st126235_Assignment_2

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1 A2: Predicting Car Price

1.1 Dechathon Niamsa-ard st126235

Github Link: https://github.com/dniamsaard4codework/A2-Predicting-Car-Price.git

Link to the website: https://st126235.ml.brain.cs.ait.ac.th/

Objective of the assignment:

This assignment's objectives include - To predict car prices using a linear regression model built from scratch. - To experiment how the learning rate, initialization, momentum, batch type, and L1/L2 regularization affect performance of the model. - To evaluate models with cross-validation using R-square and MSE. - To analyze feature importance to find out which feature matter the most. - To apply trained model to deployment system for real-world application

1.2 Task 1. Implementation

In this task, I need to implement linear regression from scratch with the following additions: - R^2 score function - Zero or Xavier initialization option - Momentum option - Feature importance plotting

[1]:
```
# Import necessary libraries
import numpy as np
import mlflow
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sns
from sklearn.model_selection import KFold
from sklearn.preprocessing import StandardScaler, OneHotEncoder
import seaborn as sns
import os
```

[2]:
```
# Define Classes of Regularization

# No Regularization
class NoRegularization:
    def __call__(self, theta):
        return 0
    def derivation(self, theta):
```

```
        return np.zeros_like(theta)

# Lasso Regularization (L1)
class LassoPenalty:

    def __init__(self, l):
        self.l = l # lambda value

    def __call__(self, theta): #__call__ allows us to call class as method
        return self.l * np.sum(np.abs(theta))

    def derivation(self, theta):
        return self.l * np.sign(theta)

# Ridge Regularization (L2)
class RidgePenalty:

    def __init__(self, l):
        self.l = l

    def __call__(self, theta): #__call__ allows us to call class as method
        return self.l * np.sum(np.square(theta))

    def derivation(self, theta):
        return self.l * 2 * theta
```

[3]:
```
class LinearRegression(object):

    # In this class, we add cross validation as well for some spicy code....
    kfold = KFold(n_splits=3)

    def __init__(self,
                 regularization = None,
                 lr=0.001,
                 method='batch',
                 num_epochs=500,
                 batch_size=50,
                 cv=kfold,
                 init_method='zeros',
                 use_momentum=False,
                 momentum=0.9,
                 poly_degree=1):
        self.lr          = lr
        self.num_epochs  = num_epochs
        self.batch_size  = batch_size
        self.method      = method
        self.cv          = cv
```

```
        self.regularization = regularization if regularization is not None else␣
↪NoRegularization()

        # Addition of parameters
        self.init_method = init_method
        self.use_momentum = use_momentum
        self.momentum = momentum
        self.poly_degree = poly_degree

        # Check if momentum is used, and momentum value is between 0 and 1
        if self.use_momentum and not (0 < self.momentum < 1):
            raise ValueError("Momentum value must be between 0 and 1.")

    def mse(self, ytrue, ypred):
        # Verify if it is scalar or array
        if np.isscalar(ytrue):
            return (ypred - ytrue) ** 2
        else:
            return ((ypred - ytrue) ** 2).sum() / ytrue.shape[0]

    # Add a function to compute R-squared score
    def r2(self, ytrue, ypred):
        ss_res = ((ytrue - ypred) ** 2).sum() # Residual sum of squares
        ss_tot = ((ytrue - ytrue.mean()) ** 2).sum() # Total sum of squares
        if ss_tot == 0:
            return 0  # Avoid division by zero; return 0 if variance is zero
        return 1 - (ss_res/ss_tot)

    def poly_features(self, X, degree):
        X_poly = X.copy()
        for d in range(2, degree + 1):
            X_poly = np.hstack((X_poly, X ** d))
        return X_poly

    def fit(self, X_train, y_train):

        # Create a list of kfold scores
        self.kfold_scores = list()

        # kfold.split in the sklearn.....
        # 3 splits
        for fold, (train_idx, val_idx) in enumerate(self.cv.split(X_train)):

            # Reset val loss (Move it inside the fold loop due to early␣
↪stopping)
            self.val_loss_old = np.inf
```

```
            X_cross_train = X_train[train_idx]
            y_cross_train = y_train[train_idx]
            X_cross_val   = X_train[val_idx]
            y_cross_val   = y_train[val_idx]
            # Add polynomial features if degree > 1
            if self.poly_degree > 1:
                X_cross_train = self.poly_features(X_cross_train, self.
↪poly_degree)
                X_cross_val = self.poly_features(X_cross_val, self.poly_degree)

            # Find the number of features in the dataset
            n_features = X_cross_train.shape[1]

            # Add xavier weights initialization
            if self.init_method == 'xavier':
                limit = np.sqrt(1.0/n_features)
                lower,upper = -limit, limit
                number = np.random.rand(n_features)
                self.theta = lower + number * (upper - lower)

            else: # Set default initialization to zeros
                self.theta = np.zeros(n_features)

            # init once per fold
            self.prev_step = np.zeros_like(self.theta)

            # Define X_cross_train as only a subset of the data
            # How big is this subset?  => mini-batch size ==> 50

            # One epoch will exhaust the WHOLE training set
            with mlflow.start_run(run_name=f"Fold-{fold}", nested=True):

                params = {
                    "method": self.method,
                    "lr": self.lr,
                    "reg": type(self.regularization).__name__, # Define the␣
↪type of regularization
                    "init_method": self.init_method, # Define the␣
↪initialization method
                    "use_momentum": self.use_momentum, # Define if momentum is␣
↪used
                    "momentum": self.momentum # Define the momentum value
                    }
                mlflow.log_params(params=params)

                for epoch in range(self.num_epochs):
```

```
                    # With replacement or no replacement
                    # with replacement means just randomize
                    # with no replacement means 0:50, 51:100, 101:150, ......
↪300:323
                    # Shuffle your index
                    perm = np.random.permutation(X_cross_train.shape[0])

                    X_cross_train = X_cross_train[perm]
                    y_cross_train = y_cross_train[perm]

                    if self.method == 'sto':
                        for batch_idx in range(X_cross_train.shape[0]):
                            X_method_train = X_cross_train[batch_idx].
↪reshape(1, -1) # (11,) ==> (1, 11) ==> (m, n)
                            y_method_train = y_cross_train[batch_idx]
                            train_loss = self._train(X_method_train,␣
↪y_method_train)
                    elif self.method == 'mini':
                        for batch_idx in range(0, X_cross_train.shape[0], self.
↪batch_size):
                            # batch_idx = 0, 50, 100, 150
                            X_method_train = X_cross_train[batch_idx:
↪batch_idx+self.batch_size, :]
                            y_method_train = y_cross_train[batch_idx:
↪batch_idx+self.batch_size]
                            train_loss = self._train(X_method_train,␣
↪y_method_train)
                    else:
                        X_method_train = X_cross_train
                        y_method_train = y_cross_train
                        train_loss = self._train(X_method_train, y_method_train)

                    mlflow.log_metric(key="train_loss", value=train_loss,␣
↪step=epoch)

                    yhat_val = self.predict(X_cross_val)
                    val_loss_new = self.mse(y_cross_val, yhat_val)
                    val_r2_new = self.r2(y_cross_val, yhat_val)
                    mlflow.log_metric(key="val_loss", value=val_loss_new,␣
↪step=epoch)
                    mlflow.log_metric(key="val_r2", value=val_r2_new,␣
↪step=epoch)

                    # Early stopping
                    if np.allclose(val_loss_new, self.val_loss_old):
                        break
```

```
                    self.val_loss_old = val_loss_new

                self.kfold_scores.append(val_loss_new)
                print(f"Fold {fold}: {val_loss_new}")


    def _train(self, X, y):
        yhat = self.predict(X)
        m    = X.shape[0]
        grad = (1/m) * X.T @(yhat - y) + self.regularization.derivation(self.
↪theta)

        # Update with momentum if enabled
        if self.use_momentum:
            step = self.lr * grad
            update = self.momentum * self.prev_step - step
            self.theta += update
            self.prev_step = step # Store the current step for the next␣
↪iteration
        else: # Standard gradient descent update
            self.theta = self.theta - self.lr * grad
        return self.mse(y, yhat)

    def predict(self, X, is_polynomial=False):
        if is_polynomial:
            X = self.poly_features(X, self.poly_degree)
        return X @ self.theta  #===>(m, n) @ (n, )

    def _coef(self):
        return self.theta[1:]  # Remind that theta is (w0, w1, w2, w3, w4.....
↪wn)
                               # w0 is the bias or the intercept
                               # w1....wn are the weights / coefficients / theta
    def _bias(self):
        return self.theta[0]

    # Create a function to plot the feature importance
    def plot_feature_importance(self, feature_names):

        if len(feature_names) != len(self._coef()):
            raise ValueError("Length of feature_names must match number of␣
↪coefficients.")

        # Create a DataFrame with pandas for better in plotting
        features_importance = pd.Series(self._coef(), index=feature_names)
```

```
        # Make a sorting with absolute value for better visualization in␣
↪importance
        features_importance_sorted = features_importance.
↪reindex(features_importance.abs().sort_values(ascending=False).index)

        # Plotting
        plt.figure(figsize=(10, 6))
        sns.barplot(x=features_importance_sorted, y=features_importance_sorted.
↪index)
        plt.title("Feature Importance based on Coefficient Values")
        plt.xlabel("Coefficient Value")
        plt.ylabel("Feature")
        plt.show()
```

[4]:
```
# Define Lasso classes inheriting from LinearRegression
class Lasso(LinearRegression):

    def __init__(self, method='batch', lr=0.001, l=0.1, init_method='zeros',␣
↪use_momentum=False):
        self.regularization = LassoPenalty(l)
        super().__init__(self.regularization, lr=lr, method=method,␣
↪init_method=init_method, use_momentum=use_momentum)

# Define Ridge classes inheriting from LinearRegression
class Ridge(LinearRegression):

    def __init__(self, method='batch', lr=0.001, l=0.1, init_method='zeros',␣
↪use_momentum=False):
        self.regularization = RidgePenalty(l)
        super().__init__(self.regularization, lr=lr, method=method,␣
↪init_method=init_method, use_momentum=use_momentum)

class Polynomial(LinearRegression):
    def __init__(self, method='batch', lr=0.001, init_method='zeros',␣
↪use_momentum=False, poly_degree=2):
        super().__init__(lr=lr, method=method, init_method=init_method,␣
↪use_momentum=use_momentum, poly_degree=poly_degree)
```

1.3 Task 2. Experiment

In this task, I need to modify LinearRegression class to conduct the experiments using the Jupyter Notebook from Assignment 1. All experiments need ti be logged and managed using MLFlow

1.3.1 Modified from Assignment 1 (A1: Predicting Car Price)

Load Dataset In this task, I load the car listings CSV as a Pandas DataFrame, inspect shape, schema, and summary statistics

[5]:
```python
# Load the dataset
df = pd.read_csv('../data/Cars.csv')

# Display the first few rows of the dataset
df.head()
```

[5]:
```
                          name  year  selling_price  km_driven    fuel  \
0        Maruti Swift Dzire VDI  2014         450000     145500  Diesel
1  Skoda Rapid 1.5 TDI Ambition  2014         370000     120000  Diesel
2      Honda City 2017-2020 EXi  2006         158000     140000  Petrol
3     Hyundai i20 Sportz Diesel  2010         225000     127000  Diesel
4        Maruti Swift VXI BSIII  2007         130000     120000  Petrol

  seller_type transmission         owner     mileage   engine   max_power  \
0  Individual       Manual   First Owner   23.4 kmpl  1248 CC      74 bhp
1  Individual       Manual  Second Owner  21.14 kmpl  1498 CC  103.52 bhp
2  Individual       Manual   Third Owner   17.7 kmpl  1497 CC      78 bhp
3  Individual       Manual   First Owner   23.0 kmpl  1396 CC      90 bhp
4  Individual       Manual   First Owner   16.1 kmpl  1298 CC    88.2 bhp

                      torque  seats
0            190Nm@ 2000rpm    5.0
1       250Nm@ 1500-2500rpm    5.0
2     12.7@ 2,700(kgm@ rpm)    5.0
3  22.4 kgm at 1750-2750rpm    5.0
4     11.5@ 4,500(kgm@ rpm)    5.0
```

[6]:
```python
# Display dataset information
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8128 entries, 0 to 8127
Data columns (total 13 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   name           8128 non-null   object
 1   year           8128 non-null   int64
 2   selling_price  8128 non-null   int64
 3   km_driven      8128 non-null   int64
 4   fuel           8128 non-null   object
 5   seller_type    8128 non-null   object
 6   transmission   8128 non-null   object
 7   owner          8128 non-null   object
 8   mileage        7907 non-null   object
 9   engine         7907 non-null   object
 10  max_power      7913 non-null   object
 11  torque         7906 non-null   object
 12  seats          7907 non-null   float64
```

```
dtypes: float64(1), int64(3), object(9)
memory usage: 825.6+ KB
```

[7]:
```python
# Display statistical summary of the dataset
df.describe()
```

[7]:

	year	selling_price	km_driven	seats
count	8128.000000	8.128000e+03	8.128000e+03	7907.000000
mean	2013.804011	6.382718e+05	6.981951e+04	5.416719
std	4.044249	8.062534e+05	5.655055e+04	0.959588
min	1983.000000	2.999900e+04	1.000000e+00	2.000000
25%	2011.000000	2.549990e+05	3.500000e+04	5.000000
50%	2015.000000	4.500000e+05	6.000000e+04	5.000000
75%	2017.000000	6.750000e+05	9.800000e+04	5.000000
max	2020.000000	1.000000e+07	2.360457e+06	14.000000

Exploratory Data Analysis (EDA)

[8]:
```python
# Perform some data cleaning for better analysis and visualization
# Parse from numeric columns and handle empty strings
df.mileage = pd.to_numeric(df.mileage.str.split(' ', expand=True)[0].
 ↪replace('', np.nan), errors='coerce')
df.engine = pd.to_numeric(df.engine.str.split(' ', expand=True)[0].replace('',␣
 ↪np.nan), errors='coerce')
df.max_power = pd.to_numeric(df.max_power.str.split(' ', expand=True)[0].
 ↪replace('', np.nan), errors='coerce')

# Rename the columns for better understanding
df = df.rename(columns={'name':'brand'})

# Drop the torque column
df = df.drop(columns=['torque'], errors='ignore')

# Remove all rows with CNG and LPG fuel types
df = df[~df['fuel'].isin(['CNG', 'LPG'])]

# Take the first word of name and remove the rest for brand class
df.brand = df.brand.str.split(' ', expand=True)[0]

df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 8033 entries, 0 to 8127
Data columns (total 12 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   brand          8033 non-null   object
 1   year           8033 non-null   int64
 2   selling_price  8033 non-null   int64
```

```
 3   km_driven      8033 non-null   int64
 4   fuel           8033 non-null   object
 5   seller_type    8033 non-null   object
 6   transmission   8033 non-null   object
 7   owner          8033 non-null   object
 8   mileage        7819 non-null   float64
 9   engine         7819 non-null   float64
 10  max_power      7825 non-null   float64
 11  seats          7819 non-null   float64
dtypes: float64(4), int64(3), object(5)
memory usage: 815.9+ KB
```

[9]:
```
# Check for missing values
df.isnull().sum()
```

[9]:
```
brand              0
year               0
selling_price      0
km_driven          0
fuel               0
seller_type        0
transmission       0
owner              0
mileage          214
engine           214
max_power        208
seats            214
dtype: int64
```

[10]:
```
# Check for unique values in the 'owner' column
df.owner.unique()
```

[10]:
```
array(['First Owner', 'Second Owner', 'Third Owner',
       'Fourth & Above Owner', 'Test Drive Car'], dtype=object)
```

[11]:
```
# map feature owner to be First owner to 1, ..., Test Drive Car to 5
owner_mapping = {
    'First Owner': 1,
    'Second Owner': 2,
    'Third Owner': 3,
    'Fourth & Above Owner': 4,
    'Test Drive Car': 5
}
df.owner = df.owner.map(owner_mapping).astype(int)

# Check the dataframe info
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 8033 entries, 0 to 8127
Data columns (total 12 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   brand          8033 non-null   object
 1   year           8033 non-null   int64
 2   selling_price  8033 non-null   int64
 3   km_driven      8033 non-null   int64
 4   fuel           8033 non-null   object
 5   seller_type    8033 non-null   object
 6   transmission   8033 non-null   object
 7   owner          8033 non-null   int64
 8   mileage        7819 non-null   float64
 9   engine         7819 non-null   float64
 10  max_power      7825 non-null   float64
 11  seats          7819 non-null   float64
dtypes: float64(4), int64(4), object(4)
memory usage: 815.9+ KB
```

[12]:
```
# Remove the 'Test Drive Car' samples due not to involve in the training
df = df[df['owner'] != 5]
```

[13]:
```
# Check dataset header
df.head()
```

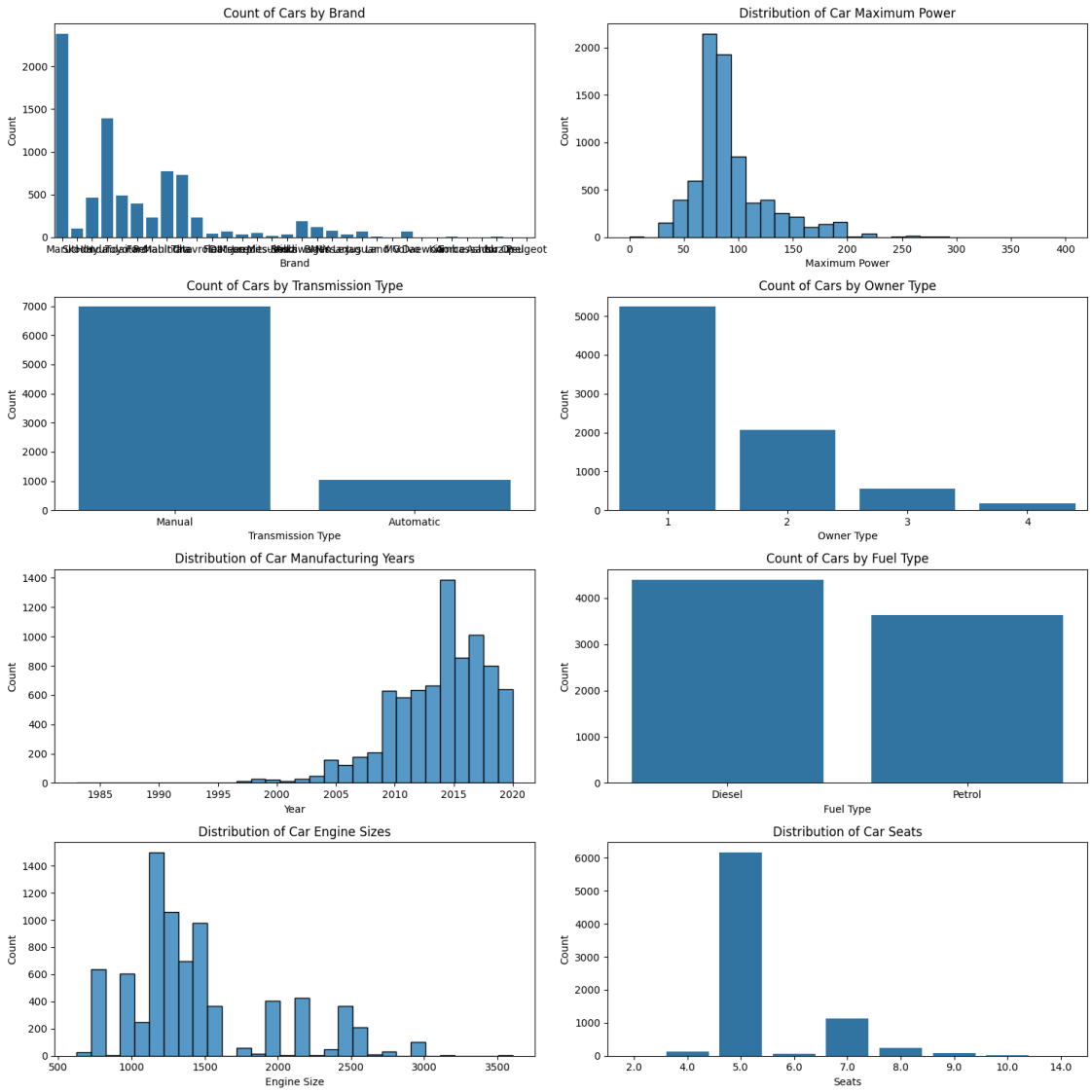
[13]:
```
     brand  year  selling_price  km_driven    fuel seller_type transmission  \
0   Maruti  2014         450000     145500  Diesel  Individual       Manual
1    Skoda  2014         370000     120000  Diesel  Individual       Manual
2    Honda  2006         158000     140000  Petrol  Individual       Manual
3  Hyundai  2010         225000     127000  Diesel  Individual       Manual
4   Maruti  2007         130000     120000  Petrol  Individual       Manual

   owner  mileage  engine  max_power  seats
0      1    23.40  1248.0      74.00    5.0
1      2    21.14  1498.0     103.52    5.0
2      3    17.70  1497.0      78.00    5.0
3      1    23.00  1396.0      90.00    5.0
4      1    16.10  1298.0      88.20    5.0
```

