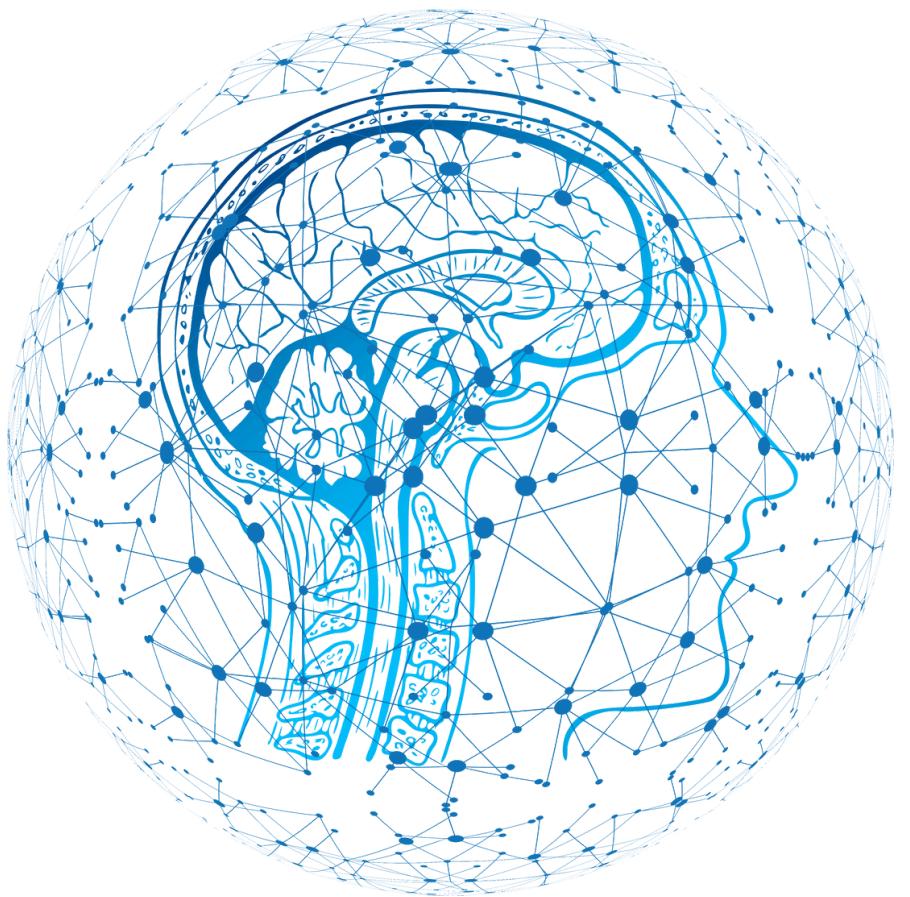




Data Series 16.0



AI
MACHINE LEARNING



ISI Topik

01

Summary of AI Machine Learning day 2 material

02

Assignment for random forest regressor

03

conclusion



What is AI Machine Learning?

Machine Learning (ML) is a branch of Artificial Intelligence (AI) that allows systems to learn from data without needing to be explicitly programmed. One technique in ML is Deep Learning (DL), which uses neural networks to analyze complex data. ML is at the core of many modern AI applications, such as prediction, pattern recognition, etc.

Example of machine learning

- Automatic Translation
- Medical Diagnosis
- Email Spam Filtering
- Virtual personal Assistant
- Image, text, and speech Recognition
- Prediction

Category of Machine Learning

1. **Unsupervised Learning**
2. **Supervised Learning**
3. **Reinforcement**



Machine Learning Proses

- Preprocessing
- Training
- Validation
- Testing apa model underfitting, overfitting atau ideal balance?
- model

