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import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score

# Sample monthly sales data
data = {
    "Month": [1, 2, 3, 4, 5, 6, 7, 8],
    "AdvertisingSpend": [2000, 2500, 3000, 3500, 4000, 4200, 4500,
4800],
    "Sales": [15000, 18000, 21000, 25000, 28000, 30000, 33000, 36000]
}

df = pd.DataFrame(data)
df

{"summary": "{\n  \"name\": \"df\",\n  \"rows\": 8,\n  \"fields\": [\n    {\n      \"column\": \"Month\",\n      \"properties\": {\n        \"dtype\": \"number\",\n        \"std\": 2,\n        \"min\": 1,\n        \"max\": 8,\n        \"num_unique_values\": 8,\n        \"samples\": [\n          2,\n          6,\n          1\n        ],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n      }\n    },\n    {\n      \"column\": \"AdvertisingSpend\",\n      \"properties\": {\n        \"dtype\": \"number\",\n        \"std\": 992,\n        \"min\": 2000,\n        \"max\": 4800,\n        \"num_unique_values\": 8,\n        \"samples\": [\n          2500,\n          4200,\n          2000\n        ],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n      }\n    },\n    {\n      \"column\": \"Sales\",\n      \"properties\": {\n        \"dtype\": \"number\",\n        \"std\": 7363,\n        \"min\": 15000,\n        \"max\": 36000,\n        \"num_unique_values\": 8,\n        \"samples\": [\n          18000,\n          30000,\n          15000\n        ],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n      }\n    }\n  ]\n}", "type": "dataframe", "variable_name": "df"}

X = df[["Month", "AdvertisingSpend"]]
y = df["Sales"]

X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.25, random_state=42
)

model = LinearRegression()
model.fit(X_train, y_train)

LinearRegression()

y_pred = model.predict(X_test)

```

```
print("Mean Squared Error:", mean_squared_error(y_test, y_pred))
print("R2 Score:", r2_score(y_test, y_pred))
```

Mean Squared Error: 102278.39088643581
R2 Score: 0.9971589335864879

```
# Predict sales for a future month
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```
future_data = pd.DataFrame(
    [[9, 5000]],
    columns=["Month", "AdvertisingSpend"]
)
```

```
future_sales = model.predict(future_data)
print("Predicted Future Sales:", int(future_sales[0]))
```

Predicted Future Sales: 38339