Univariate Analysis

[14]:
```
# Column list: 'brand', 'year', 'selling_price', 'km_driven', 'fuel',␣
↪'seller_type','transmission', 'owner', 'mileage', 'engine', 'max_power',␣
↪'seats'
# y is selling_price
# Create a figure and a set of subplots for univariate analysis
fig, axes = plt.subplots(4, 2, figsize=(15, 15))
```

```python
# Count plot on brand to visualize the distribution of car brands
sns.countplot(data=df, x='brand', ax=axes[0, 0])
axes[0, 0].set_title('Count of Cars by Brand')
axes[0, 0].set_xlabel('Brand')
axes[0, 0].set_ylabel('Count')

# Histogram plot on max_power to visualize the distribution of car maximum power
sns.histplot(data=df, x='max_power', ax=axes[0, 1], bins=30)
axes[0, 1].set_title('Distribution of Car Maximum Power')
axes[0, 1].set_xlabel('Maximum Power')
axes[0, 1].set_ylabel('Count')

# Count plot on transmission to visualize the distribution of transmission types
sns.countplot(data=df, x='transmission', ax=axes[1, 0])
axes[1, 0].set_title('Count of Cars by Transmission Type')
axes[1, 0].set_xlabel('Transmission Type')
axes[1, 0].set_ylabel('Count')

# Count plot on owner to visualize the distribution of car owners
sns.countplot(data=df, x='owner', ax=axes[1, 1])
axes[1, 1].set_title('Count of Cars by Owner Type')
axes[1, 1].set_xlabel('Owner Type')
axes[1, 1].set_ylabel('Count')

# Histogram on year to visualize the distribution of car manufacturing years
sns.histplot(data=df, x='year', ax=axes[2, 0], bins=30)
axes[2, 0].set_title('Distribution of Car Manufacturing Years')
axes[2, 0].set_xlabel('Year')
axes[2, 0].set_ylabel('Count')

# Count plot on fuel to visualize the distribution of fuel types
sns.countplot(data=df, x='fuel', ax=axes[2, 1])
axes[2, 1].set_title('Count of Cars by Fuel Type')
axes[2, 1].set_xlabel('Fuel Type')
axes[2, 1].set_ylabel('Count')

# Histogram on engine to visualize the distribution of car engine sizes
sns.histplot(data=df, x='engine', ax=axes[3, 0], bins=30)
axes[3, 0].set_title('Distribution of Car Engine Sizes')
axes[3, 0].set_xlabel('Engine Size')
axes[3, 0].set_ylabel('Count')

# Distribution plot on seats to visualize the distribution of car maximum power
sns.countplot(data=df, x='seats', ax=axes[3, 1])
axes[3, 1].set_title('Distribution of Car Seats')
axes[3, 1].set_xlabel('Seats')
```

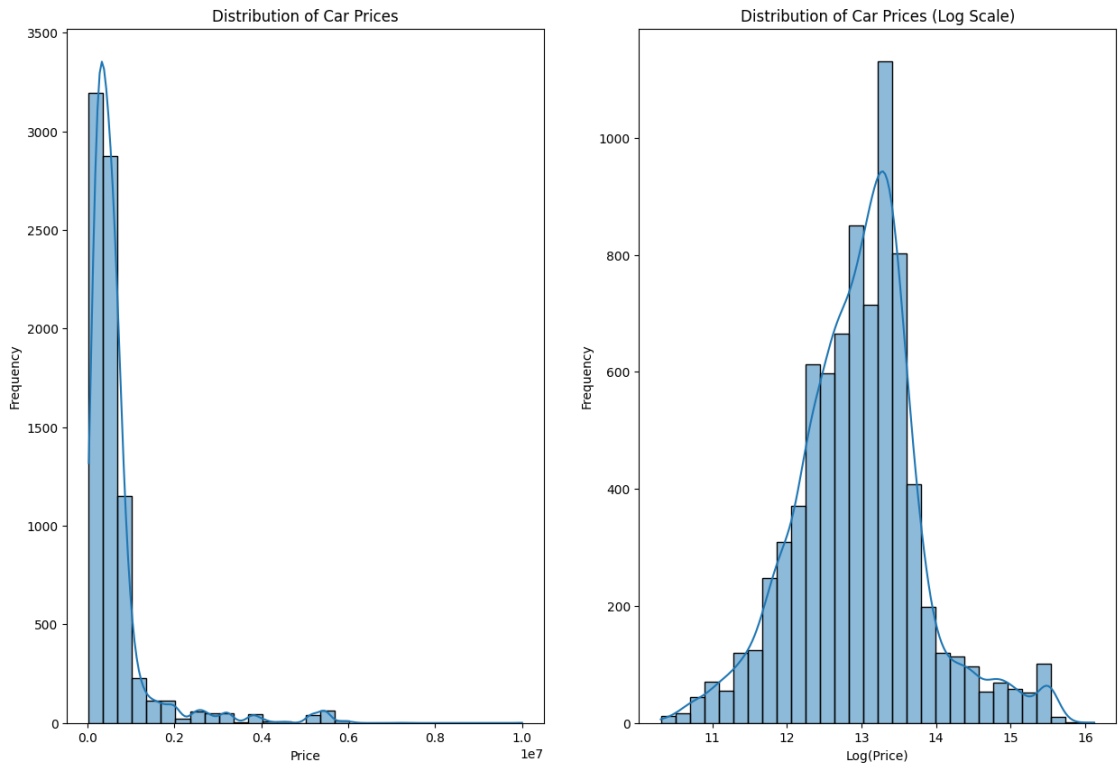
```
axes[3, 1].set_ylabel('Count')


plt.tight_layout()
```



[15]:
```
fig, axes = plt.subplots(1, 2, figsize=(15, 10))

# Show the histogram of car prices between log and no log
sns.histplot(data=df, x='selling_price', bins=30, kde=True, ax=axes[0])
axes[0].set_title('Distribution of Car Prices')
axes[0].set_xlabel('Price')
axes[0].set_ylabel('Frequency')
```

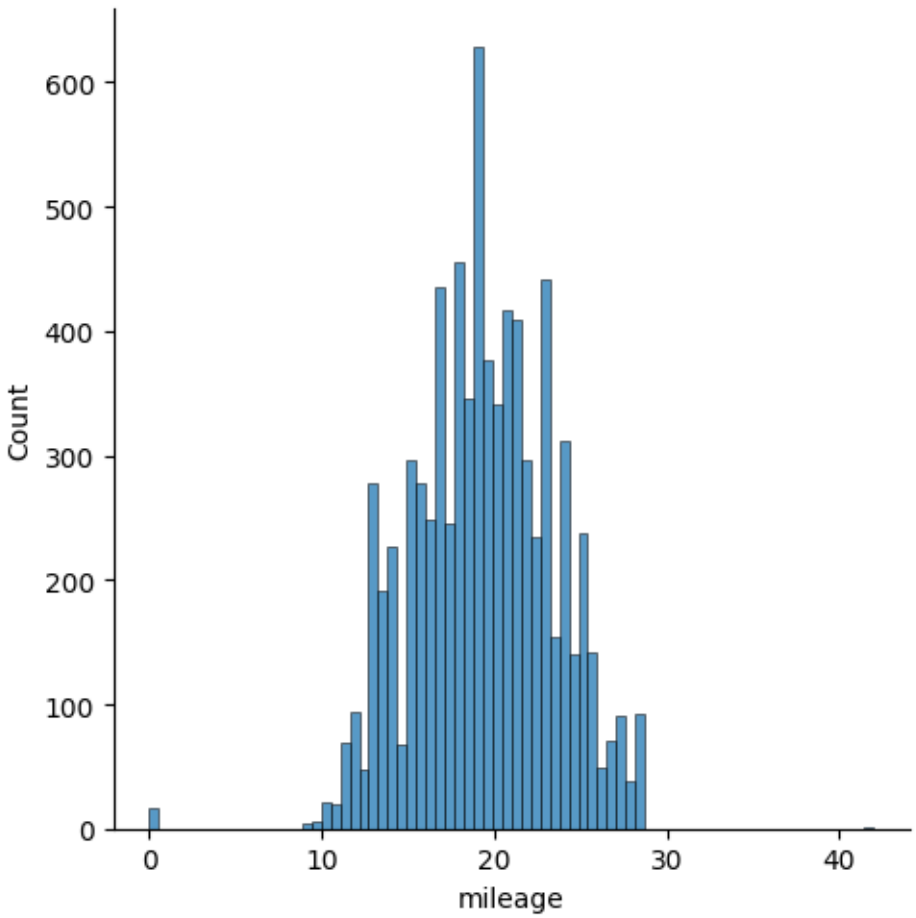
```
sns.histplot(x=np.log1p(df['selling_price']), bins=30, kde=True, ax=axes[1])
axes[1].set_title('Distribution of Car Prices (Log Scale)')
axes[1].set_xlabel('Log(Price)')
axes[1].set_ylabel('Frequency')
```

[15]: Text(0, 0.5, 'Frequency')



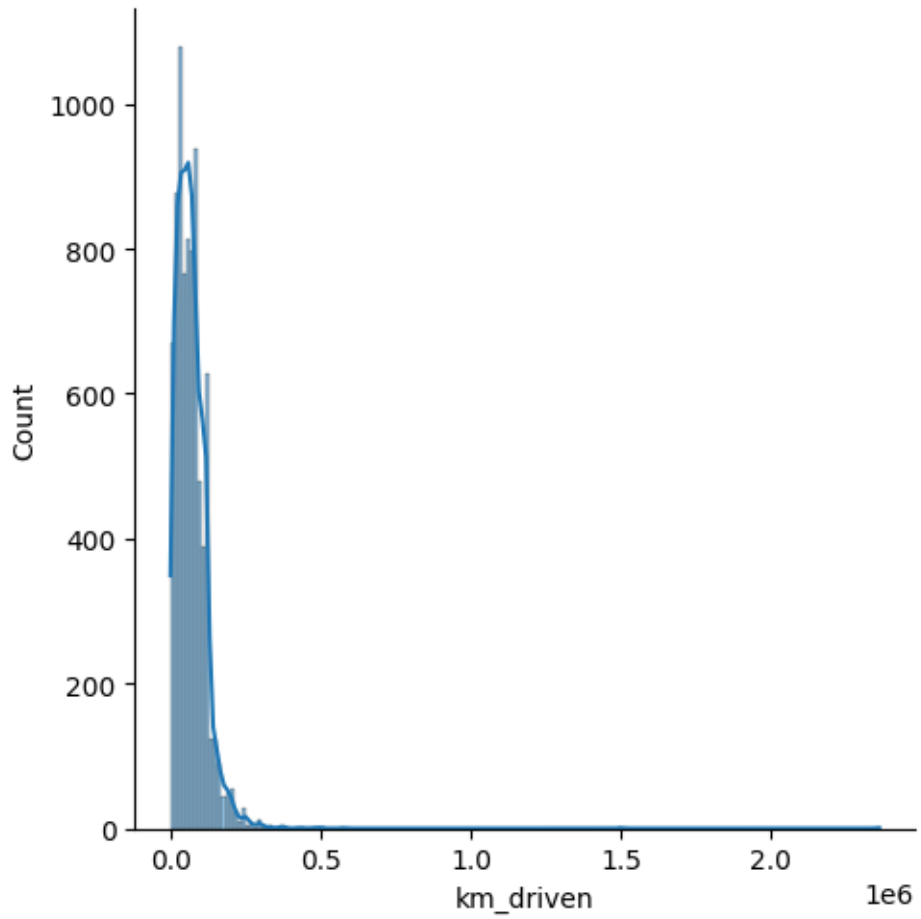
[16]:
```
# Distribution plot on mileage to visualize the distribution of car mileage
sns.displot(data=df, x='mileage')
```

[16]: <seaborn.axisgrid.FacetGrid at 0x131601e20>



[17]:
```
# Distribution plot of KM Driven
sns.displot(data=df, x='km_driven', kde=True)
```

[17]: <seaborn.axisgrid.FacetGrid at 0x13273ec60>



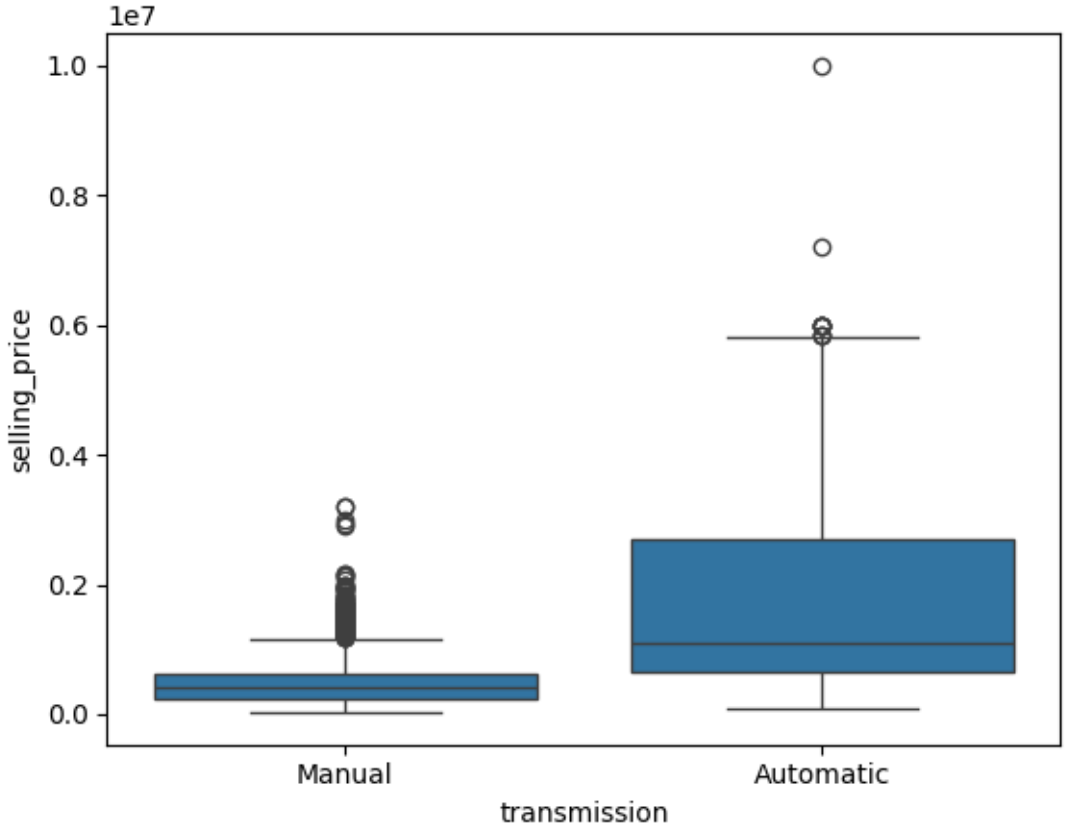
From above univariate analysis, I found that:

- **Car Price** is right-skewed → log transform helps.
- **Year** shows expected recency patterns.
- **Km driven** is long-tailed (a few very high mileage cars).
- **Engine / max_power / mileage** show realistic spread for typical segments.

Multivariate Analysis

[18]:
```
# Boxplot on transmission to visualize the distribution of car transmissions by␣
↪selling price
sns.boxplot(data=df, x='transmission', y='selling_price')
```

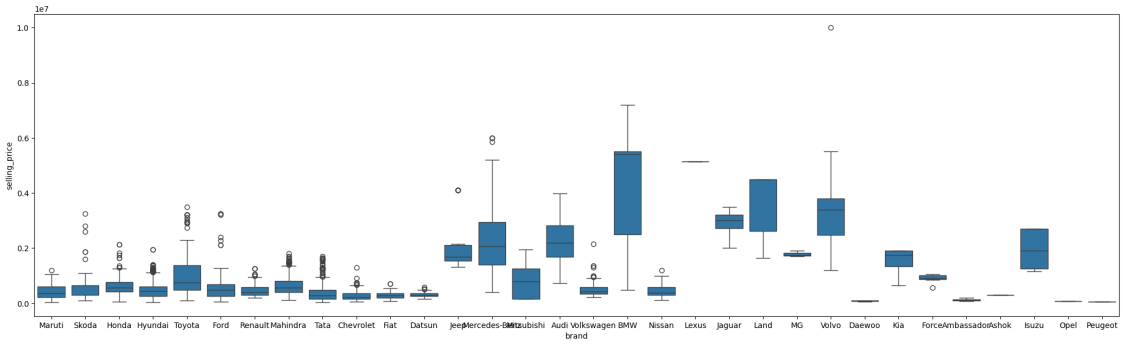
[18]:
```
<Axes: xlabel='transmission', ylabel='selling_price'>
```



Automatics priced higher, but mostly because they appear in premium cars.

[19]:
```
# Boxplot of Car Prices by Brand
plt.figure(figsize=(25, 7))
sns.boxplot(data=df, x='brand', y='selling_price')
```

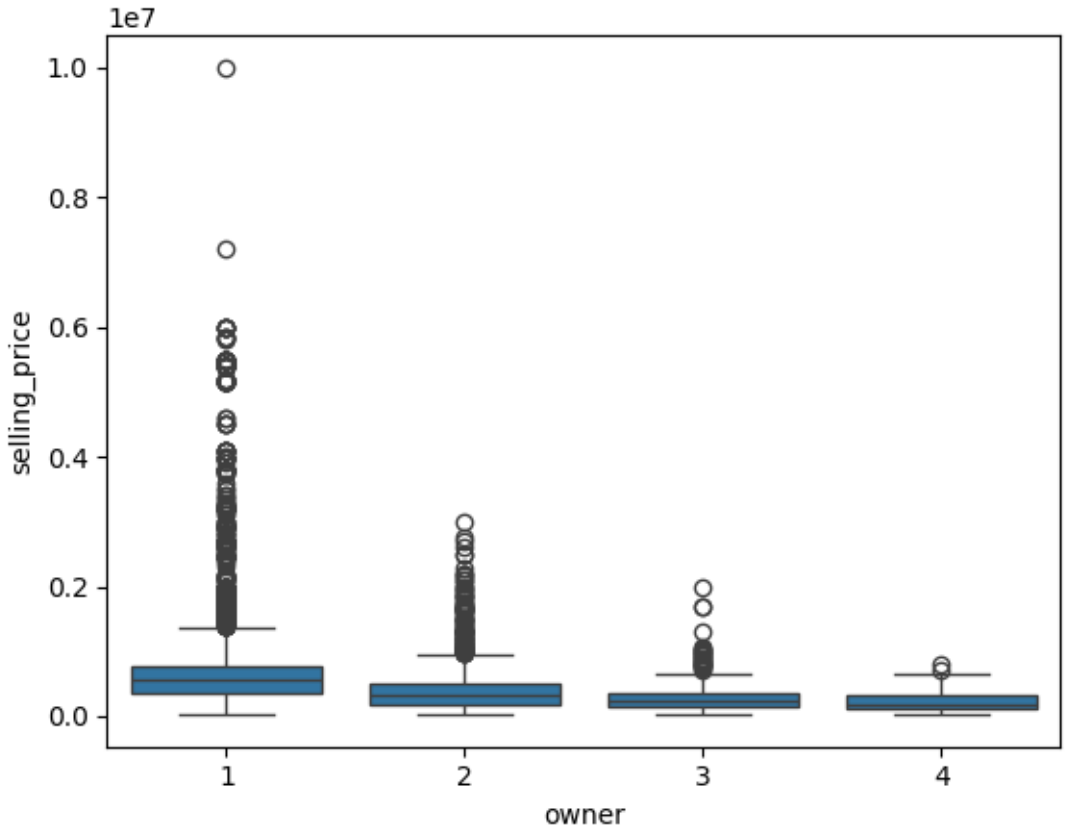
[19]: <Axes: xlabel='brand', ylabel='selling_price'>



Premium brands (BMW, Mercedes, Audi) consistently above mass-market.