What is Overfitting/Underfitting

Underfitting

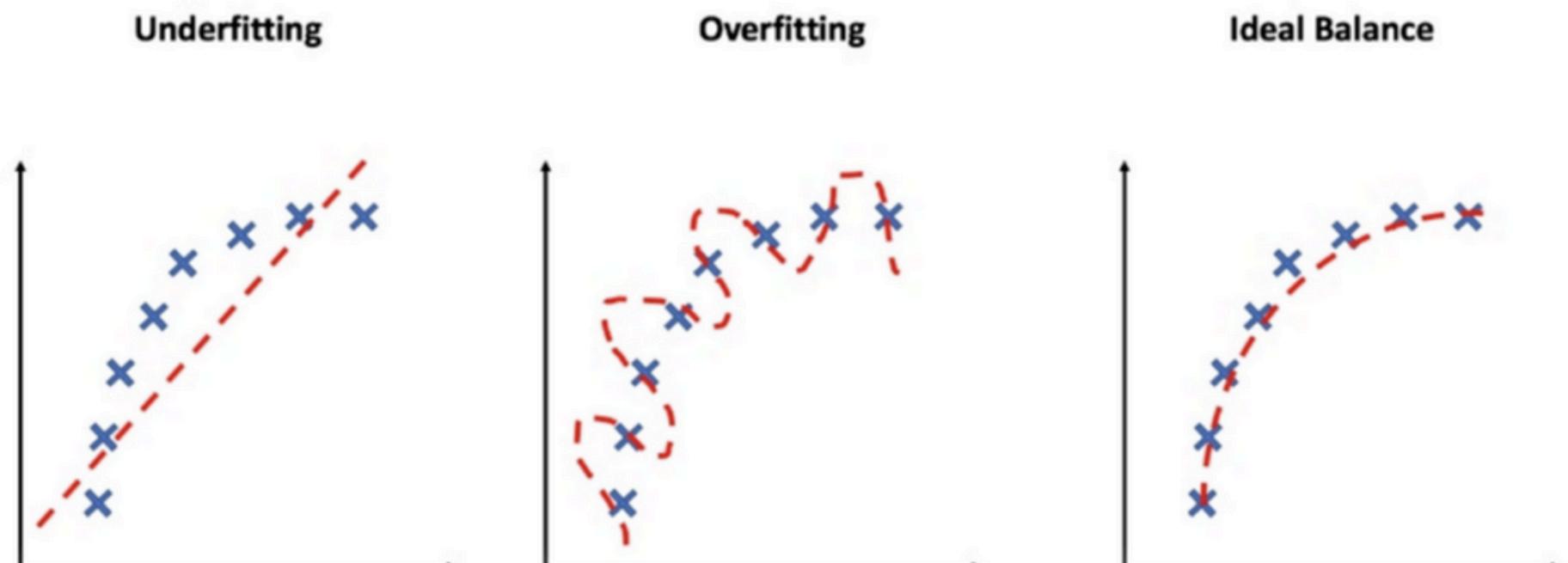
Underfitting happens when the model is too simple to capture the underlying patterns, leading to poor performance on both training and test data.

Overfitting

Overfitting occurs when a model learns the training data too well, including its noise and details, resulting in poor performance on unseen test data

