```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
#reading the datset
df=pd.read_csv('/content/food_wastage_data.csv')
df
```

	Type of Food	Number of Guests	Event Type	Quantity of Food	Storage Conditions	Purchase History	Seasonality	Preparation Method	Geographical Location	Pricing	Wastage Food Amount
0	Meat	310	Corporate	450	Refrigerated	Regular	All Seasons	Buffet	Urban	Low	25
1	Meat	400	Birthday	500	Room Temperature	Regular	Winter	Buffet	Suburban	High	40
2	Vegetables	302	Birthday	371	Refrigerated	Regular	Summer	Buffet	Suburban	Low	27
3	Meat	491	Birthday	497	Refrigerated	Regular	All Seasons	Finger Food	Rural	High	32
4	Meat	300	Corporate	400	Refrigerated	Regular	Winter	Finger Food	Urban	Moderate	25
...	...	...	...	...	...	...	...	...	...	...	...
1777	Baked Goods	310	Corporate	350	Room Temperature	Regular	Summer	Finger Food	Urban	High	35
1778	Baked Goods	284	Social Gathering	443	Room Temperature	Regular	Winter	Buffet	Rural	Low	32
1779	Fruits	220	Wedding	300	Room Temperature	Regular	All Seasons	Finger Food	Urban	Moderate	15
1780	Fruits	250	Wedding	350	Room Temperature	Regular	All Seasons	Finger Food	Rural	Moderate	20
1781	Baked Goods	400	Wedding	500	Room Temperature	Regular	Winter	Sit-down Dinner	Rural	High	45

1782 rows × 11 columns

```
df.head()
#displaying first five rows of the dataset
```

	Type of Food	Number of Guests	Event Type	Quantity of Food	Storage Conditions	Purchase History	Seasonality	Preparation Method	Geographical Location	Pricing	Wastage Food Amount
0	Meat	310	Corporate	450	Refrigerated	Regular	All Seasons	Buffet	Urban	Low	25
1	Meat	400	Birthday	500	Room Temperature	Regular	Winter	Buffet	Suburban	High	40
2	Vegetables	302	Birthday	371	Refrigerated	Regular	Summer	Buffet	Suburban	Low	27
3	Meat	491	Birthday	497	Refrigerated	Regular	All Seasons	Finger Food	Rural	High	32
4	Meat	300	Corporate	400	Refrigerated	Regular	Winter	Finger Food	Urban	Moderate	25

```
# Display basic information about the dataset
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1782 entries, 0 to 1781
Data columns (total 11 columns):
 #   Column                Non-Null Count  Dtype 
---  ------                --------------  ----- 
 0   Type of Food          1782 non-null   object
 1   Number of Guests      1782 non-null   int64 
 2   Event Type            1782 non-null   object
 3   Quantity of Food      1782 non-null   int64 
 4   Storage Conditions    1782 non-null   object
 5   Purchase History      1782 non-null   object
 6   Seasonality           1782 non-null   object
 7   Preparation Method    1782 non-null   object
 8   Geographical Location 1782 non-null   object
 9   Pricing               1782 non-null   object
 10  Wastage Food Amount   1782 non-null   int64 
dtypes: int64(3), object(8)
memory usage: 153.3+ KB
```

```
# Display descriptive statistics of the dataset
df.describe()
```

	Number of Guests	Quantity of Food	Wastage Food Amount
count	1782.000000	1782.000000	1782.000000
mean	317.804714	411.125701	28.536476
std	67.829658	65.204674	10.461317
min	207.000000	280.000000	10.000000
25%	267.000000	350.000000	20.000000
50%	302.000000	400.000000	26.500000
75%	350.000000	480.000000	35.000000
max	491.000000	500.000000	63.000000

```
# List all columns in the dataset
print(df.columns)
```

```
Index(['Type of Food', 'Number of Guests', 'Event Type', 'Quantity of Food',
       'Storage Conditions', 'Purchase History', 'Seasonality',
       'Preparation Method', 'Geographical Location', 'Pricing',
       'Wastage Food Amount'],
      dtype='object')
```

```
import pandas as pd
from sklearn.model_selection import train_test_split
import tensorflow as tf
from sklearn.preprocessing import OneHotEncoder

# ----> Load your data into a pandas DataFrame <----
# Replace 'your_data.csv' with the actual path to your data file
df = pd.read_csv('/content/food_wastage_data.csv')

# Define features (X) and target (y)
features = ['Type of Food', 'Number of Guests', 'Event Type', 'Quantity of Food',
            'Storage Conditions', 'Purchase History', 'Seasonality',
            'Preparation Method', 'Geographical Location', 'Pricing']
target = 'Wastage Food Amount'
X = df[features]
y = df[target]
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42) # Adjust test_size and random_state as needed


categorical_features = ['Type of Food', 'Event Type', 'Storage Conditions', 'Purchase History', 'Seasonality', 'Preparation Method', 'Geographical Location']

# Now you can fit the encoder using X_train
encoder = OneHotEncoder(sparse_output=False, handle_unknown='ignore')
encoder.fit(X_train[categorical_features])

# ----> Convert categorical features to numerical using one-hot encoding <----
# Create a OneHotEncoder instance
encoder = OneHotEncoder(sparse_output=False, handle_unknown='ignore') # sparse=False for dense output

# Fit the encoder on the categorical features and transform them
X_encoded = encoder.fit_transform(X.select_dtypes(include=['object'])) # Select only object (string) columns

# Create a new DataFrame with the encoded features
X_encoded_df = pd.DataFrame(X_encoded, columns=encoder.get_feature_names_out(X.select_dtypes(include=['object']).columns))

# Concatenate the encoded features with the numerical features
X = pd.concat([X.select_dtypes(exclude=['object']), X_encoded_df], axis=1)

# Split data into training and testing sets (e.g., 80% train, 20% test)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