[20]:
```
# Boxplot of Car Prices by Owner
sns.boxplot(data=df, x='owner', y='selling_price')
```

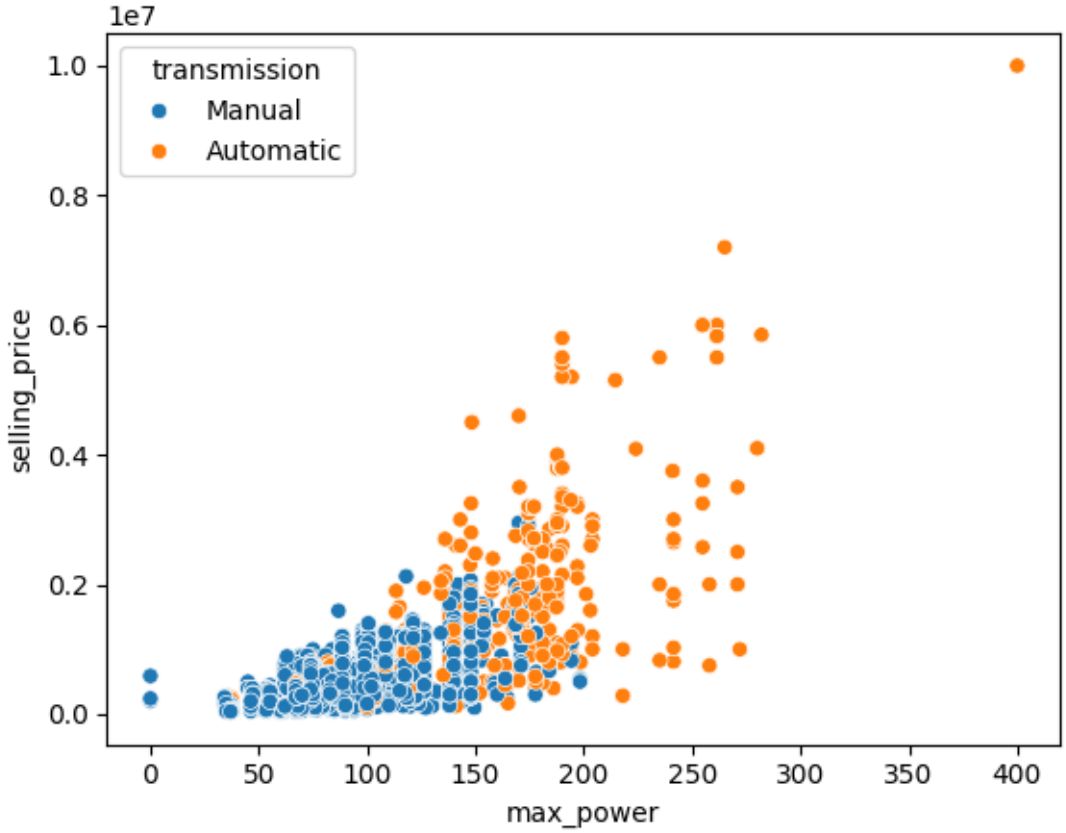
[20]: <Axes: xlabel='owner', ylabel='selling_price'>



More owners = cheaper. Stepwise drop from 1 → 4.

[21]:
```
# Scatter plot on max_power vs selling price to visualize the relationship␣
↪between car maximum power and selling price
sns.scatterplot(data=df, x='max_power', y='selling_price', hue='transmission')
```

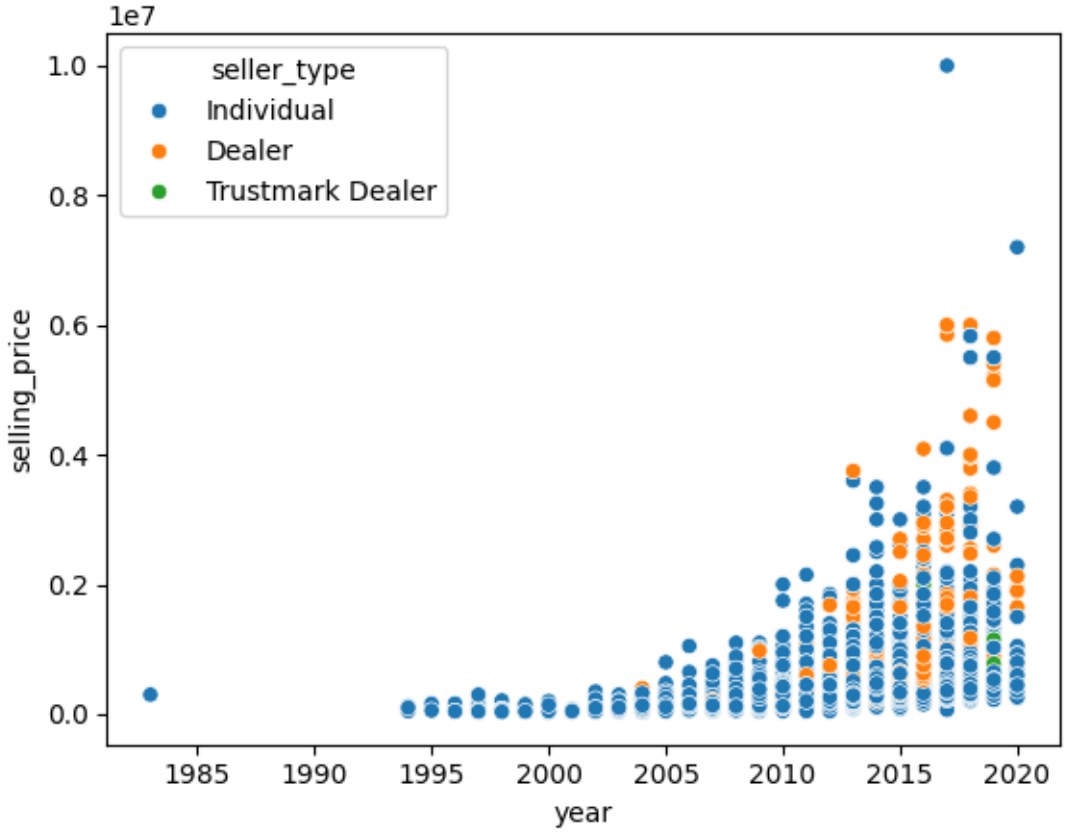
[21]: <Axes: xlabel='max_power', ylabel='selling_price'>



Higher power → higher price, but slows after ~150 bhp. One extreme outlier.

[22]:
```
# Scatter plot on car manufacturing year vs selling price to visualize the␣
↪relationship between car manufacturing year and selling price
sns.scatterplot(data=df, x='year', y='selling_price', hue='seller_type')
```

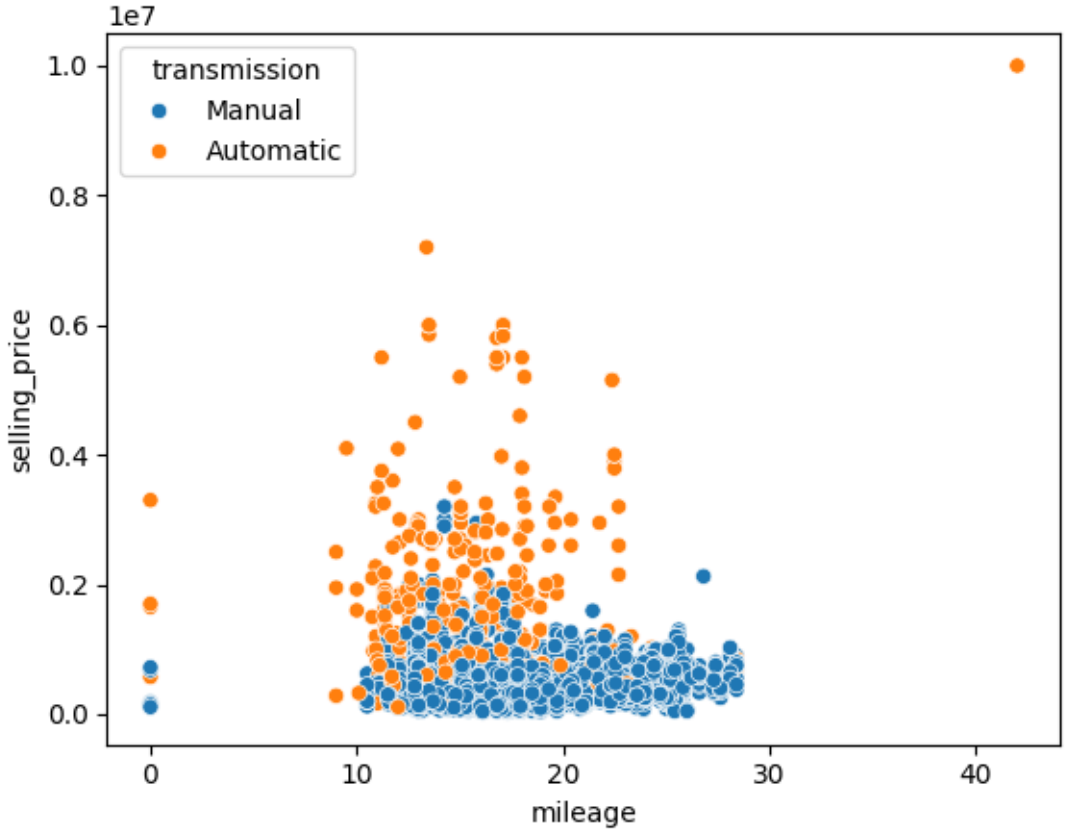
[22]: <Axes: xlabel='year', ylabel='selling_price'>



Newer cars cost more; steep rise after 2011.

[23]:
```
# Scatter plot on car mileage vs selling price to visualize the relationship␣
↪between car mileage and selling price
sns.scatterplot(data=df, x='mileage', y='selling_price', hue='transmission')
```

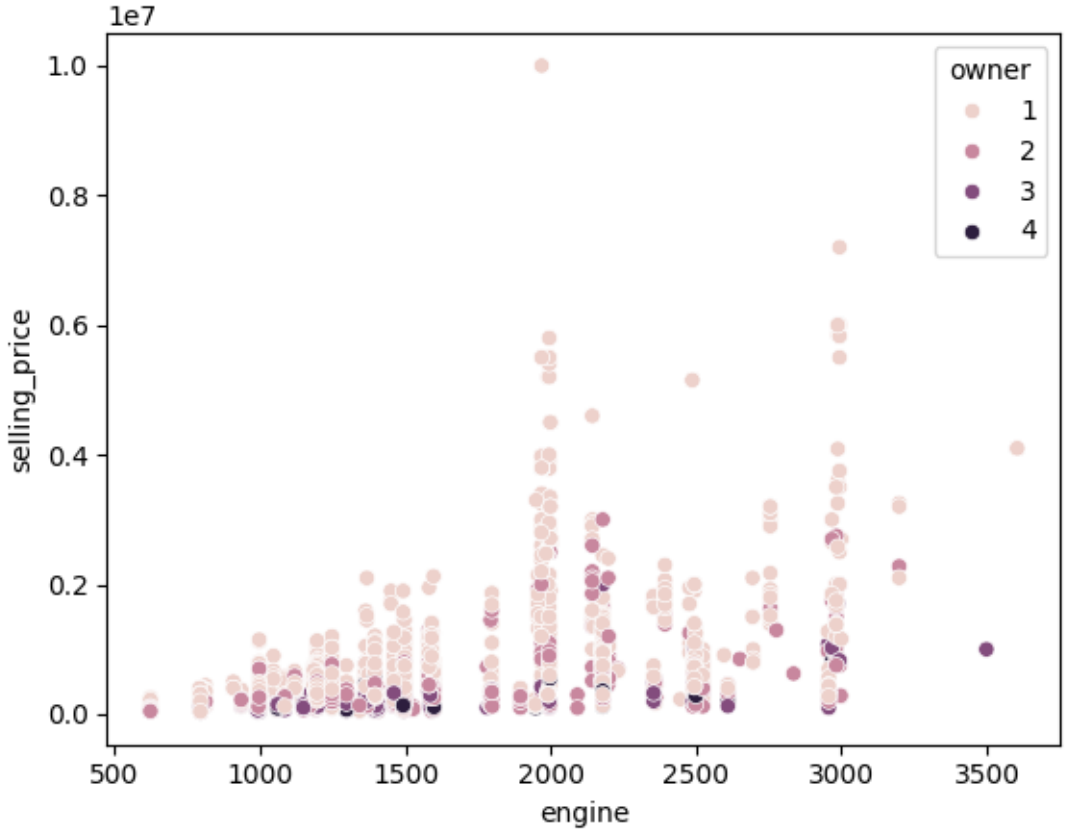
[23]: <Axes: xlabel='mileage', ylabel='selling_price'>



Higher mileage (efficiency) cars tend to be mid-priced. Premium cars often low-efficiency.

[24]:
```
# Scatter plot of engine capacity vs selling price
sns.scatterplot(data=df, x='engine', y='selling_price', hue='owner')
```

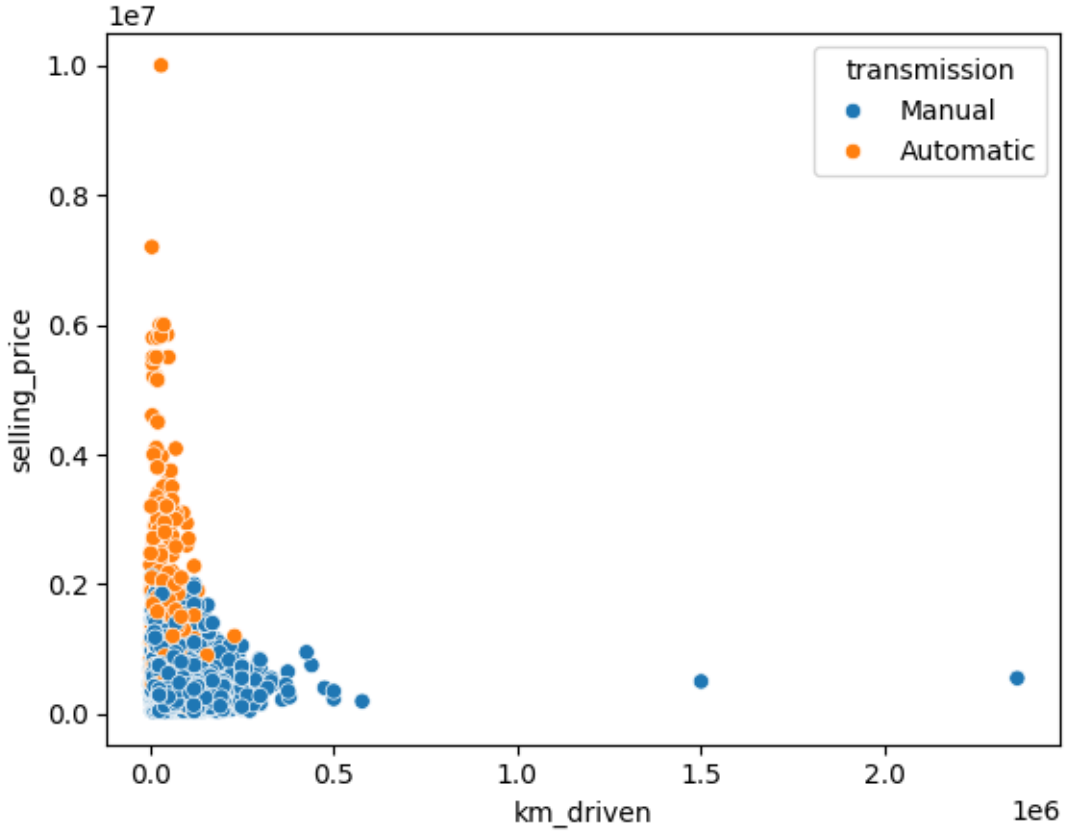
[24]: <Axes: xlabel='engine', ylabel='selling_price'>



Bigger engines cost more; overlaps with power. Popular bands (1200, 1500, 2000cc).

[25]:
```
# Scatter plot km_driven vs selling price
sns.scatterplot(data=df, x='km_driven', y='selling_price', hue='transmission')
```

[25]:
```
<Axes: xlabel='km_driven', ylabel='selling_price'>
```



More km → lower price; steep drop early, then flattens. Outliers above 1M km.

Feature Engineering (Skip) No synthetic features were added in this iteration to keep the pipeline transparent.

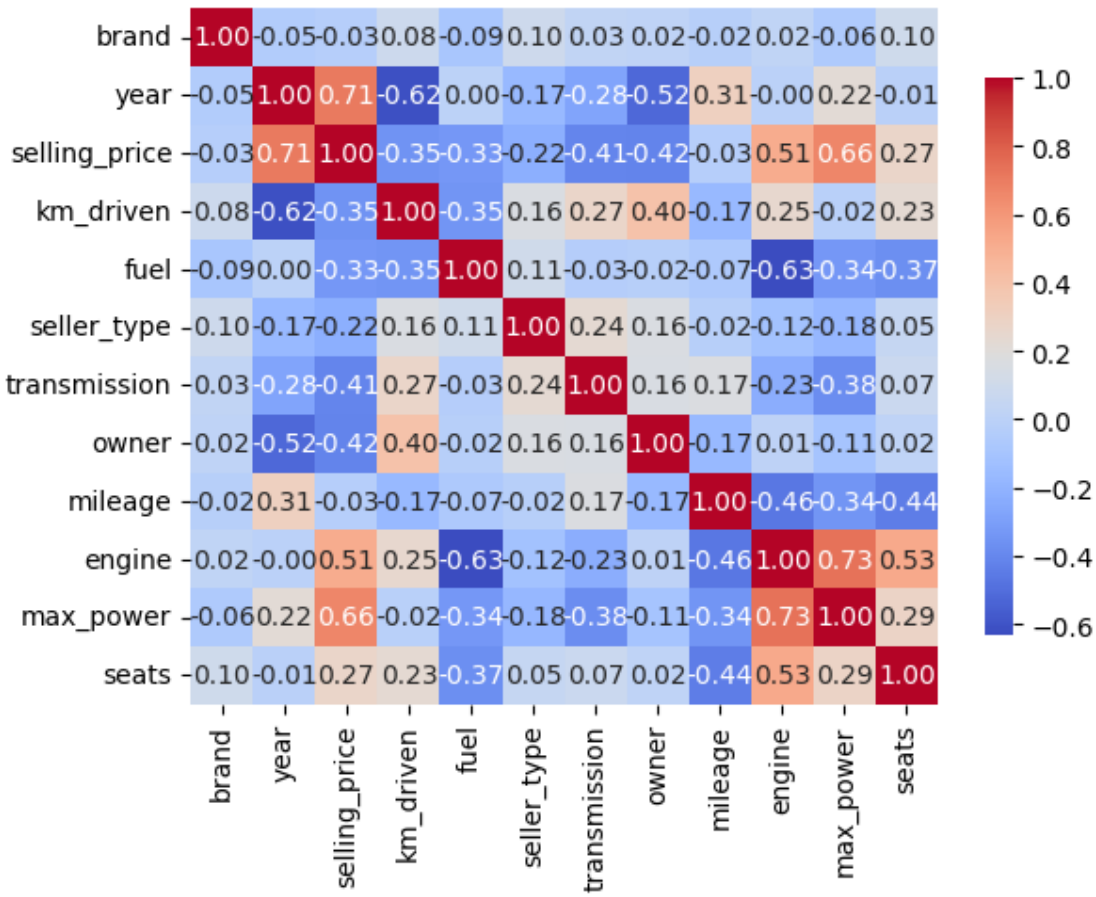
Feature Selection In this part, I performs correlation matrix based on only train set to check which features should I select and make the selection.

[26]:
```
from sklearn.model_selection import train_test_split

# Split training set and testing set
train_set, test_set = train_test_split(df, test_size=0.2, random_state=42)
```

[27]:
```
# Create a correlation matrix from training data to visualize relationships

from sklearn.preprocessing import LabelEncoder

# Create a copy for EDA
corr_train_set = train_set.copy(deep=True)
```

```
for col in corr_train_set.select_dtypes(include=[object]).columns:
    le = LabelEncoder()
    # Fit on only the training data (avoid data leakage)
    train_vals = corr_train_set[col].astype(str).fillna("MISSING")
    corr_train_set[col] = le.fit_transform(train_vals)
corr_matrix_train_enc = corr_train_set.select_dtypes(include=[np.number]).
 ↪corr(method='spearman')

sns.heatmap(corr_matrix_train_enc, annot=True, fmt=".2f", cmap='coolwarm',␣
 ↪cbar_kws={"shrink": .8})
```

[27]: <Axes: >



[28]:
```
# Display the correlation value related to selling_price
corr_matrix_train_enc['selling_price'].sort_values(ascending=False)
```

[28]:
```
selling_price    1.000000
year             0.712011
```

```
max_power        0.664478
engine           0.510408
seats            0.268431
mileage         -0.027310
brand           -0.031312
seller_type     -0.223886
fuel            -0.334790
km_driven       -0.350329
transmission    -0.408235
owner           -0.415531
Name: selling_price, dtype: float64
```

[29]:
```python
# Select relevant features for the model
features = ['year', 'km_driven', 'fuel', 'transmission', 'owner',
            'engine', 'max_power', 'brand', 'mileage']
target = 'selling_price'
print(features)
```

```
['year', 'km_driven', 'fuel', 'transmission', 'owner', 'engine', 'max_power',
'brand', 'mileage']
```

Reasons for selecting these features for predicting `selling_price` - **year, km_driven** → capture age and usage (depreciation/wear).
- **fuel, transmission, owner** → reflect demand and perceived risk.
- **engine, max_power** → represent vehicle segment and performance.
- **mileage** → indicates operating cost.
- **brand** → conveys reputation and reliability premium.