Ideal Balance

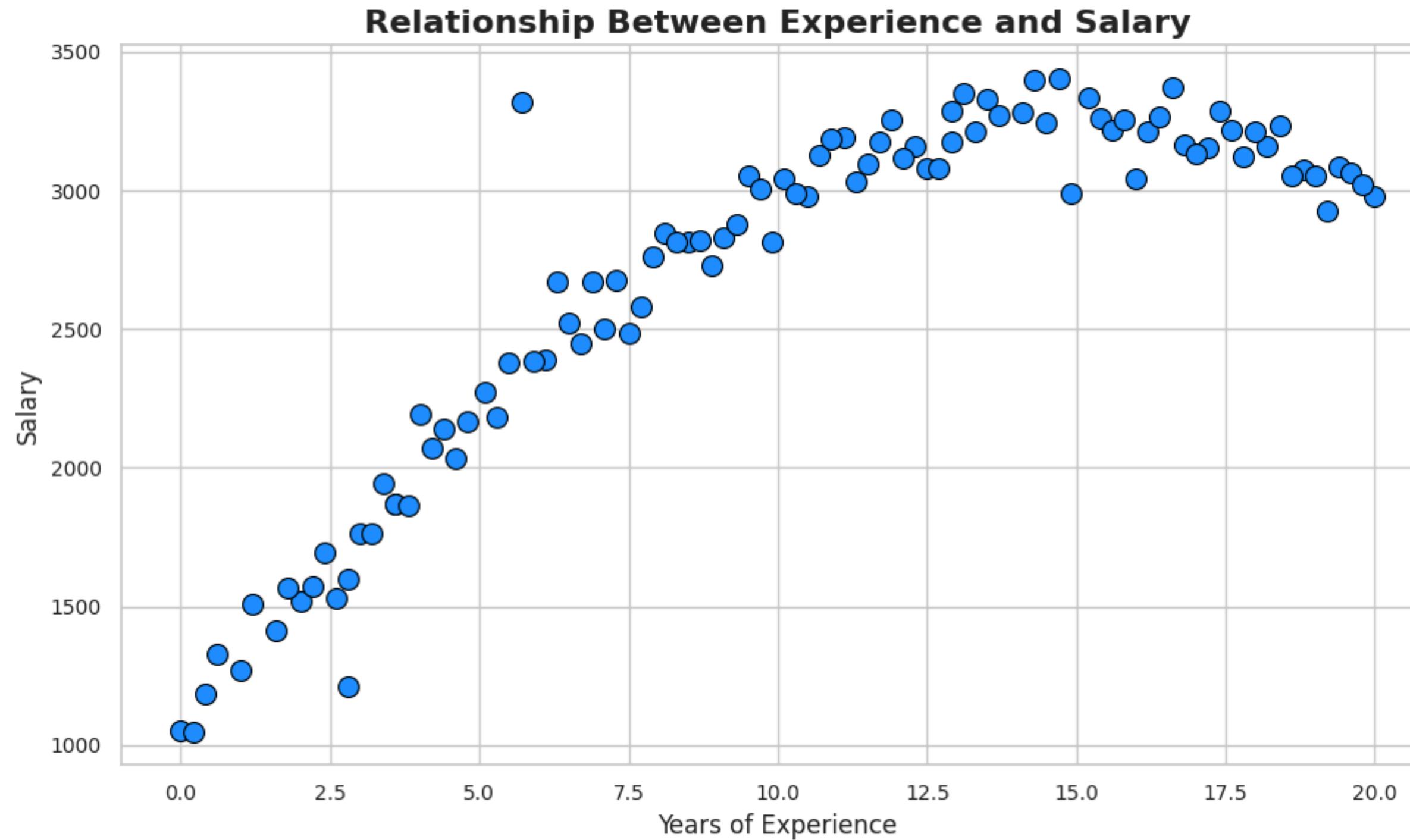
- The model learns key patterns from the data.
- It performs well on both training and test data, with a minimal gap.
- This shows the model generalizes effectively without underfitting or overfitting.





