Linear Regression model 1

January 12, 2026

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import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error, r2_score, mean_absolute_error
from sklearn.linear_model import LinearRegression

# Load dataset
df = pd.read_csv("ncr_ride_bookings.csv")

# Convert Date and Time
df['Date'] = pd.to_datetime(df['Date'])
df['year'] = df['Date'].dt.year
df['month'] = df['Date'].dt.month
df['day'] = df['Date'].dt.day

df['Time'] = pd.to_timedelta(df['Time'])
df['seconds'] = df['Time'].dt.total_seconds().astype(int)

# Select relevant columns
df = df[['year', 'month', 'day', 'seconds', 'Booking Status', 'Vehicle Type',
         'Pickup Location', 'Drop Location', 'Avg VTAT', 'Avg CTAT',
         'Booking Value', 'Ride Distance', 'Driver Ratings', 'Customer Rating',
         'Payment Method']]

# Handle missing values
df.fillna(df.median(numeric_only=True), inplace=True)

# Encode categorical variables
x_categorical = df.select_dtypes(include=['object']).apply(lambda col:␣
 ↪LabelEncoder().fit_transform(col))
x_numerical = df.select_dtypes(exclude=['object'])
X = pd.concat([x_numerical, x_categorical], axis=1).drop(columns=['Ride␣
 ↪Distance'])
y = df['Ride Distance'].values
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# Train-test split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, 
 random_state=42)

# Linear Regression
regressor = LinearRegression()
regressor.fit(X_train, y_train)

# Predictions
predictions = regressor.predict(X_test)

# Evaluation
mse = mean_squared_error(y_test, predictions)
rmse = np.sqrt(mse)
mae = mean_absolute_error(y_test, predictions)
r2 = r2_score(y_test, predictions)

print(f"Mean Squared Error: {mse:.2f}")
print(f"Root Mean Squared Error: {rmse:.2f}")
print(f"Mean Absolute Error: {mae:.2f}")
print(f"R-squared: {r2:.4f}")

# ========================
# Actual vs Predicted Scatter
# ========================
plt.figure(figsize=(8,6))
sns.scatterplot(x=y_test, y=predictions, alpha=0.6, color="blue")
plt.plot([y_test.min(), y_test.max()], [y_test.min(), y_test.max()], 'r--', 
 lw=2)
plt.title("Actual vs Predicted Ride Distance (Linear Regression)", fontsize=14)
plt.xlabel("Actual Ride Distance")
plt.ylabel("Predicted Ride Distance")
plt.show()

# ========================
# Residual Plot
# ========================
residuals = y_test - predictions
plt.figure(figsize=(8,6))
sns.scatterplot(x=predictions, y=residuals, alpha=0.6, color="purple")
plt.axhline(0, color='red', linestyle='--', lw=2)
plt.title("Residuals vs Predictions", fontsize=14)
plt.xlabel("Predicted Ride Distance")
plt.ylabel("Residuals")
plt.show()
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Mean Squared Error: 130.28
Root Mean Squared Error: 11.41
Mean Absolute Error: 8.52
R-squared: 0.0177
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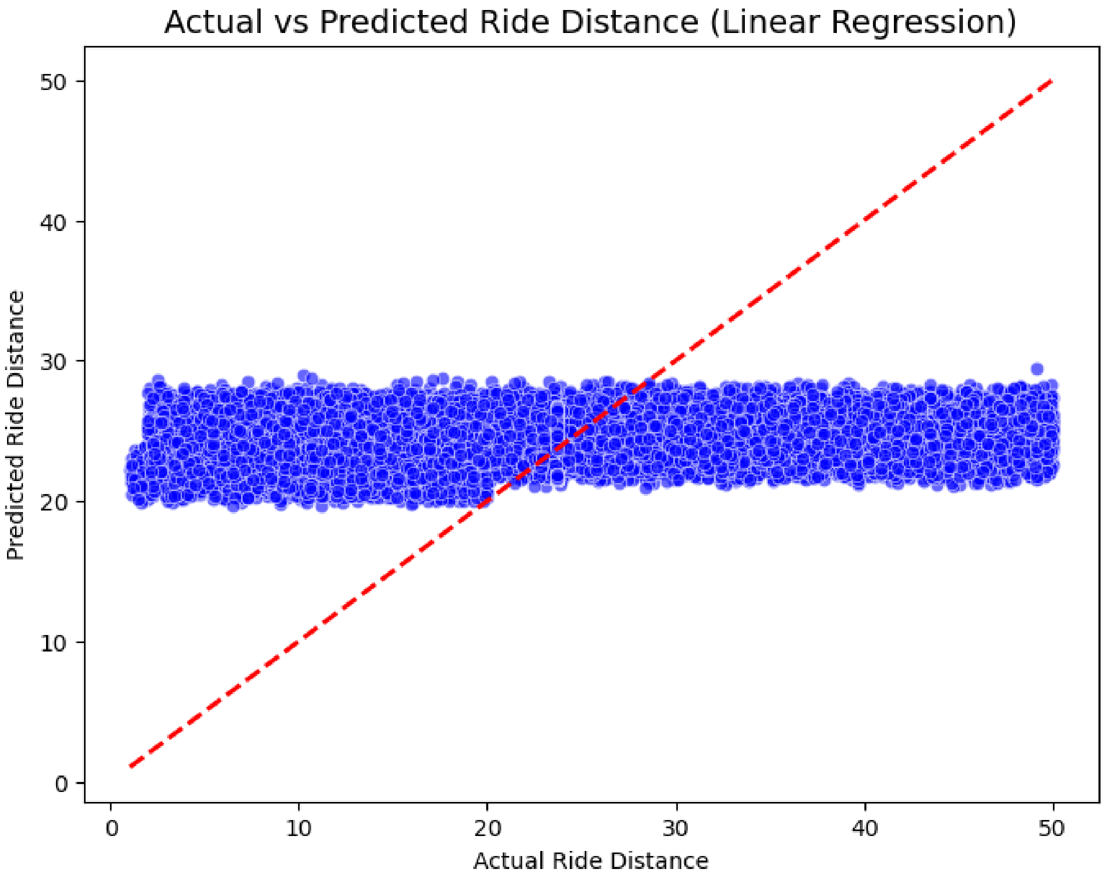