Preprocessing In this part, I do the preprocessing process to the data by create the pipeline that includes:

- **Imputation**: median for robust numerics (mean for `mileage` if desired).
- **Scaling**: `StandardScaler` for numeric features.
- **One-hot**: `handle_unknown='ignore'`, `drop='first'` to avoid dummy traps.
- **Train/Test split**: 80/20 with fixed seed.
- **Target**: model on **log(selling_price)**.

[30]:
```python
# Create feature sets for numerical and categorical features
features_num = [ft for ft in features if train_set[ft].dtype in [np.float64, np.
 ↪int64]]
features_cat = [ft for ft in features if train_set[ft].dtype == 'object']

print("Numerical features:", features_num)
print("Categorical features:", features_cat)
```

```
Numerical features: ['year', 'km_driven', 'owner', 'engine', 'max_power',
'mileage']
Categorical features: ['fuel', 'transmission', 'brand']
```

[31]:
```
# Split the data into features and target label
X_train = train_set[features].copy()
X_test = test_set[features].copy()
y_train = np.log(train_set[target]).copy() # Use log transformation for skewed␣
↪target
y_test = np.log(test_set[target]).copy()
```

[32]:
```
# The following code block is commented out because the pipeline approach␣
↪requires within the scikit-learn interface (fit, transform, predict, etc.).

# # Create a pipeline for preprocessing and modeling
# from sklearn.pipeline import Pipeline
# from sklearn.compose import ColumnTransformer
# from sklearn.preprocessing import StandardScaler, OneHotEncoder
# from sklearn.impute import SimpleImputer

# # Define the preprocessing steps for numerical and categorical features

# # Numerical features pipeline that use median to fill missing values
# numeric_transformer_med = Pipeline(steps=[
#     ('imputer', SimpleImputer(strategy='median')),
#     ('scaler', StandardScaler())
# ])

# # Numerical features pipeline that use mean to fill missing values
# numeric_transformer_mean = Pipeline(steps=[
#     ('imputer', SimpleImputer(strategy='mean')),
#    ('scaler', StandardScaler())
# ])

# # Categorical features pipeline
# categorical_transformer = Pipeline(steps=[
#     ('imputer', SimpleImputer(strategy='most_frequent')),
#     ('onehot', OneHotEncoder(drop='first', handle_unknown='ignore'))
# ])

# # Combine all transformations
# preprocessor = ColumnTransformer(
#     transformers=[
#         ('num_med', numeric_transformer_med, [col for col in features_num if␣
↪col != 'mileage']),
#         ('num_mean', numeric_transformer_mean, ['mileage']),
#         ('cat', categorical_transformer, features_cat)
```

```
#     ]
# )

print("The shape of training data is:", X_train.shape)
print("The shape of test data is:", X_test.shape)
print("The shape of training label is:", y_train.shape)
print("The shape of test label is:", y_test.shape)
```

```
The shape of training data is: (6422, 9)
The shape of test data is: (1606, 9)
The shape of training label is: (6422,)
The shape of test label is: (1606,)
```

[33]:
```
# Create a class that look like the above pipeline but using with custom model␣
↪classes
# The custom LinearRegression, Lasso, and Ridge classes implemented above do␣
↪not fully comply

class ManualPreprocessor:
    def __init__(self, num_med_cols, num_mean_cols, cat_cols, drop_first=True):
        self.num_med_cols = list(num_med_cols)
        self.num_mean_cols = list(num_mean_cols)
        self.cat_cols = list(cat_cols)
        self.drop_first = drop_first
        # learned params
        self.medians_ = {}
        self.means_ = {}
        self.num_mean_for_scale_ = {}
        self.num_std_for_scale_ = {}
        self.cat_categories_ = {}
        self.feature_names_ = None
        self.is_fitted_ = False

    def fit(self, X: pd.DataFrame):
        X = X.copy()

        # 1) impute stats
        for c in self.num_med_cols:
            if c in X.columns:
                self.medians_[c] = X[c].median()
        for c in self.num_mean_cols:
            if c in X.columns:
                self.means_[c] = X[c].mean()

        # 2) impute to compute scaler on train
        for c in self.num_med_cols:
            if c in X.columns:
```

```
                X[c] = X[c].fillna(self.medians_[c])
        for c in self.num_mean_cols:
            if c in X.columns:
                X[c] = X[c].fillna(self.means_[c])

        # 3) scaler stats (column-wise)
        num_all = self.num_med_cols + self.num_mean_cols
        for c in num_all:
            if c in X.columns:
                self.num_mean_for_scale_[c] = X[c].mean()
                self.num_std_for_scale_[c] = X[c].std(ddof=0)
                # Ensure std is not zero
                if self.num_std_for_scale_[c] == 0:
                    self.num_std_for_scale_[c] = 1.0

        # 4) categorical categories (store train cats; unknowns will be ignored)
        for c in self.cat_cols:
            if c in X.columns:
                cats = pd.Index(pd.Series(X[c], dtype="object").dropna().
↪unique())
                # Use a deterministic order:
                self.cat_categories_[c] = pd.Index(sorted(cats.astype(str)))

        # 5) build feature names (without bias)
        self._build_feature_names()
        self.is_fitted_ = True
        return self

    def _build_feature_names(self):
        """Helper method to build feature names"""
        num_names = self.num_med_cols + self.num_mean_cols
        cat_names = []
        for c in self.cat_cols:
            if c in self.cat_categories_:
                cats = self.cat_categories_[c]
                # drop_first=True -> drop the first category
                cats_keep = cats[1:] if self.drop_first and len(cats) > 0 else␣
↪cats
                cat_names += [f"{c}={val}" for val in cats_keep]
        self.feature_names_ = np.array(num_names + cat_names, dtype=object)

    def transform(self, X: pd.DataFrame) -> np.ndarray:
        if not self.is_fitted_:
            raise ValueError("Preprocessor must be fitted before transform")

        X = X.copy()
```

```
        # 1) impute using train stats
        for c in self.num_med_cols:
            if c in X.columns and c in self.medians_:
                X[c] = X[c].fillna(self.medians_[c])
        for c in self.num_mean_cols:
            if c in X.columns and c in self.means_:
                X[c] = X[c].fillna(self.means_[c])

        # 2) scale numeric
        num_all = self.num_med_cols + self.num_mean_cols
        X_num = []
        for c in num_all:
            if c in X.columns and c in self.num_mean_for_scale_:
                mu = self.num_mean_for_scale_[c]
                sd = self.num_std_for_scale_[c]
                X_num.append(((X[c].astype(float) - mu) / sd).to_numpy())
        X_num = np.column_stack(X_num) if X_num else np.empty((len(X), 0))

        # 3) one-hot categorical using TRAIN categories
        X_cat_parts = []
        for c in self.cat_cols:
            if c in X.columns and c in self.cat_categories_:
                cats = self.cat_categories_[c]
                # force to training categories (unknown -> NaN -> all zeros␣
↪after dummies)
                col = pd.Categorical(X[c].astype("object"), categories=cats)
                dummies = pd.get_dummies(col, prefix=c, prefix_sep='=',␣
↪dummy_na=False)
                if self.drop_first and dummies.shape[1] > 0:
                    dummies = dummies.iloc[:, 1:]  # drop first category
                X_cat_parts.append(dummies.to_numpy(dtype=float))
        X_cat = np.column_stack(X_cat_parts) if X_cat_parts else np.
↪empty((len(X), 0))

        # 4) concat numeric + categorical
        X_all = np.column_stack([X_num, X_cat]) if X_num.size > 0 or X_cat.size␣
↪> 0 else np.empty((len(X), 0))

        # 5) add bias as first column
        bias = np.ones((X_all.shape[0], 1), dtype=float)
        X_with_bias = np.hstack([bias, X_all])
        return X_with_bias

    def fit_transform(self, X: pd.DataFrame) -> np.ndarray:
        return self.fit(X).transform(X)

    def get_feature_names(self, include_bias=False):
```

```
        if not self.is_fitted_:
            raise ValueError("Preprocessor must be fitted before getting␣
↪feature names")
        if include_bias:
            return np.array(["bias"] + list(self.feature_names_), dtype=object)
        return self.feature_names_.copy()
```

Apply to the code

[ ]:
```
# Define numerical columns for median and mean imputation
num_med_cols = [c for c in features_num if c != 'mileage']
num_mean_cols = ['mileage']

# Define categorical columns
cat_cols = features_cat

prep = ManualPreprocessor(num_med_cols, num_mean_cols, cat_cols,␣
↪drop_first=True) # Apply to the code for ManualPreprocessor
X_train_transformed = prep.fit_transform(X_train)
X_test_transformed = prep.transform(X_test)
```

[35]:
```
# Display the shape of transformed data
print("X_train_transformed shape:", X_train_transformed.shape)
print("X_test_transformed shape:", X_test_transformed.shape)
print("y train shape:", y_train.shape)
print("y test shape:", y_test.shape)

# Display the type of transformed data
print("Type of X_train_transformed:", type(X_train_transformed))
print("Type of X_test_transformed:", type(X_test_transformed))
print("Type of y_train:", type(y_train))
print("Type of y_test:", type(y_test))
```

```
X_train_transformed shape: (6422, 38)
X_test_transformed shape: (1606, 38)
y train shape: (6422,)
y test shape: (1606,)
Type of X_train_transformed: <class 'numpy.ndarray'>
Type of X_test_transformed: <class 'numpy.ndarray'>
Type of y_train: <class 'pandas.core.series.Series'>
Type of y_test: <class 'pandas.core.series.Series'>
```

Set up MLFlow

[36]:
```
# Set the MLflow tracking URI to the server provided in the assignment
# mlflow.set_tracking_uri("http://mlflow.ml.brain.cs.ait.ac.th/")
mlflow.set_tracking_uri("http://localhost:8080")

# Change log name
```

```
os.environ["LOGNAME"] = "dechathon"

# Set an experiment name to group your runs
mlflow.set_experiment("A2 - Car Price Prediction Experiments 2")
print("Experiment ID:", mlflow.get_experiment_by_name("A2 - Car Price␣
↪Prediction Experiments 2").experiment_id)
```

```
2025/09/13 03:34:56 INFO mlflow.tracking.fluent: Experiment with name 'A2 - Car
Price Prediction Experiments 2' does not exist. Creating a new experiment.

Experiment ID: 409655642356588706
```

[37]:
```
# Helping function for looping classname
import sys

def str_to_class(classname):
    return getattr(sys.modules[__name__], classname)
```

[38]:
```
# Convert y_train and y_test to numpy arrays of type float
y_train_array = np.array(y_train).astype(float)
y_test_array = np.array(y_test).astype(float)
```