Data Series 16.0

Supervised - Salary Prediction

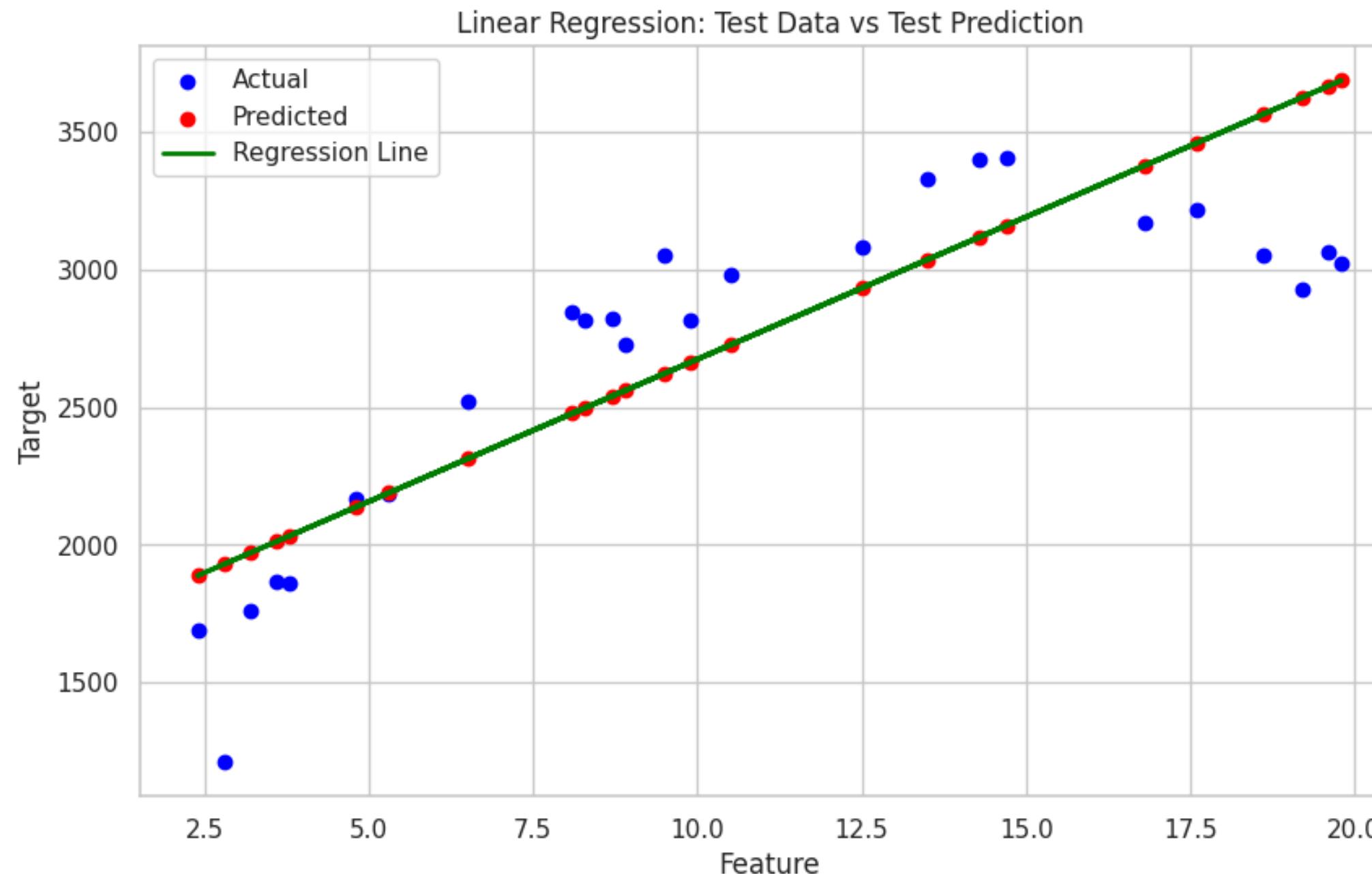




Supervised - Salary Prediction

Linier Regression

Intercept of the Linear Regression model: 1641.365997528288
Coefficient of the line Linear Regression: [103.19725286]