```
model = LinearRegression() # Initialize the model
model.fit(X_train, y_train) # Train the model

# Make predictions on the test set
y_pred = model.predict(X_test)
```

```
from sklearn.metrics import mean_squared_error, r2_score
mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)
print(f"Mean Squared Error: {mse}")
print(f"R-squared: {r2}")
```

```
Mean Squared Error: 25.256443409844618
R-squared: 0.7563478558273058
```

```
import tensorflow as tf
# Create a sequential model
model = tf.keras.models.Sequential([
```

```
    tf.keras.layers.Dense(64, activation='relu', input_shape=(X_train.shape[1],)),
    tf.keras.layers.Dense(32, activation='relu'),
    tf.keras.layers.Dense(1)  # Output layer for regression
])
```

```
/usr/local/lib/python3.10/dist-packages/keras/src/layers/core/dense.py:87: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer i
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
# Compile the model
model.compile(optimizer='adam', loss='mse')
```

```
model.fit(X_train, y_train, epochs=10, batch_size=32) # Use y_train instead of X_test
```

```
Epoch 1/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 4s 7ms/step - loss: 294.9199
Epoch 2/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 84.1812
Epoch 3/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - loss: 68.6069
Epoch 4/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 65.7516
Epoch 5/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 5ms/step - loss: 64.8484
Epoch 6/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 56.0999
Epoch 7/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 58.2486
Epoch 8/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 60.8811
Epoch 9/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 56.8592
Epoch 10/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 50.7856
<keras.src.callbacks.history.History at 0x7d5cb9205f00>
```

```
history = model.fit(X_train, y_train, epochs=10, validation_data=(X_test, y_test))

# Access training and validation metrics from the history object
train_loss = history.history['loss']
val_loss = history.history['val_loss']
```

```
Epoch 1/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 12ms/step - loss: 53.6898 - val_loss: 49.3179
Epoch 2/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - loss: 53.1741 - val_loss: 49.0442
Epoch 3/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 6ms/step - loss: 49.8029 - val_loss: 48.9363
Epoch 4/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 9ms/step - loss: 47.8341 - val_loss: 49.8998
Epoch 5/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 53.3341 - val_loss: 44.8269
Epoch 6/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 45.9910 - val_loss: 43.3184
Epoch 7/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 6ms/step - loss: 48.0845 - val_loss: 43.4610
Epoch 8/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 8ms/step - loss: 46.3796 - val_loss: 43.6155
Epoch 9/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - loss: 42.1517 - val_loss: 39.2912
Epoch 10/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 39.4412 - val_loss: 41.3337
```

```
loss = model.evaluate(X_test, y_test, verbose=0)