[39]:
```
# Produce the mlflow experiments for different configurations
regs = ["Polynomial","Lasso", "Ridge", "LinearRegression"] #␣
↪"Polynomial","Lasso", "Ridge",
using_momentum = [True, False]
using_batch = ['batch', 'mini', 'sto']
init_methods = ['zeros', 'xavier']
learning_rates = [0.01, 0.001, 0.0001]

# Create start best mse to be infinity
best_mse = np.inf

# Loop through all combinations of hyperparameters (using variables already␣
↪defined above)
for reg in regs:
    for method in using_batch:
        for init in init_methods:
            for lr in learning_rates:
                for mom in using_momentum:

                    if reg in ['Lasso', 'Ridge']:
                        params = {
                            "method": method,
                            "lr": lr,
                            "l": 0.1, # lambda value for regularization
                            "init_method": init,
                            "use_momentum": mom
```

```
                        }
                    elif reg in ['Polynomial']:
                        params = {
                            "method": method,
                            "lr": lr,
                            "init_method": init,
                            "use_momentum": mom,
                            "poly_degree": 2 # Select polynomial degree
                        }
                    else:
                        params = {
                            "method": method,
                            "lr": lr,
                            "init_method": init,
                            "use_momentum": mom
                        }

                    mlflow.
↪start_run(run_name=f"{reg}-method-{method}-lr-{lr}-init_method-{init}-momentum-{mom}",␣
↪nested=True)

                    print("="*5,reg,"="*5)

                    type_of_model = str_to_class(reg)
                    model = type_of_model(**params)
                    model.fit(X_train_transformed, y_train_array)
                    if reg == 'Polynomial':
                        is_polynomial = True
                    else:
                        is_polynomial = False
                    yhat_test = model.predict(X_test_transformed,␣
↪is_polynomial=is_polynomial)
                    test_mse = model.mse(y_test_array, yhat_test)
                    test_r2 = model.r2(y_test_array, yhat_test)
                    print(f"Test MSE: {test_mse}")
                    print(f"Test R2: {test_r2}")
                    mlflow.log_metric(key="test_mse", value=test_mse)
                    mlflow.log_metric(key="test_r2", value=test_r2)


                    trained_predictions = model.predict(X_train_transformed,␣
↪is_polynomial=is_polynomial)
                    signature = mlflow.models.
↪infer_signature(X_train_transformed, trained_predictions)
                    mlflow.sklearn.log_model(model, artifact_path="model",␣
↪signature=signature)
```

```
                    ######

                    mlflow.end_run()
```

```
===== Polynomial =====

/var/folders/wr/4dhn7j5j6s7gsbn883b1ws9w0000gn/T/ipykernel_80948/2735948468.py:3
9: RuntimeWarning: overflow encountered in square
  return ((ypred - ytrue) ** 2).sum() / ytrue.shape[0]
/Users/dechathonniamsa-ard/Documents/Dechathon_N/AIT/Machine Learning/A2 -
Predicting Car Price/A2-Predicting-Car-Price/.venv/lib/python3.12/site-
packages/numpy/_core/_methods.py:51: RuntimeWarning: overflow encountered in
reduce
  return umr_sum(a, axis, dtype, out, keepdims, initial, where)
/var/folders/wr/4dhn7j5j6s7gsbn883b1ws9w0000gn/T/ipykernel_80948/2735948468.py:4
3: RuntimeWarning: overflow encountered in square
  ss_res = ((ytrue - ypred) ** 2).sum() # Residual sum of squares

Fold 0: inf
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1abadf2181ab489abd0ffc7d5529476f
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/76e2d0300a654b79acabbd56f403b879
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:35:19 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 12.339914424028434
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ca3f5b5103494763be695dfa25b7d790
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 13.041654976473328
Test R2: -17.313294518097013

2025/09/13 03:35:21 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Polynomial-method-batch-lr-0.01-init_method-zeros-momentum-True at: h
ttp://localhost:8080/#/experiments/409655642356588706/runs/33331da853c7443aa4458
06de3e13a0a
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c858b2581f774b4aafb9ea79ebae0c04
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
```

```
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ca791894c3e041e2adb3b3183cd38998
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:35:46 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 1.5895552595746423
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1841de9288cb426a831ac921b5935ebb
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.7309360138484258
Test R2: -1.4306072404745538

2025/09/13 03:35:48 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Polynomial-method-batch-lr-0.01-init_method-zeros-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/ee99fa5da4844c5382fc
dff415690fac
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 76.38048709872267
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/712d912cfbc244ddbd62aaeb65a9f678
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 77.38685188408188
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c1dfdfe5b3214e45ae72882ae747c00c
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:36:28 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 82.80636681660732
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/77d8bbbfd33f4479b4240e8511bb9b08
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 77.29375315481991
Test R2: -107.53708892673696

2025/09/13 03:36:30 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Polynomial-method-batch-lr-0.001-init_method-zeros-momentum-True at:
http://localhost:8080/#/experiments/409655642356588706/runs/de05f4dbdb7b49dd8755
31e02822c514
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 10.197865925095437
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/09eb9821ce924ba6b6bc123e7e0428ef
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 10.5902305311091
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/cfc3f8cdbf614e7da155b526217c0f50
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:37:10 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 12.354619453880618
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e987441158a845768af3dc0fd495289b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 13.047754337777867
Test R2: -17.321859335993498

2025/09/13 03:37:12 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.001-init_method-zeros-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/c92099eac40543b0a385
06384a27ff44
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 153.50434665428313
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4feb7fe41e264475a1a6fe836024e246
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 154.3923113945164
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/dcb9f68401c34262b71449b39d3e6395
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:37:52 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 154.65697496523546
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2743ee84f6064770a71400c6037ed5ae
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 153.6507695626348
Test R2: -214.75879756126605

2025/09/13 03:37:55 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.0001-init_method-zeros-momentum-True at:
http://localhost:8080/#/experiments/409655642356588706/runs/35b54e7b8e3d41e88e30
```

```
244923ff6319
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 76.79899261054938
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b29c2ccfb50c44eaafb12c099decef2b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 77.8003948956798
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/29866f527a044e2283350062886a8423
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:38:35 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 83.33256534340589
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6ba6951be08e4416add533c2c5c4ab23
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 77.7004677145941
Test R2: -108.10820382982091

2025/09/13 03:38:37 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.0001-init_method-zeros-momentum-False
at: http://localhost:8080/#/experiments/409655642356588706/runs/69706713de9d4fa1
92977e0145b6489d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4c8c46f3f0bc41d2b0d3a8778edc2ec1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a991b51e8b274da98002369a955b3a1a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:39:00 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 12.380999995322421
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fded1d35ac524ba0bbf7874f2111366f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 13.047210684674646
Test R2: -17.321095929860387

2025/09/13 03:39:02 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.01-init_method-xavier-momentum-True at:
http://localhost:8080/#/experiments/409655642356588706/runs/8be8cbfd689a442fa54f
7217e46a5760
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/37eee9d318c44bd8902012a02c3a28a1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2a5c23efa2164989a37a286619103dcf
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:39:26 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 1.5901025679045833
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2a99c6d196864a8387ac085607c1a6d2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.734409812194001
Test R2: -1.4354852020763413

2025/09/13 03:39:28 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.01-init_method-xavier-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/c569d5b999a64831b951
4d87b69c3229
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 77.28581871673553
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/741a450a83c8463cb05d5899ae915715
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 78.61154968309363
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/dfa9eca90e584d4e9691f14b40211a27
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:40:09 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 80.71534722113333
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/da17339671844b5b8dd28ac261539b4d
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 75.25599805531002
Test R2: -104.67564155978857

2025/09/13 03:40:11 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.001-init_method-xavier-momentum-True at:
http://localhost:8080/#/experiments/409655642356588706/runs/7b6818c361ce4d73b617
a7848ccddf0e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 10.296724685726241
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ff0ad975ce11453b9ff8a8f06fb04d3b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 10.559405654066149
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8a2e3ffb4ba74f36a38f8b3aca1d0216
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:40:51 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 11.81565492022059
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/048206b9028e44c0a0f5ac76e0f28c47
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 12.528166376210262
Test R2: -16.592245848640047

2025/09/13 03:40:53 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.001-init_method-xavier-momentum-False
at: http://localhost:8080/#/experiments/409655642356588706/runs/6f8a4273a6bd426d
ab69c7e9e13d4e4f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 159.8760611824686
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7e75148ebbad40489f9f598818c12a3b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 156.8013651531053
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c06a5d48ab5240cea5c451cae177d348
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:41:34 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 161.81536729522963
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c1afdad8950142c489c88cdec3969e2b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 154.9815586381978
Test R2: -216.62751225477822

2025/09/13 03:41:36 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.0001-init_method-xavier-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/44d2d38a65344e80
9fdda36e559a4945
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 78.07443932905353
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fc210f6829254573a730e604fb97a3d8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 79.92814089414641
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/50307a7e5f8c44569c0538d991e065bf
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:42:16 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 84.07091957407953
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/519a70aa738a4fc8919910b256df0c02
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 78.50558472107475
Test R2: -109.2387616376917

2025/09/13 03:42:18 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-batch-lr-0.0001-init_method-xavier-momentum-False
at: http://localhost:8080/#/experiments/409655642356588706/runs/9cc2e058adc34d31
9ec5348e660a4965
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/37856b525060482e948bc011350c731a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/94fbe68810bd4ac598caf0330707336d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:42:30 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b86c5ef5ccd747c7aab6755df424447d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.4469093237650342e+304
Test R2: -2.0317725499478788e+304

2025/09/13 03:42:32 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.01-init_method-zeros-momentum-True at: ht
tp://localhost:8080/#/experiments/409655642356588706/runs/7faf430bd7424437b22bc8
6a771d910c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ad9ad2a6dcca47d19e4a786312b4f880
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e7c7fb8f4f624ffca01122c2c11a4cf4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:42:50 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 8.79327795567448e+80
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2250dc28e8ba4e6cb3238586b8c9ecff
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.899060165425964e+80
Test R2: -4.07090532075136e+80

2025/09/13 03:42:52 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.01-init_method-zeros-momentum-False at: h
ttp://localhost:8080/#/experiments/409655642356588706/runs/af2e2684236141fb92bc8
b66129f63b9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 2.182850849906452e+54
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6cf8d36ab33b4af5b74ae409b6a3c550
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/24c66ed72b13429fbfb9107cfb5b02b9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:43:26 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 1.7787723151344128
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9745496aa58f4341ab5356795d5417cd
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.9372997349134549
Test R2: -1.7203863834231932

2025/09/13 03:43:28 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.001-init_method-zeros-momentum-True at: h
ttp://localhost:8080/#/experiments/409655642356588706/runs/021006d6f49f44c198428
c1e88ad880a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fde7565ebe0a48b983d14ca67262432e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5a47d162ef4b4fbab899846c10eaf776
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:43:39 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c37687c48b104e46bcbb6f1c9f4ef38a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.10942027358283e+304
Test R2: -1.557865182840791e+304

2025/09/13 03:43:41 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.001-init_method-zeros-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/27af6ac7254f441aa640
```

```
d1cd239d5a81
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 12.019851394106302
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7ac22fe8bda44a868584d44b612257d9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 12.339317063790327
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5f5a64953b944906a79c8fd988e92cdf
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:44:22 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 14.322843682629038
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/790a24a086774647985de68a8ebb8355
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 15.133221095396872
Test R2: -20.250304154452063

2025/09/13 03:44:24 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.0001-init_method-zeros-momentum-True at:
http://localhost:8080/#/experiments/409655642356588706/runs/e215bfb5aac94f81becb
3e9262e72632
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 121728807.23617516
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/91821ea0fccd4d8a9df57e487de6a308
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8ff415aa794c4b139b242ef4eafde879
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:44:59 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 1.770426256026115
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4b13104bb88f460abb4c8d6970b73e5c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.936642111734461
Test R2: -1.719462938739174

2025/09/13 03:45:02 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.0001-init_method-zeros-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/9cbcb20ed21e4c52bd79
15d11fcf54c8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/14b242a0c6884e20825cccccc01ebc14
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8e66e481068c4e2f8f4714061372b12d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:45:13 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/eabdedb797794babad8e7fe1d364157a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.9159247817154794e+304
Test R2: -5.498802411782772e+304

2025/09/13 03:45:15 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.01-init_method-xavier-momentum-True at: h
ttp://localhost:8080/#/experiments/409655642356588706/runs/8addc7be0aca416ca65e8
c0796a82b23
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6046235a1f21425898e7e34cee02ce74
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/70055891da3a4c629b941edc8630c5a6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:45:33 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 1.3511569818167169e+70
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f61e0bc33e4e4334bd9cf29c20e38add
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.1055055803160225e+67
Test R2: -4.3607991794382073e+67

2025/09/13 03:45:35 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.01-init_method-xavier-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/ef8af7bd4b8e46bd9893
8084f04c2db9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 2.4766236395527905e+55
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c4dac6bf42fc48bdb37c68fd9617658b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9e2ea8d06d8049549e4313ad5643f69f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:46:05 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.434842946863508
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c0b6b692b1b44f81b86688737ae25e1a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.680321588928221
Test R2: -2.7637492135626007

2025/09/13 03:46:07 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-mini-lr-0.001-init_method-xavier-momentum-True at:
http://localhost:8080/#/experiments/409655642356588706/runs/28231e0886af40109973
89d293fd799f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/097e84b114d44ad98539e0f45f717776
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a747b38e51964cf188196e7399db46df
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:46:18 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: inf
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6bd0cf5b991a4ea087987f8742f378e5
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.0631514807544515e+304
Test R2: -1.4928938251724984e+304

2025/09/13 03:46:20 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Polynomial-method-mini-lr-0.001-init_method-xavier-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/e5b37e8a5c844422b539
e84661fcc215
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 11.929507827977126
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7795ad5c0d7f4830b7204c65bdf8437e
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 12.592346021242893
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8f9eea89a7894ce281d17fcfe709456c
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:47:01 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 14.58333763273457
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7e22ca5588024e398d2b5afdefa86965
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 15.593469353331708
Test R2: -20.896591908131082

2025/09/13 03:47:03 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Polynomial-method-mini-lr-0.0001-init_method-xavier-momentum-True at:
http://localhost:8080/#/experiments/409655642356588706/runs/5309511e838943e28634
f96e634f317d
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: 468763816.5887852
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/aeb95874f4f7424bb7e7405798ed43fe
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
```

```
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4364acdf6df84a67b654b45a4a868711
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:47:37 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 1.7879869083200899
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/870cf40d28bd4c97b69b4f505b1266b1
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.9262090118857815
Test R2: -1.7048126178550334

2025/09/13 03:47:39 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Polynomial-method-mini-lr-0.0001-init_method-xavier-momentum-False
at: http://localhost:8080/#/experiments/409655642356588706/runs/0dbc5fcc2a284f6a
a76fc4133cc6cfed
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====

/var/folders/wr/4dhn7j5j6s7gsbn883b1ws9w0000gn/T/ipykernel_80948/2735948468.py:3
7: RuntimeWarning: overflow encountered in square
  return (ypred - ytrue) ** 2

Fold 0: inf
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/519ee1a6f1ea4aea8fb26bcdbfedb6f9
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/84cff72d4eaf41148cae62472d2d4ccb
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:47:57 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/557369572d6043d5b4381047dec9367a
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.4378215717538783e+304
Test R2: -4.827442457093797e+304

2025/09/13 03:47:59 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Polynomial-method-sto-lr-0.01-init_method-zeros-momentum-True at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/ffc1bf80998a480fa93d620
```

```
d416d239b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4ab9b231660d48828a5cd0de56ba83fe
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8914aabf547a4b5bb8c4023e3b200283
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:48:06 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3f348b2170634af7b8c82e2d191bf2c5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: inf
Test R2: -inf

2025/09/13 03:48:07 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.01-init_method-zeros-momentum-False at: ht
tp://localhost:8080/#/experiments/409655642356588706/runs/e8e78dbc85da4efdbfa37f
f76ddcb52c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9d811e0770364fbc8a0e0a507b2d78fc
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/df57e6bf45db4aa584a1e04301279b5d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:48:25 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d3f7d67e9a8246c8a809e5931ea6f9d8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.482796720468379e+304
Test R2: -3.4863817247524e+304

2025/09/13 03:48:27 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.001-init_method-zeros-momentum-True at: ht
tp://localhost:8080/#/experiments/409655642356588706/runs/fcdab42c91af4a4892711f
be72428da4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/730859ba06b44daa88ffc238b841042b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a856d5fa0fef42ac8644f483cba6accd
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:48:44 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1bcd7fdc4d6442bd991bdae7d8b541cb
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: inf
Test R2: -inf

2025/09/13 03:48:45 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.001-init_method-zeros-momentum-False at: h
ttp://localhost:8080/#/experiments/409655642356588706/runs/158789955d5746acb5285
bd32ffce75c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/dd6585bf26e745fca9db9af907411928
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5ce7a6ba2dd0491e884d7215a5a84f32
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:49:18 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2ed51af622bb499eb51e74321490fa73
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.492635588890954e+303
Test R2: -2.095982081788293e+303

2025/09/13 03:49:20 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.0001-init_method-zeros-momentum-True at: h
ttp://localhost:8080/#/experiments/409655642356588706/runs/599b5021be6b40d18cdae
8df4080c36f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4eed6aefd1f34ce7aa34cecd4c3aa307
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/bb0633ef3d1e4d49b0f5e804531238a2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:49:37 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/cbfa351d80b14ffd941eb314311bf7dc
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: inf
Test R2: -inf

2025/09/13 03:49:39 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.0001-init_method-zeros-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/8f0f5bf17b8241a78e3c
281a78ab2361
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b2aeb21fc1c34cc0b881cf139f0fef69
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/0c89dc922599418f9c82b0ad335a4453
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:49:56 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/38c89d92da824bcda39df9af2398726e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.1275995952289728e+304
Test R2: -2.987608403557727e+304

2025/09/13 03:49:58 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.01-init_method-xavier-momentum-True at: ht
tp://localhost:8080/#/experiments/409655642356588706/runs/5814382727514721a39cf3
ea7d2c443e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/66830acffb214b2db21a064c1ffe08cf
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/faf68f48ba1c417ebded309c402583f8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:50:05 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/883a4b0a2c6b4ae7bf25e16139bfc124
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: inf
Test R2: -inf

2025/09/13 03:50:07 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.01-init_method-xavier-momentum-False at: h
ttp://localhost:8080/#/experiments/409655642356588706/runs/b7676a48d95e4887b8834
829d22e37ed
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/59c68f3282a0464b9d8200434167cd9f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/0b446d66b29e4739939b9400f164ade6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:50:25 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a7c04e2c8f4d4b9083f85ac9aba67904
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.298875969786243e+304
Test R2: -3.228117349463562e+304

2025/09/13 03:50:27 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.001-init_method-xavier-momentum-True at: h
ttp://localhost:8080/#/experiments/409655642356588706/runs/9181bf90810146618caf2
e4dc630bf1e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/82de1a1425264b50b78bb84bab7d05e5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fdcf378cf35e45609c8fff60a59e2d8d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:50:44 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/163f865616814f6ca82510f311abaea9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: inf
Test R2: -inf

2025/09/13 03:50:46 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.001-init_method-xavier-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/4fd1070691a143e59ff9
a4546d91141c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/98173c21afdd490280b862ad4b512bc6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fb10b0af2f2d456dbb885d3cf09a1942
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:51:19 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4c5be52e0d3b4140807825f949470adc
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 1.2325186575791386e+303
Test R2: -1.730721845963143e+303

2025/09/13 03:51:20 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.0001-init_method-xavier-momentum-True at:
http://localhost:8080/#/experiments/409655642356588706/runs/e5b206df3a0d4e4aba64
d155e7f4a1ab
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Polynomial =====
Fold 0: inf
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/07442be1da8145b0b1156d6d14d27c93
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: inf
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a95aedeb8ebc44e5a3c7a40de0512d4e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:51:37 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: inf
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/45148f57fac04a83b43b433315715fbd
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 6.480448719898375e+303
Test R2: -9.099946765269836e+303

2025/09/13 03:51:39 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Polynomial-method-sto-lr-0.0001-init_method-xavier-momentum-False at:
http://localhost:8080/#/experiments/409655642356588706/runs/2861b13a41e84c8ea37b
```

```
e3140d9e2a95
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 24.745453979621562
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9859f4b34a454336a2fbfe3512d6bba3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 26.197640042809283
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/88c2c1a27a1446cc9d243f6be1deccb6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:52:17 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 25.49181894814774
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a803a9e89c1249148526c145271691f5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 25.51011237044668
Test R2: -34.821696086310006

2025/09/13 03:52:19 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.01-init_method-zeros-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/b0705f0441fd4d73998afa2fde
65258b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 2.247636530516929
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/17634c893d98468cb112931d7c800ffd
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.4206834308600835
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ac80510b5e0d4369b9b075a840c073a1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:52:58 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.2403695988203363
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/0e8f1f89ca3543ef9ef6ab1d9e4425a0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.0739085507713804
Test R2: -1.9122146048481392

2025/09/13 03:52:59 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.01-init_method-zeros-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/e7327f1d563248dbb06ec08f7
db6ad5d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 137.0097362252922
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ed98f0407b2b4e67957b4dfcb8e82ef2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 138.11106766023298
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/902e78a122ac4c50bbbf8cbd41852c0d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:53:38 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 137.4520995727339
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/21e3fc1edbd8437fbe88082807d7fcbc
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 137.65714818155723
Test R2: -192.30030595947318

2025/09/13 03:53:40 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.001-init_method-zeros-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/ebac485a812d433a93acfe800
fa0f7d7
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 24.727234440342787
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/563a89abbd004841842be7d03146d9ac
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 26.186368570598198
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f92cd492968f48d4b3683cdeb346463b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:54:18 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 25.47447012871759
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3e4a1cff732b431aa1f897859f6a2257
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 25.49296501441469
Test R2: -34.7976175025883

2025/09/13 03:54:20 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.001-init_method-zeros-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/2f499264dca94ee0b7dd238b
a3e10ff0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 165.2070749518596
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e2e6ce365938465e9e69d5422bb981f8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 166.17539383246233
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/71990559e34345ae99ee82178b672010
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:54:59 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 165.56682204577785
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d2440037051d4aae8430e0688e72ba65
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 165.79499562075034
Test R2: -231.81190845078288

2025/09/13 03:55:01 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.0001-init_method-zeros-momentum-True at: http
://localhost:8080/#/experiments/409655642356588706/runs/957e3bfdf8364e3db50711a4
f8fdbbde
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 137.4588251535742
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/579ca0fa41d44820a25ab0082d3d06c9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 138.5576774304813
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/75e3b5d3dfe94922acb19cc65d0ff554
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:55:39 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 137.89958513547631
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1663f784ebca47c2b835a2015315ba12
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 138.10504712272308
Test R2: -192.9292526107004

2025/09/13 03:55:41 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Lasso-method-batch-lr-0.0001-init_method-zeros-momentum-False at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/ccb02980884649dc8375ee3
7a130df88
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 25.072161582789036
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/79eaa0baea6a43a9b46285d0fce15125
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 25.75122969613889
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ff6e33283a7d442891a2c26dc4952b98
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:56:21 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 24.89132882239241
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/38ab648c64334d3c9717c4bccec35c91
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 24.94981990029486
Test R2: -34.03492469566422

2025/09/13 03:56:22 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Lasso-method-batch-lr-0.01-init_method-xavier-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/d71d95983edf451f868c0d76e
7eb003b
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 2.2597553963077446
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6cd3e288bbae4464910c885f2bb9378a
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.3636739786882823
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d9e4cc46f7f74b09aa9380ae811d87df
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:57:02 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.244028724106986
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b168a933bcb142b9b6a9f973f39f54de
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.085516351307243
Test R2: -1.9285144586860192

2025/09/13 03:57:04 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.01-init_method-xavier-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/04db7dbde35549bab9f066ee
ca0aa755
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 134.3094294829061
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/0866641aa724425a801f2a241b820df3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 141.05746126033844
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b9c9ff0b6af7497c940e44f389c82264
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:57:45 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 134.4587298582294
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d51c59244cec44b18fb35a92719c9459
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 134.59061091605105
Test R2: -187.9942266930578

2025/09/13 03:57:47 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.001-init_method-xavier-momentum-True at: http
://localhost:8080/#/experiments/409655642356588706/runs/ab53fb3e608046e081dc2e8c
4071ce24
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 24.409273505787542
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8cac2c9956034eeeb41d42b408c3c868
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 26.53737630487071
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fe65171f4c304dc9a6736c93def08c79
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:58:26 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 25.10648407091078
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2617ec2586f54d7b9153d093d88d5dd4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 25.063495801215634
Test R2: -34.19455016167506

2025/09/13 03:58:28 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.001-init_method-xavier-momentum-False at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/24df31f19ed84d3ea51d243
a18ce99e2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 160.74262080810573
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/95f52f8681d44dab832e40bd98315f2b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 161.9667533872433
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/57693479c71149bc97195c68c3919b2e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:59:07 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 168.2710226370608
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/64fe34e196ee4945846569affe123970
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 168.6344420221456
Test R2: -235.79910319799154

2025/09/13 03:59:08 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.0001-init_method-xavier-momentum-True at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/421b8f25eea2422993cbcfd
```

```
7c5a09e16
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 135.3660994032521
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4e1aefcccc64465fbc545e39a5a9e704
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 136.61422400791074
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ec3a9f815057464e9a7b5f43f14e5737
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 03:59:47 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 142.94851960984045
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/683750c421404ee4bfe6f389213f6028
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 143.12469998865657
Test R2: -199.97792714459058

2025/09/13 03:59:49 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-batch-lr-0.0001-init_method-xavier-momentum-False at: ht
tp://localhost:8080/#/experiments/409655642356588706/runs/41d67e3e504f4008ad1154
cc48dcc090
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.2027747449015582
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6c5ebd4175744c698bcfd7d8b9e3f85c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.7128949846571704
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/03b28207a8984410a78acfac081cfee1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:00:21 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.18265831249586223
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/950a4ae77ea4438dbfd85af6889ad401
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.18072475059197726
Test R2: 0.7462234976871399

2025/09/13 04:00:23 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.01-init_method-zeros-momentum-True at: http://
localhost:8080/#/experiments/409655642356588706/runs/c36466c592a4436b88631874e89
c2652
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14047387146615828
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3965141560a849daa2ef74275642dac0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.13783710426327522
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/78fe87caadfc4846998e0794b6a91d06
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:00:52 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.13588415218746197
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/38ebb7aea5b448b4b85cd3be6ec019ee
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13512464023731927
Test R2: 0.8102558810379528

2025/09/13 04:00:53 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.01-init_method-zeros-momentum-False at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/ca78c9171dec404a8b16459147
f19b9a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 2.37762104722428
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f104420b77404d9295e583debcbd4df3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.5661398222672873
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8aef541ee89d4e23985bcf56cca1e5ca
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:01:33 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.380818422005025
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9c7dde52d56841f5a85002b8bc688e4b
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.2117472436653625
Test R2: -2.1057698387130688

2025/09/13 04:01:35 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.001-init_method-zeros-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/94e53cf9cc8f428690befaf01e
e80343
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.20235252360467654
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/897494ff61184f2faf3787cd218d8d59
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.20598642572293954
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/78b2a53af0b9475784c4a6ebfd7c9fb1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:02:15 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.1836881513574775
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fc1747106ec94d3b982160d28fd87ad5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.18180109250239174
Test R2: 0.7447120816557276

2025/09/13 04:02:17 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.001-init_method-zeros-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/299f4342c3974dc5a92a7da14
9862be0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 31.668413969826936
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/10c0194166e048b88d817ea0366d0167
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 33.17044615315335
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ee0c7833f81f4b69af30f084c426792d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:02:56 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 32.42308602826085
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3df2196c77fd465e9cdfb44ffda93ae1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 32.46415094880153
Test R2: -44.586665087971085

2025/09/13 04:02:58 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.0001-init_method-zeros-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/d8a3b81b608c432bad1cff5cc
6da5902
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 2.3782850489197043
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/955246a8c9204e0ea3c20f02af2e7a94
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.5664791477006474
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4b45caad1c88492b81ad3aed3755d6d9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:03:37 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.3806394854698056
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a5e68cc7f3e2465883dec284ff810e09
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.21168715468142
Test R2: -2.1056854608283437

2025/09/13 04:03:39 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.0001-init_method-zeros-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/0470552bfd0640f3baf58a1b
9207c4a6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.20452374673017265
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7c9b707a8bf34140a1dbf5c2a4f31dc7
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.6754107986887684
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/56d3eb4410704b5d83e49ad3eb0fcf5c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:04:12 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.18055839023322356
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2c2faa63952844688d8560c293d04720
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.17871115881350838
Test R2: 0.7490510145433089

2025/09/13 04:04:14 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.01-init_method-xavier-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/9046dfc91b0042c29765f30803
57f994
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14106175918350794
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/694e411a9c8640caaf45e7bc5c8fb14b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.13894669107647709
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3d61e961e3ee4dad936bcb618f340cc1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:04:54 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.1341739977464257
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f1f98a9a7dcf4c65ba176027398bf783
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13335360742974006
Test R2: 0.8127427928190817

2025/09/13 04:04:55 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.01-init_method-xavier-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/a55432efb25040bc9be7e980c
09d9afc
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 2.4586235656956332
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/dcd34a4efc384d29b0436108f853981c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.5617945157865445
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/47f1d3a66ced40a3a94bc9d3bfacb8a2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:05:41 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.2924424295869943
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7a3cd736457040fa8deef3bea8c55668
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.142115907916287
Test R2: -2.007992435341971

2025/09/13 04:05:43 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.001-init_method-xavier-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/385ba70306f546fab86665330
311a427
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.1998133630917663
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/34b367003cdf44ef954b859077c56e7e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.20793403436692093
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8458f518f59b4623a67f275239d2fea2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:06:28 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.18319209343466897
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a273e15710b944dcac7408c60dbd070f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.18131943310981868
Test R2: 0.7453884352572842

2025/09/13 04:06:29 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.001-init_method-xavier-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/d30e101076874afab5a181c5
```

```
27eda1c3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 31.878572629796565
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8bea6a9dbe964ceab2145b8c6cfcac6c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 32.01426476934633
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ea207251ca964b079abf4486b88365c5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:07:12 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 31.256621560181927
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5ae2492c66484279b5ae9e83421f2447
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 31.32104614547784
Test R2: -42.98149956518411

2025/09/13 04:07:13 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.0001-init_method-xavier-momentum-True at: http
://localhost:8080/#/experiments/409655642356588706/runs/8fc43756cf6e4914b2da5c6d
8ecbf74c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 2.4211672732162612
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f4406f039ad0487596a214e82570c13b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.6408355281790037
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/10b1bd9a454441b78d7eb76fcb44807c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:07:58 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.329389083729074
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e38846f548ba4571b1c8f698426635f5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.1710005349157155
Test R2: -2.048552677292871

2025/09/13 04:08:00 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-mini-lr-0.0001-init_method-xavier-momentum-False at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/59e575a948cb4042bd5b987
9f9e53903
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14398827630520458
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/18ef644e035141d195a090a82267f522
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.1312068525709649
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/09af4436101c4533bb6c53f972b1027d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:09:01 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.1342683393528165
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/54e349222e55471387aacd0364904720
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13398035105609135
Test R2: 0.8118627096825921

2025/09/13 04:09:03 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.01-init_method-zeros-momentum-True at: http://l
ocalhost:8080/#/experiments/409655642356588706/runs/129defd5c1404c87afbdc0d08cd8
e575
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.1533149448366875
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/334fb9bceff14e9eae673e4115dc8657
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.1402643139595635
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/062535bd0a264350a7673b1d23a64d5a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:10:15 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.13477291013921042
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c35602e31da549d8bb98d32e83ea9544
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13451694186549842
Test R2: 0.8111092205321657

2025/09/13 04:10:17 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.01-init_method-zeros-momentum-False at: http://
localhost:8080/#/experiments/409655642356588706/runs/3440ec6289f44bb2bef87f68bde
35180
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14124448115013669
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4f5d19906de146ae9c9825d6d1a8fe65
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.1406074452957003
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/adc97af8a9f949aa9e26c76422c3d99b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:11:13 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.13432871259435747
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e12bbb61d2d5448b81ff5c56a83bad1e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13365859052267137
Test R2: 0.8123145308221215

2025/09/13 04:11:15 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.001-init_method-zeros-momentum-True at: http://
localhost:8080/#/experiments/409655642356588706/runs/310e6cc1bf0149f9b341d989570
ec922
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14097152163539392
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/61b26788b13e4d6e873aa1b85ac7fc7d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.14045416574557826
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6f3ed651b5ef42609894442252746cf6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:12:08 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 0.13347551136490438
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4bdda0bb65a441bb855fadc58dc323de
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13289508100238506
Test R2: 0.8133866627515122

2025/09/13 04:12:10 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.001-init_method-zeros-momentum-False at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/9b0951081b8d493bbe12e51d6e
cf5fed
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.6848232176254848
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a8352c73b6a04534954e8caa0772c17d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.7210399074969231
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a0aa80a4209e48b3b76b6ab258dc99b2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:13:24 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.6260806269593427