Then the linear regression model is
 $y = 1641.366 + 103.197 x$

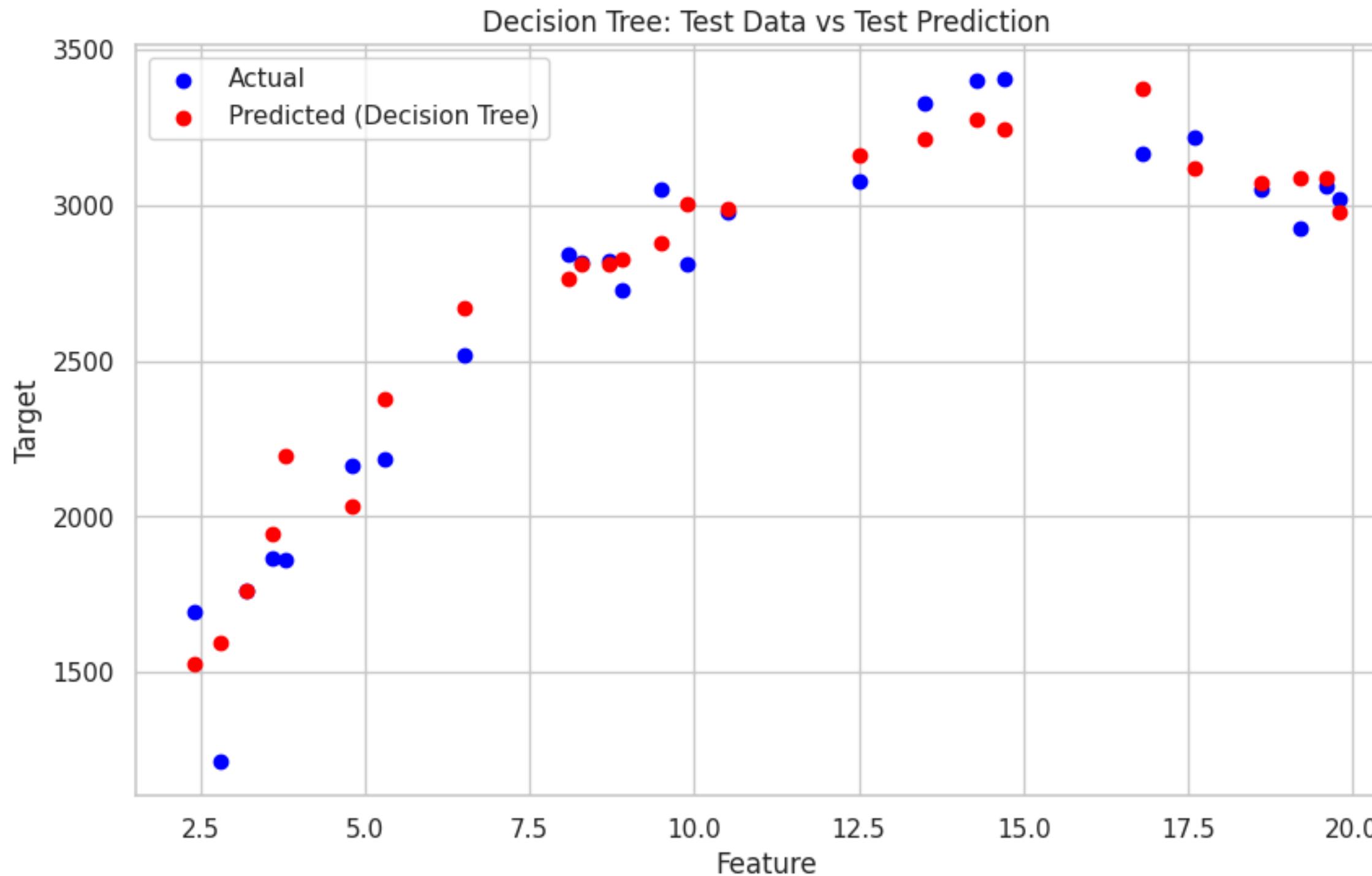
Evaluasi

Mean Squared Error:
Train: 187699.85
Test : 128111.12
Gap : 20411.27
R^2 Score:
Train: 0.77
Test : 0.63



Supervised - Salary Prediction

Decision Tree



Evaluasi

Mean Squared Error:

Train: 88.12

Test : 23627.99

Gap : 23539.87

R^2 Score:

