Simple Explanation of the Results

1. Why did we get different results?

We got different results because **each model learns in a different way**.

Some models are simple and only look for straight-line patterns, while others are smarter and can find more complex patterns in the data. Because of this, they do not all make the same predictions.

2. Differences between the models

Linear Regression

- Looks for a **straight-line relationship** between inputs and the output.
- It is **simple and fast**, but not very smart.
- It does not work well when the data has **curves or complex patterns**.

👉 This is why its results are usually weaker compared to other models.

Decision Tree

- Makes decisions by asking **yes/no questions** (like a flow chart).
- Can understand **complex and non-linear patterns**.
- However, it can learn the training data **too well**, which causes overfitting.

👉 This means it may perform well on training data but not always on new data.

Random Forest

- Uses **many decision trees together** instead of just one.
- Each tree makes a prediction, and the forest averages them.

- This makes the model **more accurate and stable**.

👉 This is why Random Forest usually gives the **best results**.

3. Why Random Forest performs better

- It reduces mistakes made by a single decision tree.
- It handles noise and complex data better.
- It does not overfit as easily.

4. Why Linear Regression performs worse

- It assumes everything follows a straight line.
- Real-life data is often more complicated.
- Because of this, it cannot capture all patterns in the data.

5. Meaning of the evaluation metrics (simple)

- **R^2 Score**:
  Shows how well the model explains the data.
  👉 Higher is better.
- **MSE (Mean Squared Error)**:
  Measures how big the errors are.
  👉 Lower is better.
- **RMSE**:
  Same as MSE but easier to understand because it uses the same units as the target value.
- **MAE (Mean Absolute Error)**:
  Shows the average error.
  👉 Lower is better.

6. Conclusion (Simple)

The results are different because the models think differently.
Simple models give simple results, while complex models give better predictions.

👉 **Random Forest performs best**,
👉 **Decision Tree is good but unstable**,
👉 **Linear Regression is basic and works as a starting point**.