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5ca03133ee2e448ea5c05a9d2e398a47
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.5785710557881582
Test R2: 0.1875615354486182

2025/09/13 04:13:26 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.0001-init_method-zeros-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/76893f8f35304ff3961cf77915
78d9c4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14089493201266604
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8aa75d17b39b41acb49967285254cff6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.1405290891646441
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/81dfaaef5ef840989045ffe265c88c7b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:13:58 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.13465982578791083
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6f64bdeb44b4494584c6bb4ea2d0ee4d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.1340112270638017
Test R2: 0.8118193531129111

2025/09/13 04:13:59 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.0001-init_method-zeros-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/5ed8cabec7984daabc8f0445c
78ffc6a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14105817431075446
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a5025b35f2504fbcbc6aad547fe14a0b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.1449962838279089
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7d3862d00f26454392767e4d330ae7e0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:15:14 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.13476932063278754
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/76aff1d4268c4d0bade032c5f7d69173
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13388038994388787
Test R2: 0.8120030766292289

2025/09/13 04:15:16 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.01-init_method-xavier-momentum-True at: http://
localhost:8080/#/experiments/409655642356588706/runs/794048a1415a41b08bf1f06b203
674c0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.13212166892423474
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/dc090222f83146f498a198c66d61e59f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.13586168346325
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e22b1145a7784563b956d195e9e6205e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:16:28 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.14214665046068037
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/20809ff6881247b9b5b70aa43704a7b1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.14044132798550413
Test R2: 0.8027901055080133

2025/09/13 04:16:31 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.01-init_method-xavier-momentum-False at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/c15d0ca2f1824e91b90e73a927
a3e622
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14121288344984856
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c5b37ab523ab432fbc15f55f5cdeb698
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.1398697879121322
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2055d6584b214d31a713f0ca3cd9dba4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:17:30 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.134675590047381
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2d5693c7f180405c9d20c4252c20ee6c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13400013749952427
Test R2: 0.8118349252513442

2025/09/13 04:17:32 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.001-init_method-xavier-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/1a6398d54ef14ceabcf375390a
```

```
0556f9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14202026957970815
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a133f7079fd342d78d1a30d97b7ff6ba
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.14120460521807343
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5fea78d02ac9475890ad641d818ed8b6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:18:45 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.13311909310223244
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/be390f797c5747e6b7acecc85636b2bd
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.13271794048818014
Test R2: 0.8136354062134098

2025/09/13 04:18:47 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.001-init_method-xavier-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/56f5f2744c954ca1a49891847
c2f2671
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.6857195890380884
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e239d1abbfe544249946e79192ce2b2a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.7402559806965002
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9d93bdbcb15e4b1cad18b7b5f2e230ad
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:20:02 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.6309851145822695
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9f93831e73fa4d55a6a2f0dbf8a85f2c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.5827291019320188
Test R2: 0.1817227424587926

2025/09/13 04:20:04 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.0001-init_method-xavier-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/ef3105f0b3ab45af84af37fc8
947a2b7
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Lasso =====
Fold 0: 0.14102393808952532
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/34e740ca31934b2095930c4204934b91
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.14049770305140286
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c0ccaef0851b4b8aac00e191cdd9511d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:20:46 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.13439591818609284
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/cfac185256764abd86dbe3fd8a2ae0c3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.1337575614625746
Test R2: 0.8121755542908108

2025/09/13 04:20:48 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Lasso-method-sto-lr-0.0001-init_method-xavier-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/cf058d025b3c42caac7323dc
7ab98393
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 26.85433408271425
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3fe841319ea74a3489f34283a85b3f2c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 28.231927245901286
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/15b5bda94bb143a49d0399eacbef5a21
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:21:31 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 27.604063495652962
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4a34fce08829463d90f4bede90eaefcc
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 27.61146897483308
Test R2: -37.7724536744457

2025/09/13 04:21:33 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.01-init_method-zeros-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/70cb832cbfa04471a7594501ea
fb08d2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.8017728686709815
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fde1ed71cb62462590577266585e526a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.199575907665435
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5600950639574695b0cbc6e751ba2643
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:22:15 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.9861713177663294
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/87bd8ed50b414d57a44c9116caab1645
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.8668669710761825
Test R2: -4.42991467197742

2025/09/13 04:22:17 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.01-init_method-zeros-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/ec985422857e48a2a1bc421c0
40d2c20
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 136.78295736548608
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d262d3d114b94092828c91f26d6f4913
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 137.86484657036385
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/56c399ee281d4103a3b3ada3439075f4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:22:59 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 137.22286625295627
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/195928239b5745c5b1d9592f8d7423f9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 137.4228064147015
Test R2: -191.97123960999053

2025/09/13 04:23:01 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.001-init_method-zeros-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/b9100f6bac1c4eabbfeca34ce
7fb6510
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 26.762239387146796
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f2e2ecd619ba4dfdbf5fdcfc4e7b6668
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 28.145053092703133
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/191fd7ea49984ff49f8706ed26f866e1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:23:44 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 27.51208167551574
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2e9c5f600b2045e18c0bed28cb8e9d10
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 27.51949317149425
Test R2: -37.64329982256716

2025/09/13 04:23:46 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.001-init_method-zeros-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/7369c1418efd4ae1afae2bff
89574add
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 165.16502992721138
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/566fd33947e6403ea2d0aee6edb30a51
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 166.13144324288353
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fa16681f28324ff2b4a2ce9c9863f775
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:24:28 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 165.52466498059317
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/163a0f51e03641cf82c4207f02d0e9a9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 165.7522599072444
Test R2: -231.751898297985

2025/09/13 04:24:30 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.0001-init_method-zeros-momentum-True at: http
://localhost:8080/#/experiments/409655642356588706/runs/2ebcfd7e74114968a019fb3a
bb68ac44
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 137.22789171824877
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/eddc4c1b53da4cd9a6ec9952769e58de
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 138.30761060741656
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e7a5fda0863a4521bbcbb705fddc42b9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:25:13 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 137.66621153506287
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a1fa947783fc446bac07ebacd8d6a8a2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 137.86664620570417
Test R2: -192.59448633950035

2025/09/13 04:25:15 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.0001-init_method-zeros-momentum-False at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/261c48659607481c9095487
144474495
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 26.297674811597997
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f11cfb84138b4eedb0c236d1af71103c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 27.662283126570323
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e38ccaf7c7144f21881a51e1f007afb2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:25:57 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 27.437279069584502
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/950370a746b947c6b00386dc2c584f39
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 27.45187317279785
Test R2: -37.548346769931236

2025/09/13 04:25:59 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.01-init_method-xavier-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/3f02d237c03641368c1c9fa3a
3477b3f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.8265640940245045
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8ea71c09615f46ab97d7fd0ff73c2c21
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.195713539300017
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/aafe390eca934be8be9d70afd162650e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:26:42 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.9900979850465927
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d62b82ef5a7a4ffab455dc390bc3b494
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.862367799672374
Test R2: -4.423596865598245

2025/09/13 04:26:44 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.01-init_method-xavier-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/5355b3224dfb491ba243eb92
```

```
733e228b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 139.23150663142954
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/31cf4cd829bf419ca1ce04cd9623966d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 137.1940506182149
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5ce4569c35b94c5583fa4994d210ff8f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:27:28 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 140.39949776054198
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9858176cd92e4d83bc93f84f5e04c684
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 140.64352864865072
Test R2: -196.4938278043337

2025/09/13 04:27:30 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.001-init_method-xavier-momentum-True at: http
://localhost:8080/#/experiments/409655642356588706/runs/9e6c91a2c32f488b93d7ad68
a3bd684e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 26.260244313496173
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/26e17d2fc6924550921c6bc2f05b586d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 27.9115655640148
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/76d3be21bf594aff8280571f4eada7a3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:28:13 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 27.238004023897936
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1e2cd42a548844b9b81593591c596d56
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 27.23670172808463
Test R2: -37.24619968460916

2025/09/13 04:28:15 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.001-init_method-xavier-momentum-False at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/992b1ff53f39441eb6b7564
6266d9ae5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 161.25705197995921
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3ae0809ae93d419e96565e9e28190158
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 170.66321492046475
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c9309f1d00c14539afa15cee5ef6523c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:28:57 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 164.3702349712326
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/45ad3029710946bdb05ffd7b5ed7238b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 164.56916219267094
Test R2: -230.0905741079373

2025/09/13 04:28:59 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.0001-init_method-xavier-momentum-True at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/fd7e70392b804655bb206ab
74d6e4123
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 140.41556141299392
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5a44fe0f5b184c10835affda40a6b816
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 143.3029372666508
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/845b0cae96154cab8d1a3c55792ea3ab
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:29:41 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 134.03040688977666
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b5bb785c005d422984ceedde78c6b90f
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 134.20341389412303
Test R2: -187.45051861981943

2025/09/13 04:29:43 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-batch-lr-0.0001-init_method-xavier-momentum-False at: ht
tp://localhost:8080/#/experiments/409655642356588706/runs/812bb0ee7e8b4212b1afd6
0db8e90b3b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.5204828379206807
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/bef6f223c92548b7a416b60873550055
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.943672428520352
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2fe611930d244436956bac33b1a12fad
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:30:14 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.7268402673264753
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4b9ba595af8d4e81929603f4f63ca7e1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.6201320445024456
Test R2: -4.083445655092895

2025/09/13 04:30:16 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.01-init_method-zeros-momentum-True at: http://
localhost:8080/#/experiments/409655642356588706/runs/c4785fbcbed242cd98e3b2bf8dd
7b929
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.540598259516145
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/608fe484382d468fb48c04bdfa651893
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.9049727752204166
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ead2612374bb4eedb655e764e14fb5f7
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:30:44 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 3.7328268113181142
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9b141e9417c2477da5c62b66e920bb6b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.624709614091651
Test R2: -4.089873549421906

2025/09/13 04:30:47 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.01-init_method-zeros-momentum-False at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/6b49a103d82f468a9ba0b716e7
2395af
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 4.16485488381356
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c84cfb81a1284b1fa49c9a97d42a2503
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.393774796217188
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b894878b75254e41b7947c0a43dd84e9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:31:16 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 4.210269109821717
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/59ed7f3696dd45a1a34233aaa25fe51b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 4.0876176922827545
Test R2: -4.73989626402468

2025/09/13 04:31:18 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.001-init_method-zeros-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/ca1347e789324b4b9dec80fe90
c0fcdf
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.5699851229846424
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9a37c72845a6441999f27d858d1de10d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.967563830908324
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fb579ee606374fa9a72f2b62db1e7e86
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:31:30 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.7302443344445226
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e76d7a8961714e94b3836956ab4fd5ed
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.6214996105690878
Test R2: -4.085366012608605

2025/09/13 04:31:32 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.001-init_method-zeros-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/d0cd56d687d44095bbb12da34
98ddd6a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 33.44762809710545
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e602ed7d55134566b226efac8378f91f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 34.86424054153954
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/0c28215c1e0d48f98bcbd1f48d4bd871
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:32:15 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 34.19894644740379
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f7f824ab2cec437eb74656b1d477935e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 34.22743309906469
Test R2: -47.06269327569153

2025/09/13 04:32:17 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.0001-init_method-zeros-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/726cc7aeae2c4a208c3ed31f1
dff4ff8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.8581195535476636
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6a723b02e6e74ad0b492362d637566cc
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.267129934271446
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9dd481312bbe45f7bd464e2926bf4338
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:32:59 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 4.050266423659671
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/bb5f10f9c2a04ce38422df7d66d2563a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.9296758994063192
Test R2: -4.518111944865778

2025/09/13 04:33:01 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.0001-init_method-zeros-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/ea88d5ca93534c76ab994e97
f1cfc394
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.5503574657029207
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c7f13eae4ff349a98e04cb0ca3f35040
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.9159437625706497
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e6e2f86d4db54e3d94c6cca0e750e551
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:33:36 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.706803749589631
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/aac066a4372c4fa983ebe8af3a595ec3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.6006459544305067
Test R2: -4.0560829847004225

2025/09/13 04:33:38 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.01-init_method-xavier-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/546c5b4fb23e4b03b57166aa29
```

```
7f91db
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.5349313758035095
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8b937729b17f4e5a99098d7c1d54cb41
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.891348408671633
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fcc226402d594960ab01e779a0193068
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:34:15 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.68941686463113
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7949227fcb18439ca77bc0bcac47e7e4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.5855533847965013
Test R2: -4.03488976395957

2025/09/13 04:34:17 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.01-init_method-xavier-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/10d15a15029445699889b1d06
9d372f2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 4.063841053815801
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/939239f6ef3a45bc8b6529bd9c11942b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.481825114222585
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/72c6b30536204c659f6d721a74240c55
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:34:49 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 4.090792458166697
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/79594d3389be411fa0b96a50a517a095
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.9770764257706244
Test R2: -4.584672500346527

2025/09/13 04:34:51 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.001-init_method-xavier-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/b0b358bb70004e348de915c45
3460ba5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.577349694438637
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4dc12a2502e54f7494e6a1d7a4e43b88
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.933047290131425
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/af5ccbbd4d5e4cfe904b003c40757f93
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:35:04 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.7433916164867482
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c4bd4a020a914e45bbff5263487f741a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.6345146743956156
Test R2: -4.1036419674208595

2025/09/13 04:35:06 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.001-init_method-xavier-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/7bf0ebd768e34743aa3decdf
ce4c7d8e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 33.79993501866539
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4174b3b2956b4ab8b29dc4cc5dbf9836
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 35.47676182294064
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9aac6a9b519e43a78be8fb5aef38ec41
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:35:49 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 34.740940705770896
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9e53fe7ed2e54aceaf4e5a6bae79cc67
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 34.883257010335754
Test R2: -47.983611400023406

2025/09/13 04:35:51 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.0001-init_method-xavier-momentum-True at: http
://localhost:8080/#/experiments/409655642356588706/runs/805b1f085cdb46b591c3d5dc
3e14ca5c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.8203597872623933
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/0ea7fa3fb5404968a67a3d4ac1d3d77a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.2957389083206285
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a9809c0571fb4cc597d8634bbeb152f4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:36:34 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 4.052009277053721
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8af9b2c244ed48bf839123f9a7400f88
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.929374833489758
Test R2: -4.517689183428729

2025/09/13 04:36:36 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-mini-lr-0.0001-init_method-xavier-momentum-False at: htt
p://localhost:8080/#/experiments/409655642356588706/runs/de7e4385fd514496bf153a8
4c22deefd
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.55084832659237
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/27babc798f2b4314ad848f9c5d6fbf8a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.11896302821588
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c626cf3535854e9584b2e5bda5a1ce08
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:37:47 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 3.6839233284580435
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b49dc2ca8ad84f99ac7d38e927ec7fc3
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.5689764446322383
Test R2: -4.01161216706066

2025/09/13 04:37:49 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Ridge-method-sto-lr-0.01-init_method-zeros-momentum-True at: http://l
ocalhost:8080/#/experiments/409655642356588706/runs/f2e6c85dfd604c1babfe5c90e09c
e826
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.37343177326983
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/25a086ee9842402fb18c5ab2a77059fc
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.898055085099576
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1f53d003d566438286fced178de7e2d8
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:38:57 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.700559939758774
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f37b7aa221484accbf2ad41fced18db3
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.592376518654832
Test R2: -4.044470914519789

2025/09/13 04:38:58 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Ridge-method-sto-lr-0.01-init_method-zeros-momentum-False at: http://
localhost:8080/#/experiments/409655642356588706/runs/39cd085f16674aeea347cf57d92
99298
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.5765070340113896
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a98f93eabc954dcaade86f03e3237028
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.909041733962047
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f72e9f8a85eb485087cfab65aa6c444d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:39:25 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.6995670473220317
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9d0d2a1e997b4f4b8625e95da6f1e530
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.5920638285927424
Test R2: -4.04403183027701

2025/09/13 04:39:27 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.001-init_method-zeros-momentum-True at: http://
localhost:8080/#/experiments/409655642356588706/runs/5d0f16236bc34819ace5f0de8d5
d8de5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.52646934765296
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b27954200da64dfa968ff0c4d62504f7
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.923680512196299
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2f431f497fc644808e3a1ff1b1773fc8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:40:31 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.612158081196615
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/67a788f4e21a4c17baf8d2f707511f16
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.5088358420930876
Test R2: -3.9271617987000402

2025/09/13 04:40:33 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.001-init_method-zeros-momentum-False at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/ac53534f816743689b3cf6bb99
672c7a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.6338993570210603
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c1b35d561c354c06aa9bb71d2bf41e33
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.9751414306404134
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3d84fee5b07e4d89a5a8b0b8bed2c0e4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:41:01 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.83940485089088
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e6674987274f4a6d9580dd7190c8ea25
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.724918276207039
Test R2: -4.230588109490711

2025/09/13 04:41:03 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.0001-init_method-zeros-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/a3c875c4c9da45daa5c70c799a
59e81c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.5426133160940605
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3bcac051b9da4aba9ca8cd43cf03a393
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.8982606093339753
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2c2ffe0efd0b477d97d4c799c5516d95
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:41:14 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.7101480542066785
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8cd11b299f0642219bcfb4b4a562d316
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.6038723077416925
Test R2: -4.0606134801408995

2025/09/13 04:41:15 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.0001-init_method-zeros-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/438ed8f2c7874c1dae5d5d5be
```

```
df58515
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.504950192861708
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d4d2f2caddcf4612afc216366003de8b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.989488727119412
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6da3230072a1432fadbe678ab6ce9ce2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:42:24 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.639035233511077
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/20ad464b2e95460c9c95acc274e5e839
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.531245245081865
Test R2: -3.95862943050356

2025/09/13 04:42:26 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.01-init_method-xavier-momentum-True at: http://
localhost:8080/#/experiments/409655642356588706/runs/f12a74205cf943c39f0d5c5c06a
064dc
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.60690264501511
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f476a6f5d35e43899a3526e5a2de84f1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.3226613115815424
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/186634ea75dc4c49a67e3b21ec1c3c1b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:43:32 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.9356702098222467
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5e277f692a6a4a21955b8c001dd59b92
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.8003373102156934
Test R2: -4.336492688668924

2025/09/13 04:43:34 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.01-init_method-xavier-momentum-False at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/0bff368243da43e6b80039b1ae
23cf79
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.541043618437914
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/be111302a5994bb0ac71b672d8e62a14
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.9133445249933585
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/48f2fe2a6a5d4dedbfcedf0fe481ffe5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:44:21 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.7429694438832
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/57847c38ce9448f1aa185e41bb151824
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.636082174651496
Test R2: -4.105843075631046

2025/09/13 04:44:23 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.001-init_method-xavier-momentum-True at: http:/
/localhost:8080/#/experiments/409655642356588706/runs/a722c7e9b39f47a69e0c659b9f
4fb2c0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.493060920266442
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/20bd5743e8114ded88820c72a16dfeb3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.873718119850248
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a19b217637f34197b01e6ba6177614d9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:45:30 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.6940597065582996
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/511b3daf3a2a4901a34fdd136c3546bd
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.5756815250286813
Test R2: -4.021027545115753

2025/09/13 04:45:32 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.001-init_method-xavier-momentum-False at: http:
//localhost:8080/#/experiments/409655642356588706/runs/be84629eeae84f65a4298d20b
15e4cad
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.5604830178392994
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/182099245003479baaefcd1595a908e1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 4.010395919044691
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4b20a8affd2a4bba93ee8d1069d83807
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:46:06 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 3.8384288729591414
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4f2a80d0f76948b8a958f311ff391c99
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.723262581926219
Test R2: -4.228263157860623

2025/09/13 04:46:08 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run Ridge-method-sto-lr-0.0001-init_method-xavier-momentum-True at: http:
//localhost:8080/#/experiments/409655642356588706/runs/948358925ba44d168370aa0c8
d60725e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== Ridge =====
Fold 0: 3.556173971980737
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/30e7ee84521d443fba2990977f848165
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 3.9017965958106404
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/24554b78373e43ca81162bd3bdb77b36
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:46:22 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 3.708338380231872
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2e6c0e89112744acbc87d9181033579f
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 3.6001916403822753
Test R2: -4.055445029856196

2025/09/13 04:46:24 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run Ridge-method-sto-lr-0.0001-init_method-xavier-momentum-False at: http
://localhost:8080/#/experiments/409655642356588706/runs/7a5f6a6ee1ed40768aa17880
6cc4202f
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 23.684495493375522
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b7309ee24d3d4d8a807e6c01cb08e67b
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 25.04319733019583
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d4830500900741608df3911680727290
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:47:05 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 24.42726350072962
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5a08f040cf0649d1a5a9213f46247465
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 24.424207389827643
Test R2: -33.29685144315548

2025/09/13 04:47:07 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-batch-lr-0.01-init_method-zeros-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/b6fb27873cd44e3f
9e5e01b53a1ca2f5
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 2.2282322425993084
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/307cf1c8cd9540cb8982aceee74e3d32
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.34349348002303
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1f39a84b0aa742a8a25acf0e50718cc4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:47:47 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.232055449663183
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/0c13905c24ab406090be0ef6be09ee2b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.08064483984456
Test R2: -1.921673806611928

2025/09/13 04:47:49 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.01-init_method-zeros-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/6a61a5eca9
5447a492c155e908afb5e7
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 136.62742383179258
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/d2c65ccf063547279c8644e802eab8eb
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 137.7099538865498
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/aacac5d1afbf40908e9632f4090c1d81
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:48:30 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 137.0677728551741
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c954c0f4d04340c5a08d54c6846fb84a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 137.26755087792543
Test R2: -191.75322737337837

2025/09/13 04:48:32 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.001-init_method-zeros-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/1617f2ac7e3
44b83838e779ccf576c2b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 23.66544406009418
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/19ed894a976643acaf55fe3285620461
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 25.030725606937764
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8679d37370bb437287216378404470da
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:49:13 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 24.408714217225953
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7a467b4450c14da89808d84e78f6e762
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 24.405943778335462
Test R2: -33.27120539617572

2025/09/13 04:49:15 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.001-init_method-zeros-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/d288250fa5
504a9597da1311daf15f2b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 165.163184295155
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5069e57ec45e4af5837025a660aecd8d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 166.12960460459328
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1cec60b831f34b76a197612337d50f0d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:49:57 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 165.52282420997966
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4550191be8224a4c899fbdbcd1e8e5bd
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 165.75041748377103
Test R2: -231.74931113832193

2025/09/13 04:49:58 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.0001-init_method-zeros-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/ef12a070a51
```

```
a4a17abec011eb5850c4f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 137.08170523029403
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b787d0238a644559911fa1cc094afcaf
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 138.16202274764885
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/eb50f07de0c54ebdbe738f1c089d45a3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:50:39 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 137.5204351242926
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/97592f6495bb4e058b0f7bdb3ebd11d4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 137.7207181036255
Test R2: -192.38957183159056

2025/09/13 04:50:41 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.0001-init_method-zeros-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/fd8c26adb4
9c4faab55fa07cf3b88a1e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 24.230129369525546
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3feb255db412477e899a399b46d860a6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 25.52403281940391
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/eab92491e3a54efa97415b1274e5b4f4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:51:22 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 24.15920427174531
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/eda70aebddce4db090f5f877bed07ca4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 24.23693472688983
Test R2: -33.03388026060578

2025/09/13 04:51:24 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.01-init_method-xavier-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/83167192c0f
a491898da70543946b416
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 2.2651705475930948
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2e8ebc233460467ea2391d1b10a78b3f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.3220546175268564
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/af668b1e0b1b49f187c5c4a2121ad1e8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:52:05 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.170938128308095
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/52a7aae975f94addbda267ac867bdb46
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.040907999219621
Test R2: -1.8658747177005925

2025/09/13 04:52:07 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.01-init_method-xavier-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/d92b39739f
a240f4bac252e43f816116
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 141.79461941458996
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2493203b29334b8babce209a0c673efc
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 136.76280613252064
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f020b5b08fc245daa6f03ef41111645b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:52:48 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 135.9475386523262
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9c3d1049b77c4c88b1f063258c07e771
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 136.33619919385308
Test R2: -190.44540887019667

2025/09/13 04:52:50 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.001-init_method-xavier-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/a25ef859f45
c4713b849e84f7b63e3d0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 24.21178306385983
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5390cdb1f40a4ccaa9b83c5dd22fb63f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 25.582387514929508
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a380bfbad16f41f3a3eaeeafa67fcad6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:53:32 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 24.12008159926489
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7adda556fd5243c5bb5c618401884a31
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 24.10371630261714
Test R2: -32.84681287971403

2025/09/13 04:53:33 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-batch-lr-0.001-init_method-xavier-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/ae089217c2
cd453ba40eda4743a15dc3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 170.8924011770079
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/79b70cd8643f40ed91b74df7ada2b7b1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 163.1637518422567
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4872372cad1d47f88bde51d56bbe3fb1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:54:14 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 170.03048470482904
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e3df2d08d7f14301a7083f72618fc447
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 170.66536465410218
Test R2: -238.65095630786018

2025/09/13 04:54:16 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-batch-lr-0.0001-init_method-xavier-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/eed85b69f2f
1457faebaccf78777a6a0
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 133.8765570558301
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b099e317482b4d449e5a3a432d865b44
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 142.77549705463764
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/56a6ee89bed044e9b2ce6ff9c1150bc0
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:54:58 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 144.0606418024493
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/20f973d2a6384511a944086b78aaca18
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 144.03096118598805
Test R2: -201.25051319651377

2025/09/13 04:54:59 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-batch-lr-0.0001-init_method-xavier-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/ff2ec74ace
044a37ba54cd917829ba5c
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.22091158807291386
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/995307e51c43499da982ce614e64ea7c
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.22114265434870445
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4d4df5d93bed414c9d41e829cdc08b14
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:55:42 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.21314104026108865
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/48f03db2fc5544ff8886f43d3d47e5a9
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.19771393824499509
Test R2: 0.7223670164603173

2025/09/13 04:55:43 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.01-init_method-zeros-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/fe625cc40c8d4ba3
a56efccc6d37e3f1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.0762436139597037
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fc20fdbec9ef44f5808a5ca497148f84
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.06616647968507743
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e607225667b94e96a1d9ed4d12bc83f6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:56:17 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.07101328214707309
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/7260553691ab4750a01071c75a8ad1ce
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.06694850723444587
Test R2: 0.9059898661064795

2025/09/13 04:56:18 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.01-init_method-zeros-momentum-False
at: http://localhost:8080/#/experiments/409655642356588706/runs/e07898132e34461f
b6df8ca0e3596b01
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 2.3495960168430585
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/12576b31baf340b0a9409ef5654fb4d2
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.475756407276874
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1b9500b87e7c4cc592b6da3f0e230ce5
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:57:00 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.3545230279153055
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/003da89ffe724b139d13654d030ffc5a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.1982129914410544
Test R2: -2.0867648314871388

2025/09/13 04:57:02 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.001-init_method-zeros-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/6ebefc550c0e4cc4
a02d830e8c2ee366
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.22101602030696038
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/e2fb5dcdaaaf43a993827cb5afad01cd
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.22090483757091797
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8ff2df22a9e34087954805dca8cc548f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:57:43 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.2131539585361365
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a1f8d34d2b0d4496bfe2a7e851327a93
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.19774443561280028
Test R2: 0.7223241915826732

2025/09/13 04:57:45 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.001-init_method-zeros-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/a46ff66405
```

```
6544dc9fb9245ab93b6699
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 30.561393461384927
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a75d23baca09423c838fb36fdf59036f
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 31.97106241004859
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1f0a6f50556a4ce082fa7a9018492997
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:58:27 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 31.311082316085766
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8ac8d4718dca4d83932600b0d31e21a1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 31.33155491490003
Test R2: -42.99625614245889

2025/09/13 04:58:29 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.0001-init_method-zeros-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/09c9e0d4042
a4e99ba36d7876f64cbd8
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 2.3497342119777764
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a99be94fa3bd44db80f307e00bf27893
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.475751856300869
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a38dc3d0dec34e6d9e96dafd5d72de02
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:59:10 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.3544563840132673
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ea0cba501d2f4dad893654678536ccc0
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.198205650943984
Test R2: -2.0867545238471186

2025/09/13 04:59:12 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.0001-init_method-zeros-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/0918de2d80
ed4ae19270fa29d7008040
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.21719489752173946
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/283313f46e294dc19835a9c74334e54c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.22641241286345012
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5ebf06668a244775aa513d0637270733
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 04:59:54 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.20766365465593753
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b40916354313460e9e9282307d78819e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.19359382187115007
Test R2: 0.7281525478778539

2025/09/13 04:59:55 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.01-init_method-xavier-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/69993986eada4a8c
a5979318131b5d67
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.07679927826461892
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/79888e9019a04ae498fbbc16deb0ab08
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.0692199488098492
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/62798d41f164450fb3560330ac332fec
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:00:24 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.07060940183435137
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1f07ae9de8e0498fa9d790c57fd7f0a5
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.06644563406773504
Test R2: 0.9066960084192333

2025/09/13 05:00:25 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.01-init_method-xavier-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/d67cb286a9
5c4a52b1172f322e803a5c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 2.3669386537620682
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/1de86761f49741d59921ce09228a83de
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.518132370813228
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c0d366623cbe48c4bbaae83225e17543
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:01:07 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.3448547827702515
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/eaf3ab968a3640b6a3056fa1643c0f4b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.2013151527245767
Test R2: -2.0911209345530657

2025/09/13 05:01:09 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.001-init_method-xavier-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/b9fd961cfe1
44fe792a00e11bbe17f18
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.2189328472710945
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/26b880633af74ba7aa377d3807ff4116
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.21659273328569847
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/baa1aa85940f43d7a7e4dea8a0cf363c
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:01:51 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

