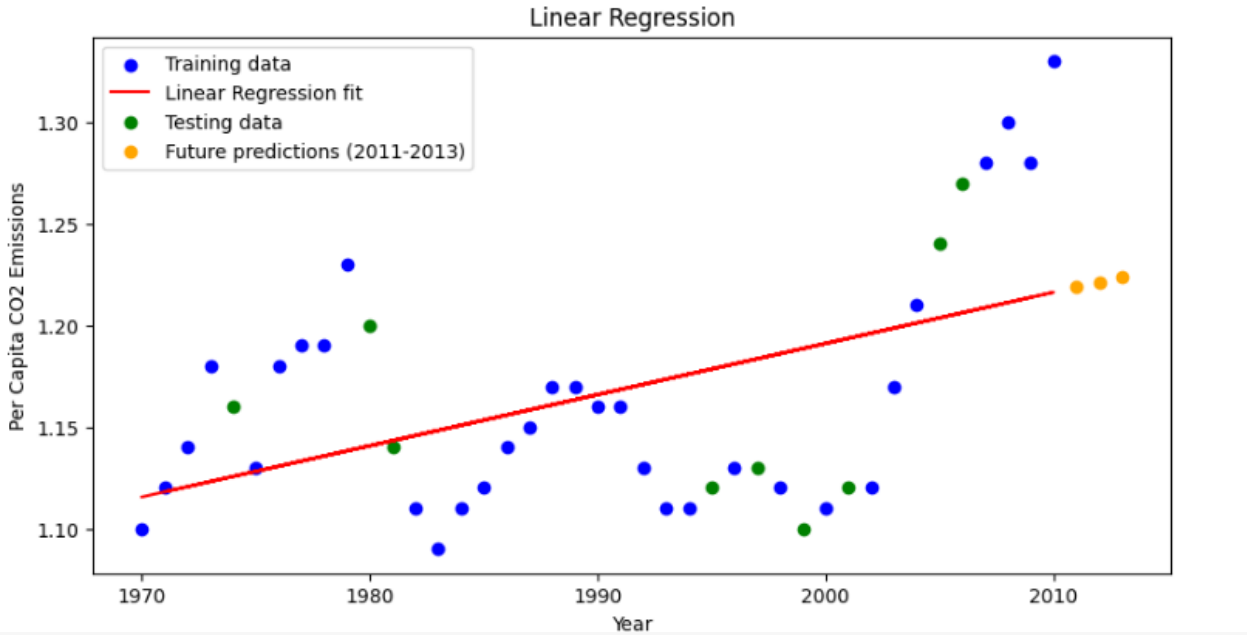
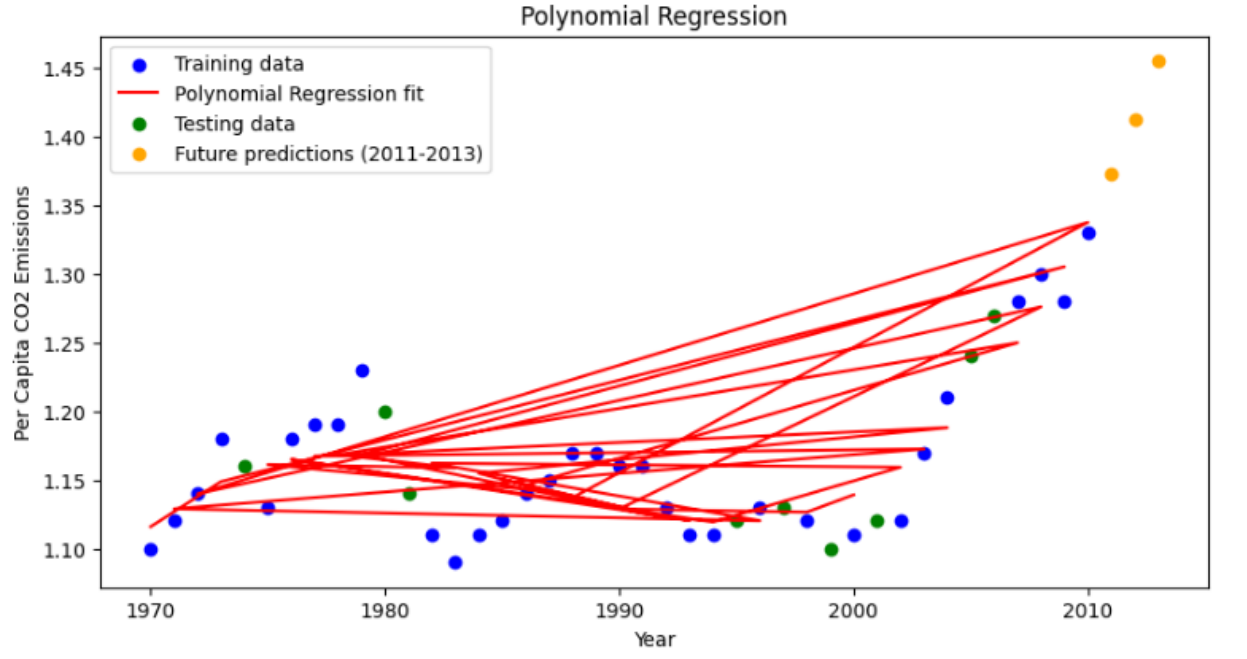
# Result and Summary

