e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.287e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.711e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.427e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.272e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.475e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.511e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.015e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.650e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.260e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.457e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.505e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.990e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.645e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.249e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.438e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.500e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.834e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.641e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.237e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.720e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.452e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.801e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.590e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.480e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.243e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.624e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.192e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.352e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.474e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.103e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.619e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.181e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.336e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.469e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.967e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.615e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.170e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.320e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.464e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.882e+04, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.335e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.198e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.385e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.628e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.204e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.369e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.051e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.543e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.991e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.087e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.379e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.958e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.539e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.981e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.076e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.374e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.867e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.535e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.971e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.064e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.369e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.778e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.503e+05, tolerance: 1.706e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.760e+05, tolerance: 1.758e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.283e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.494e+05, tolerance: 1.559e+02
```

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.516e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.031e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.654e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.399e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.342e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.556e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.021e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.124e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.394e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.243e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.552e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.011e+05, tolerance: 1.755e+02
```

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.111e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.389e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.146e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.547e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.001e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.099e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.384e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.528e+05, tolerance: 1.706e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
```

Out[12]:   ▸   **GridSearchCV**

    ▸ **estimator: ElasticNet**

        ▸ ElasticNet

In [13]: `grid_search.best_params_`

Out[13]:   `{'alpha': 0.01, 'l1_ratio': 0.97}`

In [14]: `grid_search.best_score_`

Out[14]:   0.4563664652073977

In [15]:
```python
# R2 en test
grid_search.best_estimator_.score(X_test, y_test)
```

Out[15]: 0.46261528610078473

In [16]:
```python
# Es equivalente a hacer esto:
from sklearn.metrics import mean_squared_error

model = ElasticNet(alpha=0.01, l1_ratio=0.97)
model.fit(X_train, y_train)
print(model.score(X_train,y_train))
print("RMSE_train", mean_squared_error(y_train, model.predict(X_train), squared
print(model.score(X_test, y_test))
print("RMSE_test", mean_squared_error(y_test, model.predict(X_test), squared = F
```

```
0.519618926774386
RMSE_train 54.02764661563131
0.46261528610078473
RMSE_test 53.35865217161338
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.502e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.892e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.781e+04, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.330e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.121e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.498e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.883e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.681e+04, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.326e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.245e+05, tolerance: 1.706e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.100e+05, tolerance: 1.758e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
```

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.262e+05, tolerance: 1.755e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.124e+05, tolerance: 1.559e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.788e+05, tolerance: 1.758e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.771e+05, tolerance: 1.755e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.791e+05, tolerance: 1.559e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.530e+05, tolerance: 1.706e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.790e+05, tolerance: 1.758e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
```

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.979e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.581e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.084e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.202e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.424e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.867e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.577e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.073e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.189e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.419e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.758e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.573e+05, tolerance: 1.758e+02
```

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.063e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.083e+05, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.175e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.414e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.651e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.568e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.052e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.162e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.409e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.545e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.564e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.042e+05, tolerance: 1.755e+02
```

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.149e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.404e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.443e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.560e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.032e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.136e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.531e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.961e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.053e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.364e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.690e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.527e+05, tolerance: 1.758e+02
```

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.951e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.042e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.359e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.604e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.523e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.941e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.031e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.355e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.520e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.519e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.439e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.210e+04, tolerance: 1.706e+02
```

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.590e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.105e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.230e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.434e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.094e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.585e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 4.042e+05, tolerance: 1.794e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.974e+05, tolerance: 1.706e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.008e+05, tolerance: 1.758e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.138e+05, tolerance: 1.755e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
```

```
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.495e+05, tolerance: 1.559e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.142e+05, tolerance: 1.794e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.746e+05, tolerance: 1.755e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.771e+05, tolerance: 1.559e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.937e+05, tolerance: 1.794e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.525e+05, tolerance: 1.706e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.785e+05, tolerance: 1.758e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
```

```
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.769e+05, tolerance: 1.755e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.788e+05, tolerance: 1.559e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.963e+05, tolerance: 1.794e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.966e+05, tolerance: 1.794e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.529e+05, tolerance: 1.706e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.789e+05, tolerance: 1.758e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.773e+05, tolerance: 1.755e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 7.792e+05, tolerance: 1.559e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
```

using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.968e+05, tolerance: 1.794e+02 Linear regression mo
dels with null weight for the l1 regularization term are more efficiently fitted
using one of the solvers implemented in sklearn.linear_model.Ridge/RidgeCV instea
d.
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.137e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.274e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.449e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 8.452e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.931e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.020e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.350e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.437e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.514e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.921e+05, tolerance: 1.755e+02