```
Please use `name` instead.

Fold 2: 0.21097332441510327
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/0aa6c29e207d46219467d270c839889f
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.1964536462022776
Test R2: 0.7241367381251471

2025/09/13 05:01:53 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-mini-lr-0.001-init_method-xavier-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/4e697043a3
964c309f6cb1237b5cade2
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 30.351989555548233
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c30fba45b41644f9ac6a1d9bfcbd141f
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 31.911412484683904
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2379f02572ba41058a89f7bfee39c489
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:02:34 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 30.755719644759264
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b239f5557f994721a01dc10e78f38ced
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 30.690637210278922
Test R2: -42.09626954507054

2025/09/13 05:02:36 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-mini-lr-0.0001-init_method-xavier-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/9b55ed4d46f
64c8c9a8296f996fbb7bf
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 2.3673890563260995
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f09259b380ec4d4c9b3a4ad405b38fae
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 2.466499638336632
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b98e5365cde048cd85a7a1080212c829
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:03:17 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 2.3865637024342132
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/239807b896ee4328a93d1933f82bf4e3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 2.2266684539250696
Test R2: -2.126722433958489

2025/09/13 05:03:19 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-mini-lr-0.0001-init_method-xavier-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/9121842bb4
574868bb48fb7bca20450d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.07534060544773476
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/267baa1164074b038374aa48dea36497
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.0648550897118895
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/211757e994fe48f5bbc884b0f96b4195
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:03:51 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.06895303354807442
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b997f7738f564004a1305aa039a35442
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.06549385686380767
Test R2: 0.9080325087547026

2025/09/13 05:03:53 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-sto-lr-0.01-init_method-zeros-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/522b58ae97e447e4
9a3dd3329823241e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.07637077713672243
```

```
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/c403d549d5a44c73a893f2373da895f4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.06687992347829677
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/b216a67090824ea68dcdf9565ba82682
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:04:40 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.06792175874172887
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/51ffe4da9cb64442ab3bc3dcd12a9e9b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.06849224334891675
Test R2: 0.9038221278728329

2025/09/13 05:04:42 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-sto-lr-0.01-init_method-zeros-momentum-False
at: http://localhost:8080/#/experiments/409655642356588706/runs/e785a4357e4e40bf
a48c6f227e979961
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.08746179687690714
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/a402f3ea8c594086964108b4bceaf774
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.06856350977947016
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/98fcfa8b6654416aa8efecc54e3a0284
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:05:33 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.07469916575488796
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2dfc02ecb4254c10b2ac3cc142af9478
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.07013603647353733
Test R2: 0.9015138880311637

2025/09/13 05:05:35 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-sto-lr-0.001-init_method-zeros-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/7e1b686b4bf94d1f
```

```
8114967a92bee71e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.07649986793132572
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6700537009b34604a231b9f49d6f4437
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.06299900018888409
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/6b621e2de2ce4dceab0a0e91af3ad2cb
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:06:43 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.06927407022966194
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/cd15dcbd870349ca89fdea2ffe42ac29
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.06533937702259318
Test R2: 0.9082494317475569

2025/09/13 05:06:45 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-sto-lr-0.001-init_method-zeros-momentum-False
at: http://localhost:8080/#/experiments/409655642356588706/runs/fc34db3ab7134001
9302c4c88d4f4f29
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.7211101830482117
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/9949b085bd15449d88bc5d83654d51eb
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.7552774052716615
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/df2b1a75e2bb4843a8a86ebbc82d1db4
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:07:57 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.7180544728709037
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/04b9c4206a5547448e3ecff7348ab9d3
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.6628108627119763
Test R2: 0.06927068991356156

2025/09/13 05:07:59 WARNING mlflow.utils.environment: Failed to resolve
```

```
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-sto-lr-0.0001-init_method-zeros-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/db5aae6dde924e5a
8eeff8e48d68a91c
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.08442650650186984
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/be9dcf86b2fe4001ae41ebe696bfdae2
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.07458891177342547
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/277fad9f9bdd47aaaff0afdf7f886604
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:08:43 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.0739225548683668
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/274ae100afe241b0aaaf8c13b890820b
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.06929566673813527
Test R2: 0.9026939482686317

2025/09/13 05:08:45 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-sto-lr-0.0001-init_method-zeros-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/43648d0e07
1f4f9ab2656fda23d1a3ca
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.07302111781581293
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2df7eb939bc245c7861a3ac0fce38270
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.06286491863055473
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/ea3bcf0657594abf9a03787819c30fb1
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:09:44 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.06951779247254361
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/dbd12f0a17fc404b83a799df956c6fb5
```

```
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.0654702222379065
Test R2: 0.9080656968635534

2025/09/13 05:09:45 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-sto-lr-0.01-init_method-xavier-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/611c4560b80b4b13
b7c564099221ed24
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.07586468274687926
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/3e38093ebea34ba7a55bd8065ca3c911
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.06370944607895176
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/34693bdf34ee46fbbb1a47adc96e106a
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:10:55 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.07177786699115117
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/fb5965c4767e4f5bb7c791fcdbbc2db7
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.06822199471831963
Test R2: 0.9042016151981889

2025/09/13 05:10:57 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-sto-lr-0.01-init_method-xavier-momentum-False
at: http://localhost:8080/#/experiments/409655642356588706/runs/3ad32df7981b4767
add725b36ce2d81e
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.08304419305317208
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/5cbf1ee0a8d94f078124e94e04696253
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.0704940682286044
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/f81948f9c7484e5391b461d736775bc6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:11:44 WARNING mlflow.models.model: `artifact_path` is deprecated.
```

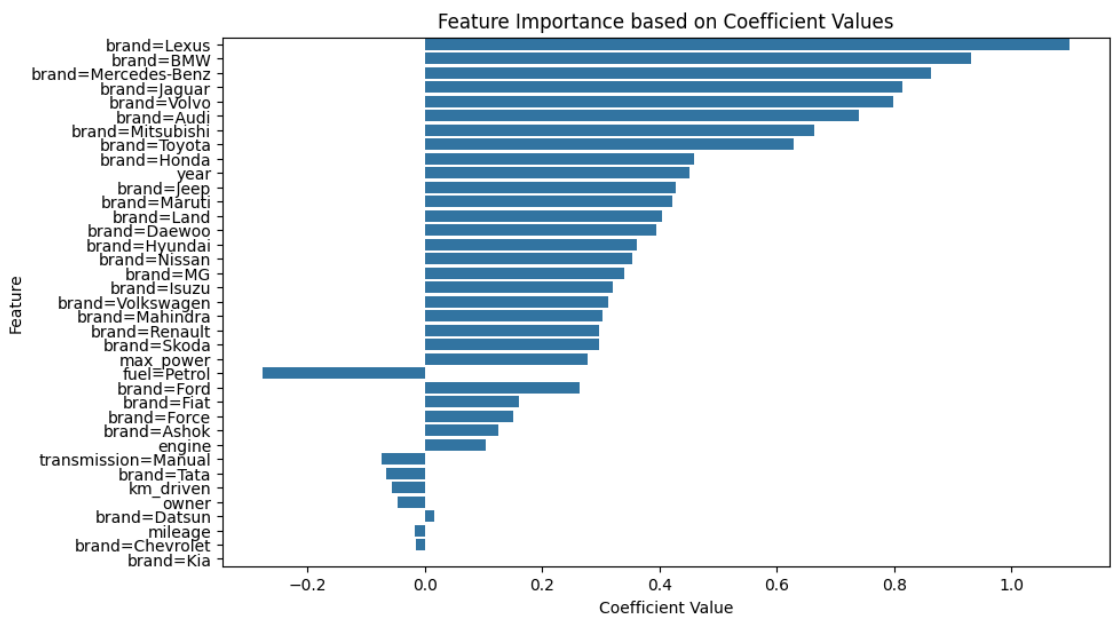
```
Please use `name` instead.