Train: 1.00

Test : 0.93



ASSIGNMENT

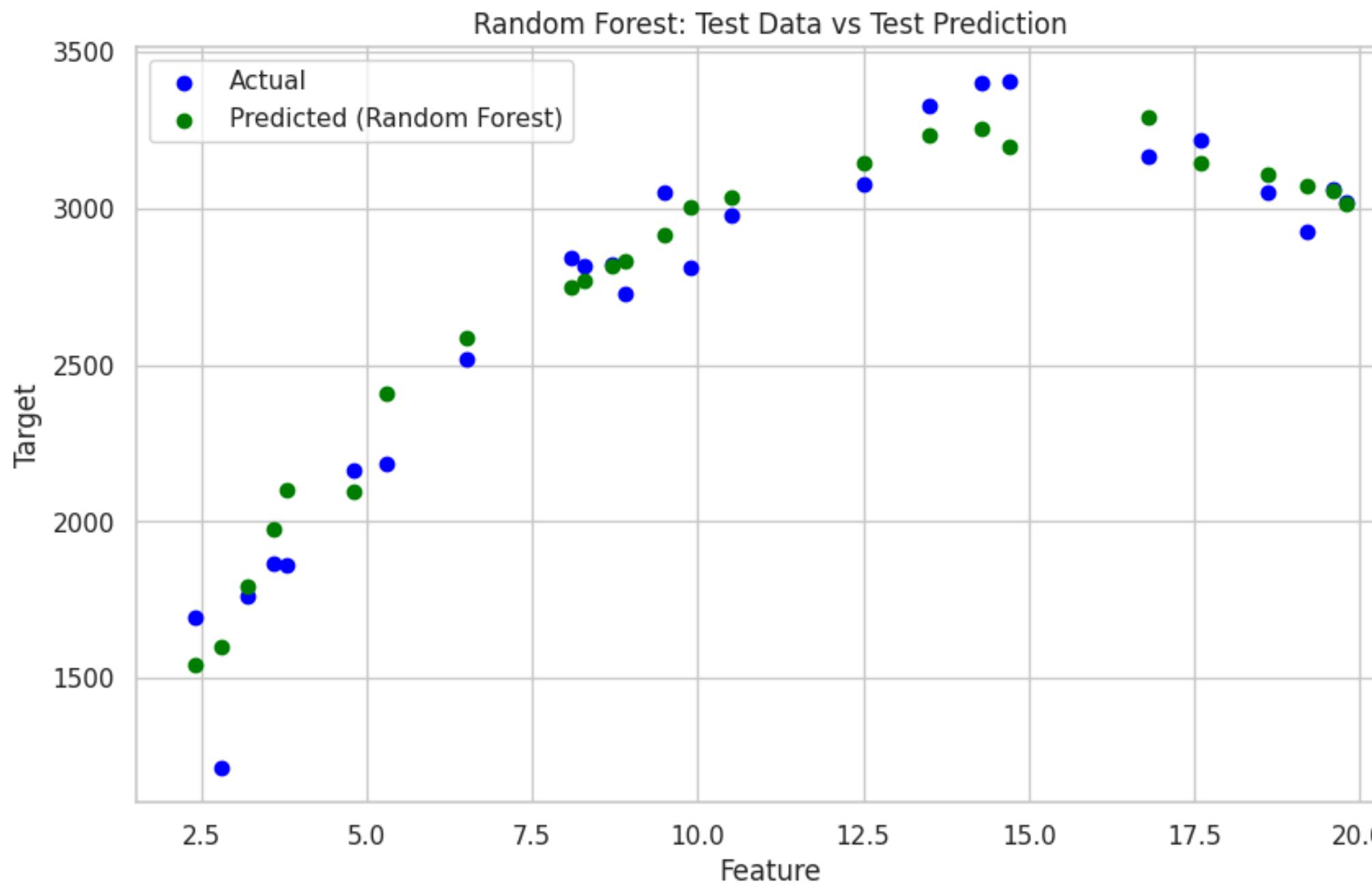
RANDOM FOREST

REGRESSOR



Supervised - Salary Prediction

Random forest



Evaluasi

Random Forest Metrics:

Mean Squared Error:

Train: 4362.95

Test : 29327.26

Gap : 15964.31

R^2 Score:

Train: 0.99

Test : 0.94



Supervised - Salary Prediction

Comparison of the three models

Linier Regression

```
Mean Squared Error:  
    Train: 107699.85  
    Test : 128111.12  
    Gap  : 20411.27  
  
R^2 Score:  
    Train: 0.77  
    Test : 0.63
```

Decision Tree

```
Mean Squared Error:  
    Train: 88.12  
    Test : 23627.99  
    Gap  : 23539.87  
  
R^2 Score:  
    Train: 1.00  
    Test : 0.93
```

Random Forest

```
Random Forest Metrics:  
Mean Squared Error:  
    Train: 4362.95  
    Test : 29327.26  
    Gap  : 15964.31  
  
R^2 Score:  
    Train: 0.99  
    Test : 0.94
```



Supervised - Salary Prediction

Conclusion

The Random Forest model is the best among the three models. This assessment is based on several metrics

1. Mean Squared Error (MSE):

- Train: 4362.95 (the lowest, indicating a small error in the training data).
- Test: 20327.26 (also lower than other models, indicating better performance on test data).

2. Gap (Train - Test MSE):

- Random Forest has the smallest gap (15964.31), indicating that it has better generalization than Decision Tree (gap 23539.87) and Linear Regression (gap 20411.27).

3. R² Score :

- Train: 0.99 (very good).
- Test: 0.94 (also the highest among the three models).
-

The Random Forest model has a balance between performance on training and test data, with a small MSE and a high R² value. This model is the best choice to use in this context.

Supervised - Salary Prediction

link untuk colab, GitHub dan linkedin

<https://colab.research.google.com/drive/1Yl-LZelTMjpTQRxd4-QoyHltlyyo8Ds#scrollTo=A5NlupnDMWre>



https://github.com/vernanda2709/salary_prediction



<https://www.linkedin.com/in/vernanda-aulia-putri-baktiawan-960976277/>



vernanda.aulia27@gmail.com

Thank You