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W25-PAK-INP-AI-16

5 experiments linear regression

```python
import numpy as np

# Generate synthetic data
np.random.seed(42)
X = np.random.rand(100, 1) * 2  # Random numbers between 0 a
Y = 2.5 * X + np.random.randn(100, 1)  # Y = 2.5X + noise

# Initialize parameters
m = 0  # Initial slope
c = 0  # Initial intercept
learning_rate = 0.01  # Step size for gradient descent
epochs = 1000  # Number of iterations

# Gradient Descent Algorithm
for _ in range(epochs):
    Y_pred = m * X + c  # Predicted Y
    error = Y - Y_pred  # Error
    m_gradient = -2 * np.sum(X * error) / len(X)  # Derivati
    c_gradient = -2 * np.sum(error) / len(X)  # Derivative w
    m -= learning_rate * m_gradient  # Update m
    c -= learning_rate * c_gradient  # Update c

print(f"Slope (m): {m}")
print(f"Intercept (c): {c}")

# Predictions
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

```
PS D:\Doc\AIC\Assignments\Python\16th_Assignment_AIC> & C:/Users/Global...
ression_model.py
Slope (m): 2.453929219773055
Intercept (c): 0.21570421576682772
PS D:\Doc\AIC\Assignments\Python\16th_Assignment_AIC> & C:/Users/Global...
ression_model.py
Slope (m): 2.2404863820002237
Intercept (c): 0.24865088948352296
```

Figure 1 — Linear Regression From Scratch

```python
import numpy as np

# Generate synthetic data
np.random.seed(42)
X = np.random.rand(100, 1) * 22  # Random
Y = 4 * X + np.random.randn(100, 1)  # Y =

# Initialize parameters
m = 0  # Initial slope
c = 0  # Initial intercept
learning_rate = 0.01  # Step size for grad
epochs = 1000  # Number of iterations

# Gradient Descent Algorithm
for _ in range(epochs):
    Y_pred = m * X + c  # Predicted Y
    error = Y - Y_pred  # Error
    m_gradient = -2 * np.sum(X * error) /
    c_gradient = -2 * np.sum(error) / len(
    m -= learning_rate * m_gradient  # Upd
    c -= learning_rate * c_gradient  # Upd

print(f"Slope (m): {m}")
print(f"Intercept (c): {c}")

# Predictions
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

```
PS D:\Doc\AIC\Assignments\Python\16th_Assignment_AIC
ression_model.py
Slope (m): 3.953796285427416
Intercept (c): 0.21656912023069955
PS D:\Doc\AIC\Assignments\Python\16th_Assignment_AIC
ression_model.py
Slope (m): -1.42734035950752e+302
Intercept (c): -9.900935683646844e+300
```

Figure 1 — Linear Regression From Scratch

EXPLORER

16TH_ASSIGNMENT_AIC
- Images
- Regression_model.py

Regression_model.py > ...

```python
import numpy as np

# Generate synthetic data
np.random.seed(42)
X = np.random.rand(100, 1) * 1   # Random numbers
Y = 40 * X + np.random.randn(100, 1)   # Y = 2.5X

# Initialize parameters
m = 0   # Initial slope
c = 0   # Initial intercept
learning_rate = 0.01   # Step size for gradient des
epochs = 1000   # Number of iterations

# Gradient Descent Algorithm
for _ in range(epochs):
    Y_pred = m * X + c   # Predicted Y
    error = Y - Y_pred   # Error
    m_gradient = -2 * np.sum(X * error) / len(X)
    c_gradient = -2 * np.sum(error) / len(X)   # D
    m -= learning_rate * m_gradient   # Update m
    c -= learning_rate * c_gradient   # Update c

print(f"Slope (m): {m}")
print(f"Intercept (c): {c}")

# Predictions
```

Figure 1

Linear Regression From Scratch

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

```
PS D:\Doc\AIC\Assignments\Python\16th_Assignment_AIC> & C:/U
ression_model.py
Slope (m): 8.920909055725486
Intercept (c): 0.224562246595268
PS D:\Doc\AIC\Assignments\Python\16th_Assignment_AIC> & C:/U
ression_model.py
Slope (m): 31.925592819842194
Intercept (c): 4.068049374482197
```

OUTLINE

TIMELINE