Fold 2: 0.07587678015861475
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/35438faa15ee428e817d67f37dcfab20
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.07116518242519411
Test R2: 0.9000687452982209

2025/09/13 05:11:46 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-sto-lr-0.001-init_method-xavier-momentum-True
at: http://localhost:8080/#/experiments/409655642356588706/runs/8fba431244e54889
812cc3f6ae0d5fa6
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.07532917804338884
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/2d8c94370b3a47419b157e32a3a61bb7
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.06332895842406194
  View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/4029d6a3bb1f425cb3c6f4906b2b3dd3
  View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:12:56 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.06869968746141834
  View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/8a896d334271404eb1c26e410c3948ce
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.06538958374803024
Test R2: 0.9081789306837443

2025/09/13 05:12:57 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

  View run LinearRegression-method-sto-lr-0.001-init_method-xavier-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/e45d320d5b
5f43e59e719965dac05a51
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.7238140717559778
  View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/266bfc9f7fb94bef9a1fe346d1885653
  View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.7560235837841087
```

```
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/bf7c18d813614ad6b6c98558d4aa8af1
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:14:11 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.7410740709289332
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/bbaffe2ba25d4924bea987db32cda560
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.6820781320742794
Test R2: 0.042215290960906704

2025/09/13 05:14:13 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-sto-lr-0.0001-init_method-xavier-momentum-
True at: http://localhost:8080/#/experiments/409655642356588706/runs/9940c90573a
e43bbb5af243ab70bb506
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
===== LinearRegression =====
Fold 0: 0.08533070494525818
 View run Fold-0 at: http://localhost:8080/#/experiments/409655642356588706/run
s/051c01009ec9477e9e002d9df97e7e4b
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Fold 1: 0.07134205298777227
 View run Fold-1 at: http://localhost:8080/#/experiments/409655642356588706/run
s/cc6d0937d9264b54bc2830dc99008aa6
 View experiment at: http://localhost:8080/#/experiments/409655642356588706

2025/09/13 05:14:54 WARNING mlflow.models.model: `artifact_path` is deprecated.
Please use `name` instead.

Fold 2: 0.07574917760633214
 View run Fold-2 at: http://localhost:8080/#/experiments/409655642356588706/run
s/588cfbd3da9f4bdaa318b0c155588609
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
Test MSE: 0.07151336385514961
Test R2: 0.8995798235253316

2025/09/13 05:14:56 WARNING mlflow.utils.environment: Failed to resolve
installed pip version. ``pip`` will be added to conda.yaml environment spec
without a version specifier.

 View run LinearRegression-method-sto-lr-0.0001-init_method-xavier-momentum-
False at: http://localhost:8080/#/experiments/409655642356588706/runs/bf9ff908b7
b74dbe83a1ef864d847d2d
 View experiment at: http://localhost:8080/#/experiments/409655642356588706
```

[98]:
```
# Check the best model from the experiments
import pickle
print(f"Best Run ID: {best_run_id} with Test MSE: {best_mse}")
model_path = "/Users/dechathonniamsa-ard/Documents/Dechathon_N/AIT/Machine␣
↪Learning/A2 - Predicting Car Price/A2-Predicting-Car-Price/mlartifacts/
↪409655642356588706/models/m-afb6853daf1c49969df3151958524522/artifacts/model.
↪pkl"
with open(model_path, 'rb') as f:
            best_model_mlflow = pickle.load(f)
print("Model loaded successfully using direct pickle")
print(f"Model type: {type(best_model_mlflow)}")
model = best_model_mlflow
```

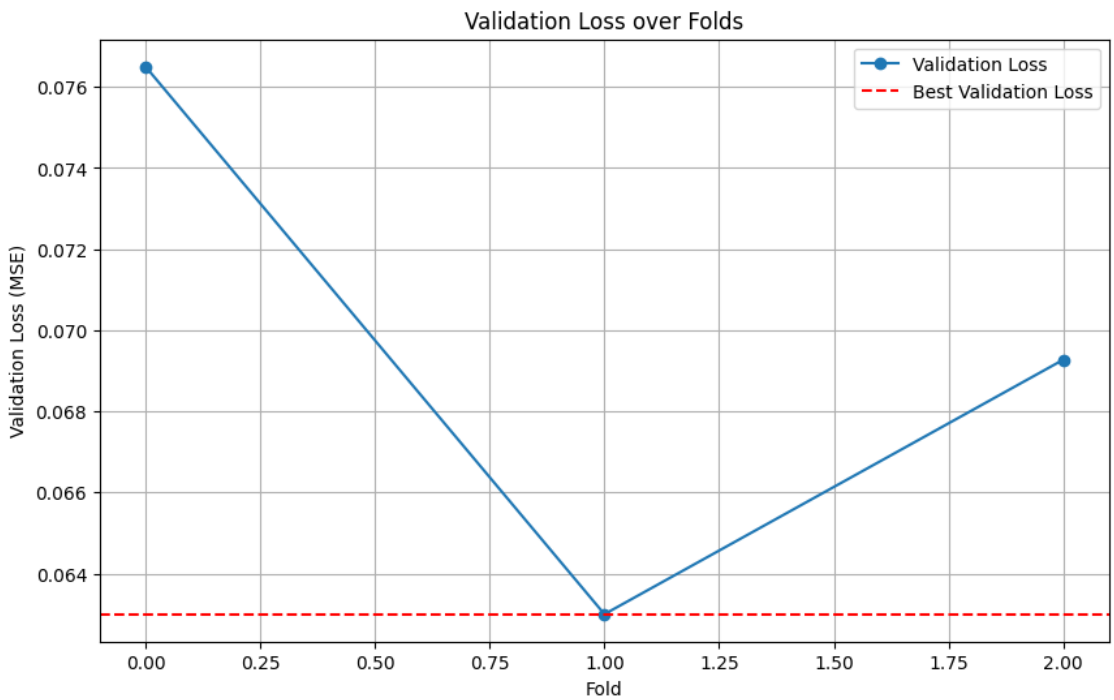
```
Best Run ID: fc34db3ab71340019302c4c88d4f4f29 with Test MSE: inf
Model loaded successfully using direct pickle
Model type: <class '__main__.LinearRegression'>
```

[99]:
```
# Feature importance plot for the best model
# Use the already trained model and preprocessor
model.plot_feature_importance(prep.get_feature_names(include_bias=False))
```



[100]:
```
# Display Validation loss of the best model graphically
best_model_index = np.argmin(model.kfold_scores)
best_model_val_loss = model.kfold_scores[best_model_index]
# Show the graph of training loss and validation loss and
plt.figure(figsize=(10, 6))
```

```
plt.plot(range(len(model.kfold_scores)), model.kfold_scores, label='Validation␣
↪Loss', marker='o')
plt.axhline(y=best_model_val_loss, color='r', linestyle='--', label='Best␣
↪Validation Loss')
plt.title('Validation Loss over Folds')
plt.xlabel('Fold')
plt.ylabel('Validation Loss (MSE)')
plt.legend()
plt.grid()
plt.show()
```



[101]:
```
# Use the already trained model variable 'model' for prediction and evaluation

# Set is_polynomial=True if the best model is Polynomial, otherwise False
predict = model.predict(X_test_transformed, is_polynomial=False)
mse = model.mse(y_test_array, predict)
r2 = model.r2(y_test_array, predict)
print(f"Best Model Test MSE: {mse}")
print(f"Best Model Test R2: {r2}")
```

```
Best Model Test MSE: 0.06533937702259318
Best Model Test R2: 0.9082494317475569
```

[102]:
```python
# Export model to a file using joblib
import os
import joblib
```

[103]:
```python
# Create a complete model package for A2 app deployment
# This package includes both the trained model and the fitted preprocessor

# Create model package
model_package = {
    'model': model,
    'preprocessor': prep,  # This is the fitted ManualPreprocessor
    'features': features,
    'feature_config': {
        'num_med_cols': num_med_cols,
        'num_mean_cols': num_mean_cols,
        'cat_cols': cat_cols
    }
}

# Save the complete package
joblib.dump(model_package, '../model/best_model.pkl')
print("Complete model package saved to '../model/best_model.pkl'")
print("Package contains: model, preprocessor, features, and feature_config")
```

```
Complete model package saved to '../model/best_model.pkl'
Package contains: model, preprocessor, features, and feature_config
```

[105]:
```python
# Inference test to real world data
# Create a sample input data point as a DataFrame
sample_data = pd.DataFrame({
    'year': [2020],
    'km_driven': [50000],
    'fuel': ['Diesel'],
    'transmission': ['Manual'],
    'brand': ['Toyota'],
    'owner': [1],
    'engine': [2000],
    'power': [150],
    'mileage': [18.0],
    'max_power': [150],
})

# Load the model package
loaded_package = joblib.load('../model/best_model.pkl')
loaded_model = loaded_package['model']
loaded_preprocessor = loaded_package['preprocessor']
loaded_features = loaded_package['features']
# loaded_feature_config = loaded_package['feature_config']
```

```python
print("Model package loaded from 'best_model.pkl'")
print("Package contains:", loaded_package.keys())
import numpy as np
# Preprocess the sample data using the loaded preprocessor
sample_data_transformed = loaded_preprocessor.
 ↪transform(sample_data[loaded_features])

# Make prediction using the loaded model
predicted_log_price = loaded_model.predict(sample_data_transformed,␣
 ↪is_polynomial=False)
predicted_price = np.expm1(predicted_log_price)  # Inverse of log
print(f"Predicted Selling Price: {predicted_price[0]:.2f}")
```

```
Model package loaded from 'best_model.pkl'
Package contains: dict_keys(['model', 'preprocessor', 'features',
'feature_config'])
Predicted Selling Price: 2394751.21
```

1.4 Task 3. Deployment

Github Link: https://github.com/dniamsaard4codework/A2-Predicting-Car-Price.git

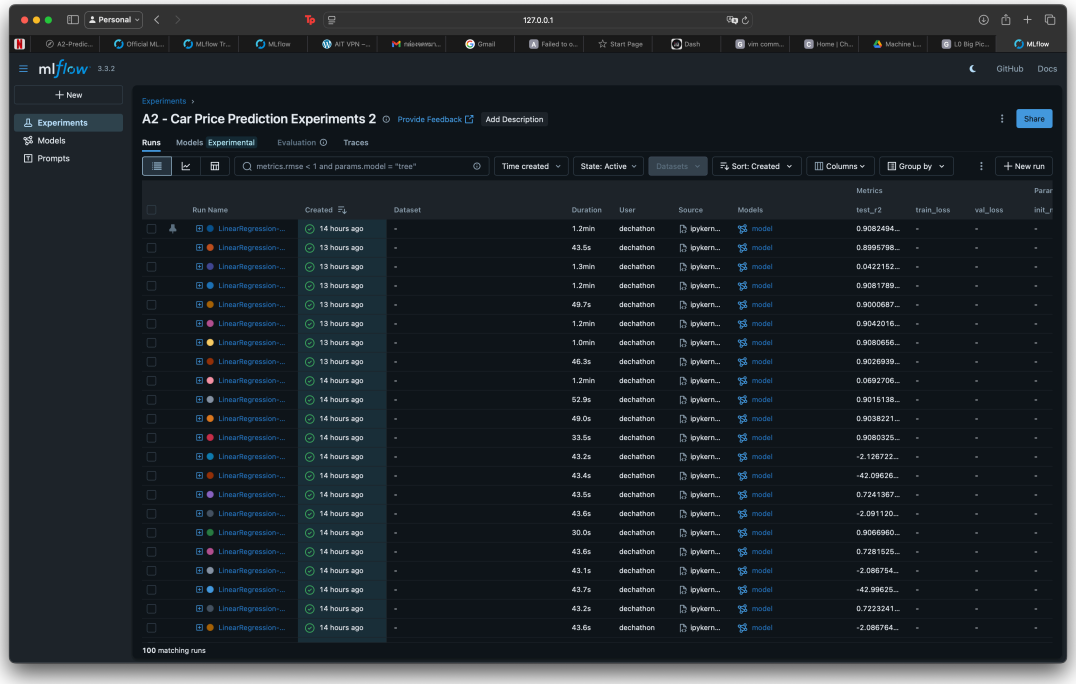
Website: https://st126235.ml.brain.cs.ait.ac.th/

1.5 Experiment Report - A2 Predicting Car Price

1.5.1 Discussion

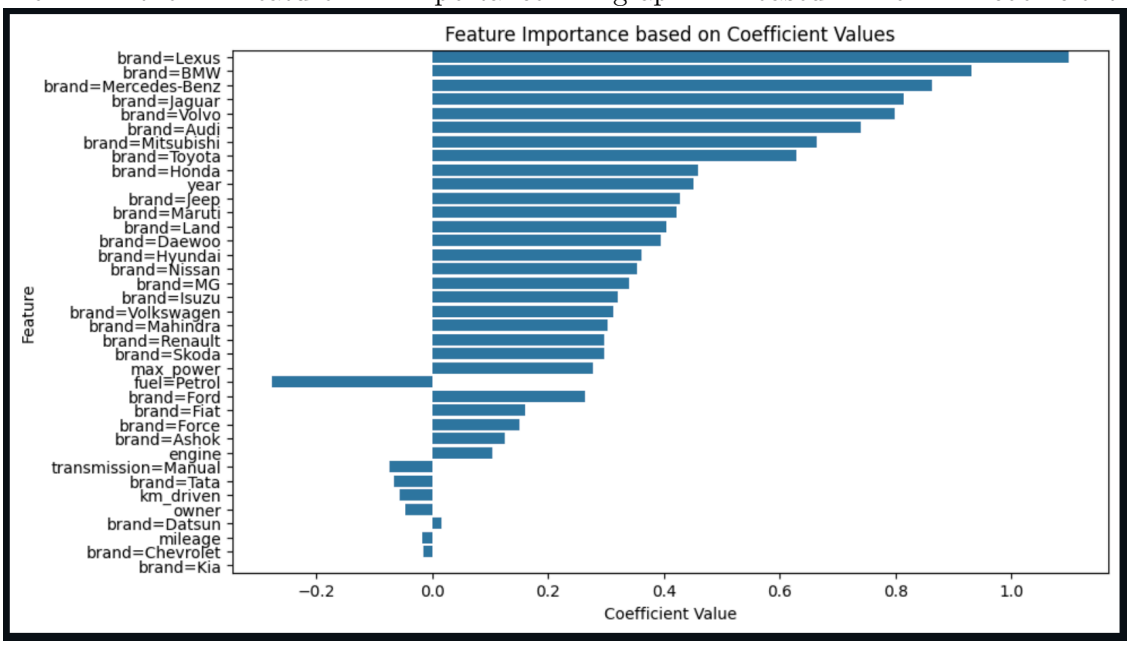
In this assignment, I have implemented a custom Linear Regression model from scratch. The implementation can support the different type of regularixation (Lasso, Ridge, Normal), different optimization methods (batch, mini-batch, stochastic gradient descent), weight initialization (zeros, Xavier), momentum (use it or not), and polynomial feature expansion.

All of parameters configuration has been tracked by using MLFlow which allowed systematic comparison of model configurations.



1.5.2 Observation

From the feature importance graph based on coefficient value



Positive values indicate features that increase the predicted car price, while negative values indicate features that lower it. The feature that the most important to the car price is brand. Premium brands like Lexus, BMW, Mercedes-Benz, Jaguar, Volvo have the strongest positive impact on price. Features like *fuel type (Petrol)* and *manual transmission* are associated with lower predicted prices. Numerical features such as *year* and *max_power* also contribute significantly to higher

car prices. Mileage and number of owners have only a minor negative effect. THe best model in this experiment (based on R-squared) is Normal Linear Regression with stochastic gradient descent, learning rate = 0.001, zeros weight initialization, and not using momentum (Run id: fc34db3ab71340019302c4c88d4f4f29). This model got the test set evaluation as table below

Metric	Value
MSE	0.065339
R2	0.908249

Train Loss graph

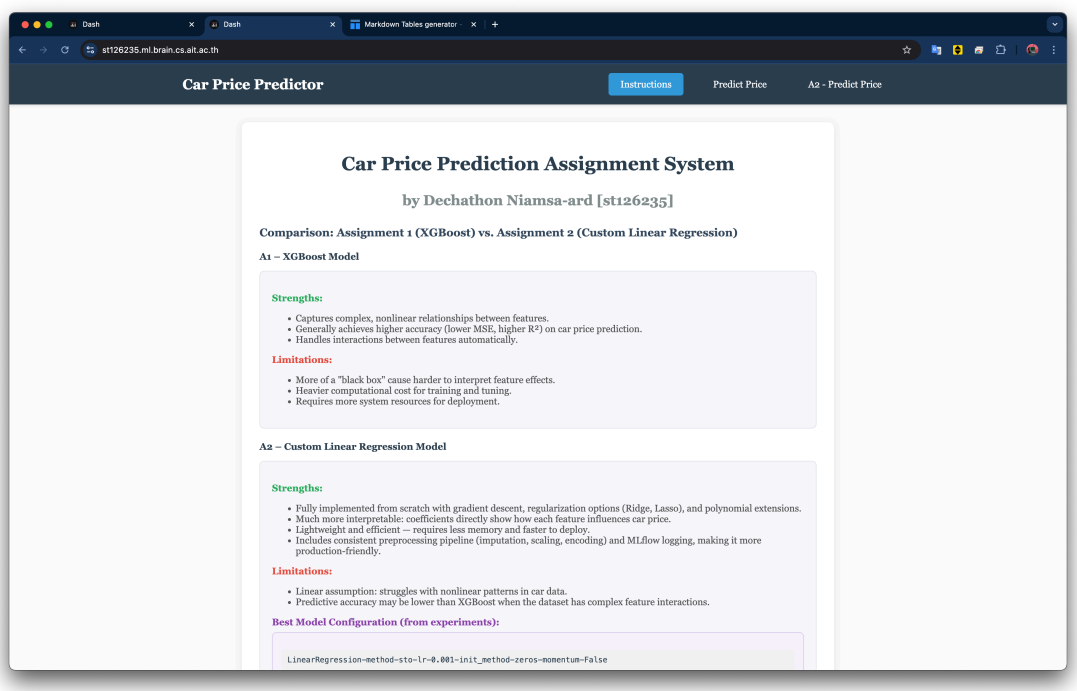
Validate Loss graph

Validate R-squared

- Top 15 models based on test set R-squared

Run Name	test_r2	test_mse
LinearRegression–sto–lr=0.001–zeros–momentum=False	0.908249	0.065339
LinearRegression–sto–lr=0.001–xavier–momentum=False	0.908179	0.065389
LinearRegression–sto–lr=0.01–xavier–momentum=True	0.908066	0.065470
LinearRegression–sto–lr=0.01–zeros–momentum=True	0.908032	0.065494
LinearRegression–mini–lr=0.01–xavier–momentum=False	0.906696	0.066646
LinearRegression–mini–lr=0.01–zeros–momentum=False	0.905989	0.066948
LinearRegression–sto–lr=0.01–xavier–momentum=False	0.904202	0.068222
LinearRegression–sto–lr=0.01–zeros–momentum=False	0.903822	0.068492
LinearRegression–sto–lr=0.0001–zeros–momentum=False	0.902639	0.069296
LinearRegression–sto–lr=0.001–zeros–momentum=True	0.901513	0.070136
LinearRegression–sto–lr=0.001–xavier–momentum=True	0.900069	0.071165
LinearRegression–sto–lr=0.0001–xavier–momentum=False	0.899580	0.071513
Lasso–sto–lr=0.001–xavier–momentum=False	0.813635	0.132718
Lasso–sto–lr=0.001–zeros–momentum=False	0.813387	0.132895
Lasso–mini–lr=0.01–xavier–momentum=False	0.812743	0.133353

1.5.3 Website



Here is the website for my model inference: https://st126235.ml.brain.cs.ait.ac.th/

1.5.4 Conclusion

In summary, this assignment demonstrated the effectiveness of a custom Linear Regression model built from scratch with added flexibility in regularization, optimization methods, initialization strategies, and momentum. Through systematic experiments tracked with MLflow, I found that:

- Normal Linear Regression with stochastic gradient descent, lr=0.001, zero initialization, and no momentum achieved the best performance with MSE = 0.0653 and R^2 = 0.9082.

- Brand, year, and engine power emerged as the most influential features in predicting car prices, while fuel type (Petrol) and manual transmission negatively impacted prices.

- Lasso regression provided competitive results by enforcing sparsity, while Ridge regression and polynomial extensions were less effective in this dataset.

- Compared to Assignment 1 (XGBoost), this custom model is more interpretable and lightweight, although XGBoost generally had higher predictive power.

Finally, the trained model was successfully deployed on the provided server with a web interface, completing the full pipeline from implementation to deployment. This highlights not only the technical aspects of model building but also the importance of experiment tracking, interpretability, and real-world deployment.