PRAKTIKUM FISIKA KOMPUTASI

MACHINE LEARNING DEGRESI POLINOMIAL

KODE PROGRAM

```python
import numpy as np
from sklearn.linear_model import LinearRegression

x = [[2], [4], [6], [8], [10], [12], [14], [16], [18], [20]]
y = [1, 4, 7, 10, 13, 16, 19, 21, 24, 27]

regr = LinearRegression().fit(x,y)
regr.score(x,y)

predict = np.array([[6]])

print ("Prediksi")
print ("Input = ", predict)
print ("Output = ", regr.predict(predict))
```

```
Prediksi
Input =  [[6]]
Output =  [7.01818182]
```

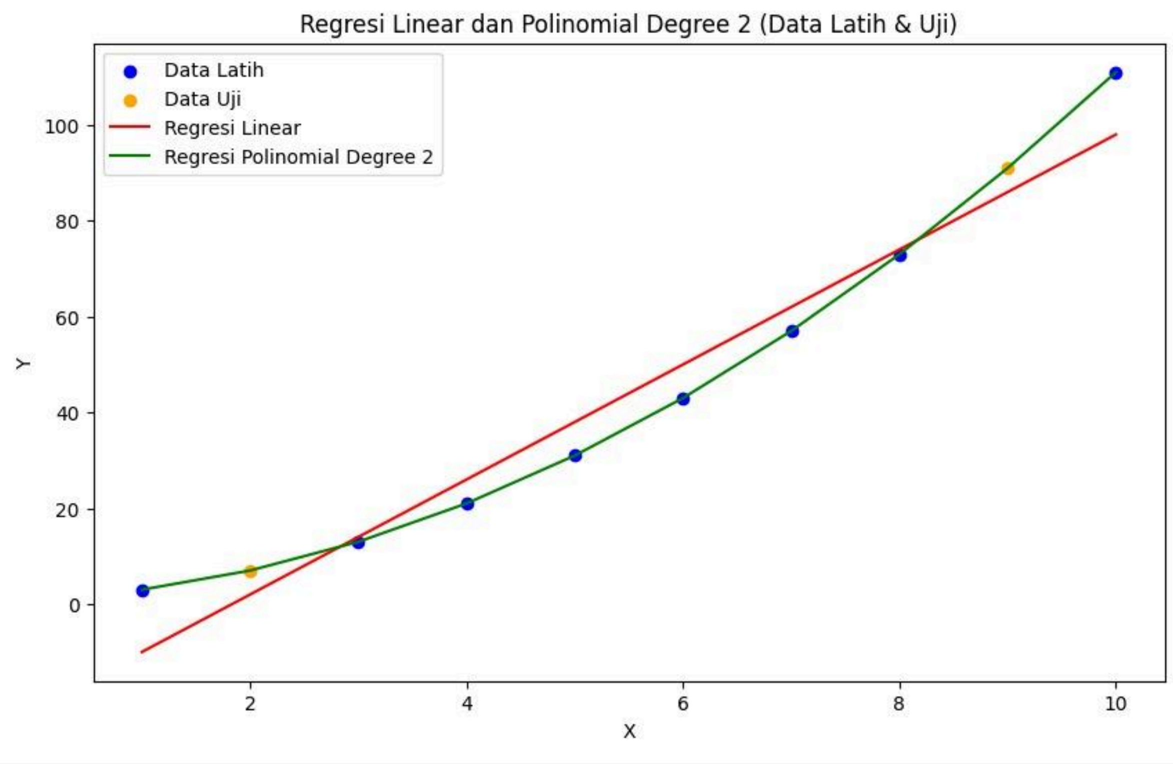
```python
from sklearn.preprocessing import PolynomialFeatures
from sklearn import linear_model
import numpy as np

x = [[0], [4], [8], [12], [16], [20], [24], [28], [32], [36]]
y = [0, 3, 8, 15, 24, 35, 48, 63, 80, 99]

predict = np.array ([[12]])
poly = PolynomialFeatures(degree=2)
x_= poly.fit_transform(x)
predict_ = poly.fit_transform(predict)
regr = linear_model.LinearRegression()
regr.fit(x_, y)

print ("Prediksi")
print ("Input = ", predict)
print ("Output = ", regr.predict(predict_))
```

```
Prediksi
```

```
Input =  [[12]]
Output =  [15.]
```

```python
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.preprocessing import PolynomialFeatures
from sklearn.metrics import mean_squared_error
from sklearn.model_selection import train_test_split

np.random.seed(0)
X = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
Y = [3, 7, 13, 21, 31, 43, 57, 73, 91, 111]

# Reshape X to a 2D array before splitting
X = np.array(X).reshape(-1, 1)  # Reshape X to have one column

X_train, X_test, Y_train, Y_test = train_test_split(X, Y,
test_size=0.2, random_state=42)

linear_model = LinearRegression()
linear_model.fit(X_train, Y_train)

poly_features_2 = PolynomialFeatures(degree=2)
X_train_poly_2 = poly_features_2.fit_transform(X_train)

poly_model_2 = LinearRegression()
poly_model_2.fit(X_train_poly_2, Y_train)

X_sorted = np.sort(X, axis=0)
Y_pred_linear_all = linear_model.predict(X_sorted)
Y_pred_poly_2_all =
poly_model_2.predict(poly_features_2.transform(X_sorted))

mse_linear = mean_squared_error(Y_test, linear_model.predict(X_test))
mse_poly_2 = mean_squared_error(Y_test,
poly_model_2.predict(poly_features_2.transform(X_test)))

print(f"Mean Squared Error (Linear): {mse_linear:.2f}")
print(f"Mean Squared Error (Polynomial Degree 2): {mse_poly_2:.2f}")

plt.figure(figsize=(10, 6))
plt.scatter(X_train[:, 0], Y_train, color='blue', label='Data Latih')
# Access the first column for plotting
plt.scatter(X_test[:, 0], Y_test, color='orange', label='Data Uji')
# Access the first column for plotting
plt.plot(X_sorted[:, 0], Y_pred_linear_all, color='red',
label='Regresi Linear') # Access the first column for plotting
plt.plot(X_sorted[:, 0], Y_pred_poly_2_all, color='green',
label='Regresi Polinomial Degree 2') # Access the first column for
plotting
plt.xlabel('X')
plt.ylabel('Y')
plt.title('Regresi Linear dan Polinomial Degree 2 (Data Latih &
Uji)')
plt.legend()
plt.show()
```

```
Mean Squared Error (Linear): 25.00
Mean Squared Error (Polynomial Degree 2): 0.00
```



PENJELASAN

Dari kode program yang dibuat, terdapat dua prediksi pada input dan output. nilai prediksi pada regresi linear dan regresi polinomial memiliki jumlah yang berbeda karena berdasarkan database yang berbeda, hal ini juga mendapatkan nilai MSE yang berbeda pada linear dan polinomial. Terdapat grafik yang didapatkan pada pengujian tersebut bahwa titk pada data latih berjumlah lebih banyak dibandingkan dengan data uji.