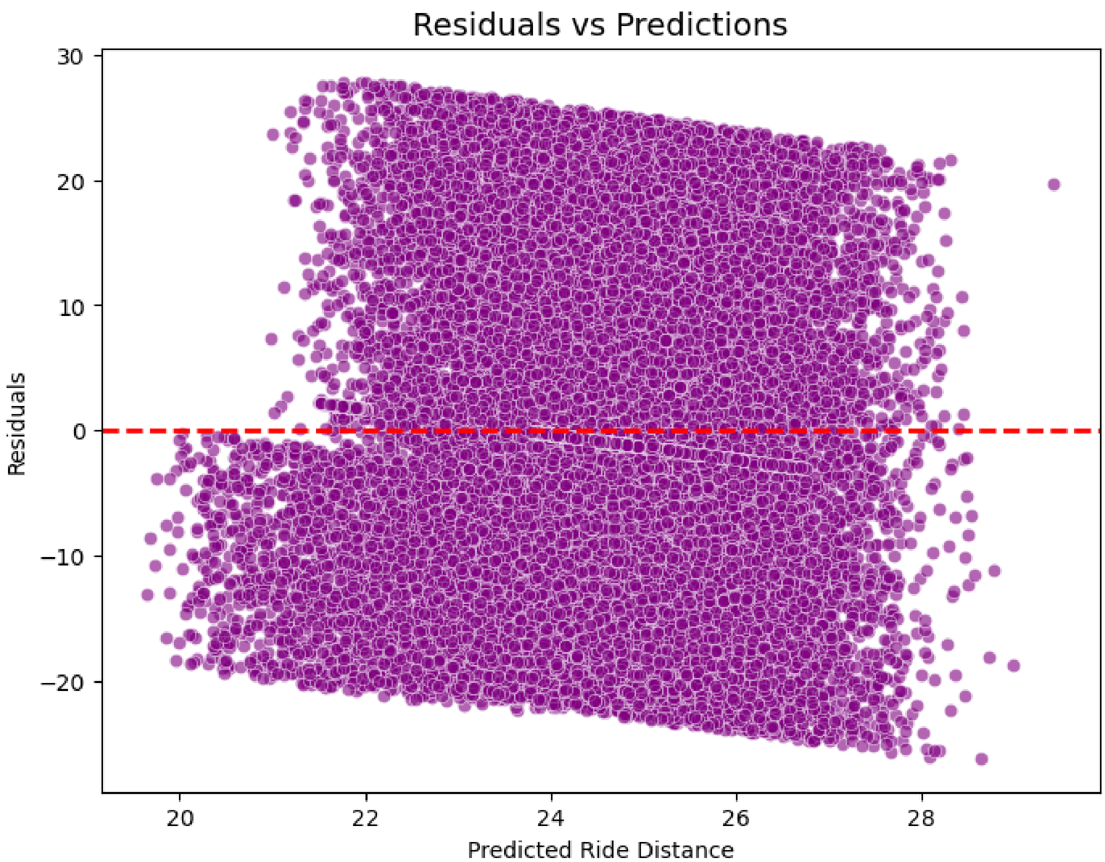

Residuals vs Predictions
30
20
10
0
−10
−20
Residuals
20
22
24
26
28
Predicted Ride Distance


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