```
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 1.009e+05, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.345e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.356e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.510e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.912e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 9.986e+04, tolerance: 1.559e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.340e+05, tolerance: 1.794e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 6.276e+04, tolerance: 1.706e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 3.506e+05, tolerance: 1.758e+02
  model = cd_fast.enet_coordinate_descent(
/usr/local/lib/python3.8/dist-packages/sklearn/linear_model/_coordinate_descent.p
y:628: ConvergenceWarning: Objective did not converge. You might want to increase
the number of iterations, check the scale of the features or consider increasing
regularisation. Duality gap: 2.902e+05, tolerance: 1.755e+02
  model = cd_fast.enet_coordinate_descent(
```
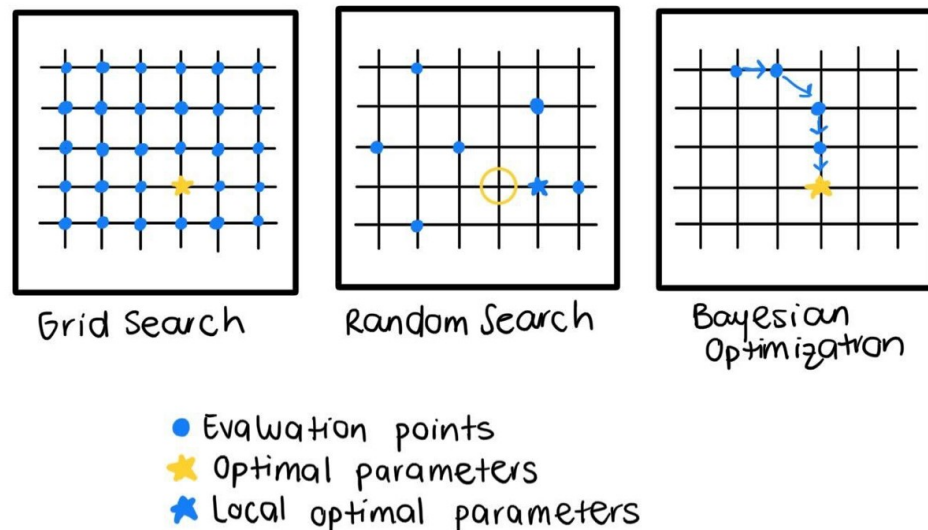
Hemos obtenido el mejor resultado con Grid Search, ya que ha evaluado todas las
posibles combinaciones, quedándose con la mejor.

Bayesian Search

Existe un tercer método para ajustar los hiperparámetros del modelo: la optimización bayesiana, que utiliza métodos probabilísticos para elegir y probar la siguiente combinación de hiperparámetros. Con esta estrategia, se consigue que la búsqueda se vaya redirigiendo en cada iteración hacia las regiones de mayor interés.

El objetivo final es reducir el número de combinaciones de hiperparámetros con las que se evalúa el modelo, eligiendo únicamente los mejores candidatos. La ventaja frente a las otras estrategias mencionadas es el ahorro de tiempo cuando el espacio de búsqueda es muy amplio o la evaluación del modelo es muy lenta.

La librería Hyperopt nos permite aplicar la optimización bayesiana

```
In [17]: from hyperopt import fmin, tpe, hp, STATUS_OK, Trials
         from sklearn.model_selection import cross_val_score
```

```
In [18]: def hyperopt_train_test(params, scoring = "r2"):
             model = ElasticNet(**params)
             return cross_val_score(model, X_train, y_train,
                                    cv=5, scoring= scoring).mean() # Aquí la métrica es r


         # Defininmos el "grid" (hiperparámetros y rango de valores)
         space = {
             'alpha': hp.uniform('alpha', 0.0001, 1.0),
             'l1_ratio': hp.uniform('l1_ratio', 0.0001, 1.0)
         }

         def f(params):
             r2 = hyperopt_train_test(params)
             return {'loss':-r2, 'status': STATUS_OK}

         trials = Trials()
         best = fmin(f, space, algo=tpe.suggest, max_evals=100, trials=trials)
```

```
100%|████████████| 100/100 [00:01<00:00, 54.92trial/s, best loss: -0.45330012674286
185]
```

In [19]: `best # Esto nos devuelve la combinación optima encontrada`

Out[19]: `{'alpha': 0.013168424367913125, 'l1_ratio': 0.9530513313107665}`

In [20]:
```python
model_bayes = ElasticNet(alpha=best['alpha'], l1_ratio=best['l1_ratio'])
model_bayes.fit(X_train, y_train)
model_bayes.score(X_test, y_test)
```

Out[20]: `0.4620007638001099`

Más información sobre los espacios de búsqueda de hyperopt:

http://hyperopt.github.io/hyperopt/getting-started/search_spaces/

RESUMEN PROCEDIMIENTO

1. Entender probelmas de negocio y trasladarlo a un problema técnico
2. Obtener datos
3. Visualización, ojeo los datos
4. Limpieza (no puedo imputar nulos o valores que tengan que considerar agregaciones)
5. Train / Test split
6. Sobre el train ya estudio el target, la bivarianza del target con las posibles features (miniEDA) -- > Lista de potenciales features
7. Tratar las features --> numericas escaladas (previo logaritmo si es necesario + categoricas a numericas
8. Selección de conjunto de modelos
9. Entrenar modelos con CV --> compararlos --> seleccionar el mejor
10. Optimización de los hiperparametros

Alternativamente: 9bis. Entrenar modelos con CV + Optimizar los hiperparametros 10bis. Comparar los optimizazos y quedarme con el mejor