# Print the loss
print("Loss:", loss)
```

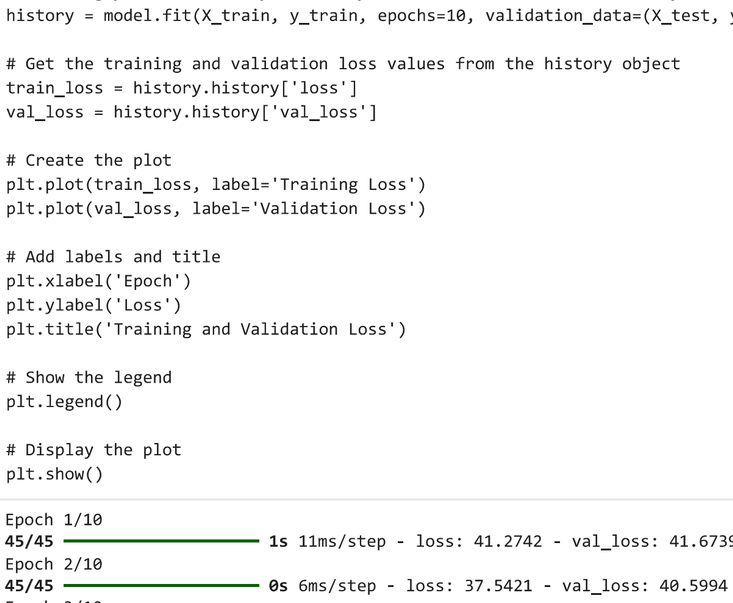
```
Loss: 41.33369064331055
```

```
!pip install matplotlib
```

```
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-packages (3.8.0)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (1.3.1)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (4.55.0)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (1.4.7)
Requirement already satisfied: numpy<2,>=1.21 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (1.26.4)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (24.2)
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (11.0.0)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (3.2.0)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (2.8.2)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.7->matplotlib) (1.16.0)
```

```
import matplotlib.pyplot as plt

# Assuming you have already trained your model and stored the history in the 'history' variable:
history = model.fit(X_train, y_train, epochs=10, validation_data=(X_test, y_test))

# Get the training and validation loss values from the history object
train_loss = history.history['loss']
val_loss = history.history['val_loss']

# Create the plot
plt.plot(train_loss, label='Training Loss')
plt.plot(val_loss, label='Validation Loss')

# Add labels and title
plt.xlabel('Epoch')
plt.ylabel('Loss')
plt.title('Training and Validation Loss')

# Show the legend
plt.legend()

# Display the plot
plt.show()
```

```
Epoch 1/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 11ms/step - loss: 41.2742 - val_loss: 41.6739
Epoch 2/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 37.5421 - val_loss: 40.5994
Epoch 3/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 3ms/step - loss: 37.3742 - val_loss: 38.7562
Epoch 4/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 39.5091 - val_loss: 33.9213
Epoch 5/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 5ms/step - loss: 36.8506 - val_loss: 35.9097
Epoch 6/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 34.7568 - val_loss: 32.7334
Epoch 7/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - loss: 35.2681 - val_loss: 31.4879
Epoch 8/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - loss: 31.5657 - val_loss: 31.8414
Epoch 9/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 9ms/step - loss: 35.8495 - val_loss: 32.2903
Epoch 10/10
45/45 ━━━━━━━━━━━━━━━━━━━━ 1s 7ms/step - loss: 32.3698 - val_loss: 29.5858
```




```
import pandas as pd
from sklearn.preprocessing import OneHotEncoder
def predict_wastage(encoder):
    """Predicts the target variable (food wastage) based on user input."""
    input_data = {}
    for attribute in ['Type of Food', 'Number of Guests', 'Event Type', 'Quantity of Food', 'Storage Conditions',
                      'Purchase History', 'Seasonality', 'Preparation Method', 'Geographical Location', 'Pricing']:
        input_data[attribute] = input(f"Enter {attribute}: ")
    input_df = pd.DataFrame([input_data])
    categorical_features = [col for col in ['Type of Food', 'Event Type', 'Storage Conditions', 'Purchase History',
```

```
                                        'Seasonality', 'Preparation Method', 'Geographical Location']
                            if col in X_train.columns]
    numerical_features = [col for col in ['Number of Guests', 'Quantity of Food'] if col in X_train.columns]
    encoded_data = encoder.transform(input_df[categorical_features])
    encoded_df = pd.DataFrame(encoded_data, columns=encoder.get_feature_names_out(categorical_features))
    input_df = pd.concat([input_df[numerical_features].astype(float), encoded_df], axis=1)
    input_df = input_df.reindex(columns=X_train.columns, fill_value=0)
    predicted_wastage = model.predict(input_df)[0]
    return predicted_wastage
encoder = OneHotEncoder(sparse_output=False, handle_unknown='ignore')
encoder.fit(X_train[[col for col in categorical_features if col in X_train.columns]])
predicted_wastage = predict_wastage(encoder)
print("Predicted Wastage Food Amount:", predicted_wastage)
```

```
Enter Type of Food: Meat
Enter Number of Guests: 100
Enter Event Type: Birthday
Enter Quantity of Food: 200
Enter Storage Conditions: Refrigerator
Enter Purchase History: Regular
Enter Seasonality: All seasons
Enter Preparation Method: Buffet
Enter Geographical Location: Rural
Enter Pricing: low
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 53ms/step
Predicted Wastage Food Amount: [12.116896]
```