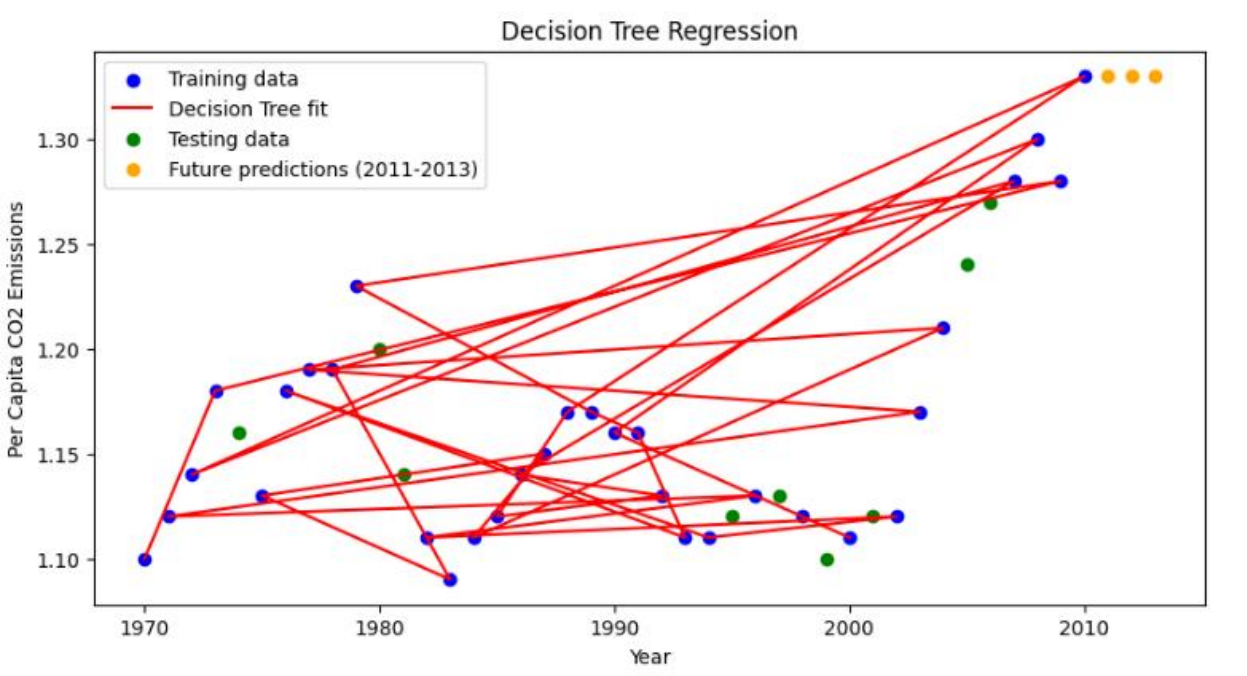
**Linear Regression:**



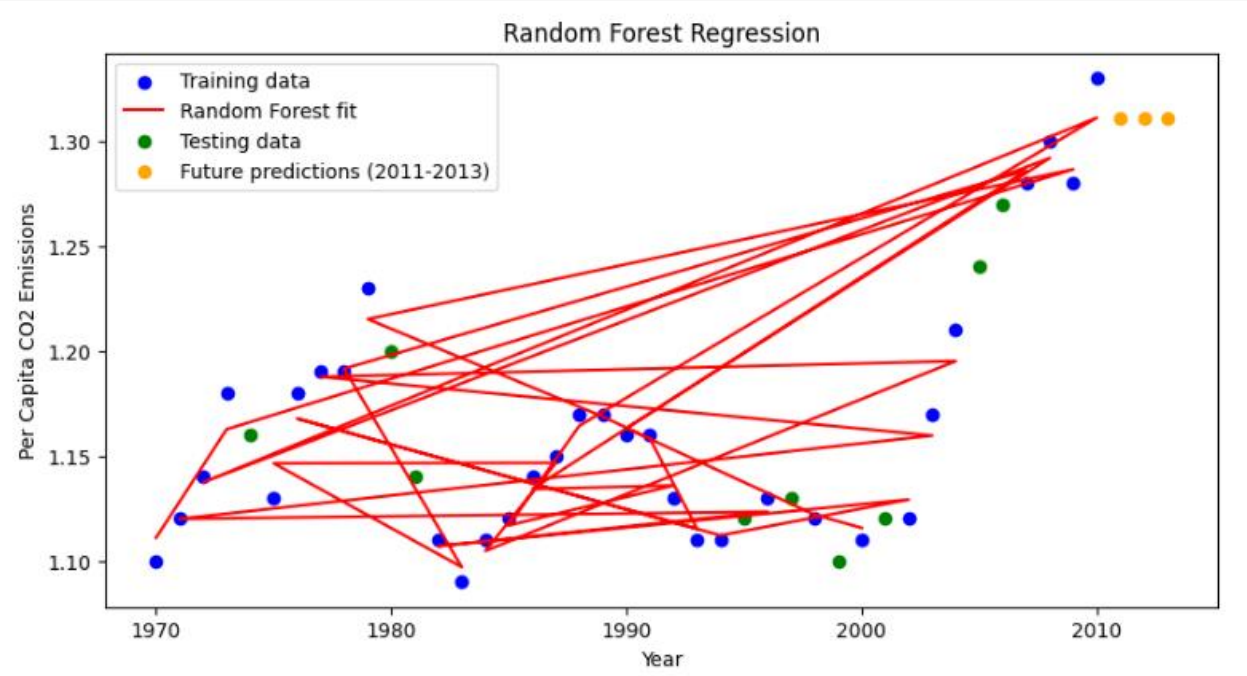

**Polynomial Regression:**



**Decision Tree Regression:**




**Random Forest Regression:**



Based on the predicted values for $CO_2$ production (per capita) for the years 2011, 2012, and 2013 using different regression models, here's a summary and conclusion on which regression gives the best prediction:

## Summary of Predictions:

1. **Linear Regression Predictions**: [1.2188, 1.2213, 1.2239]
    - Linear Regression tends to produce a smoother trend, predicting slight increases over time.
2. **Polynomial Regression Predictions**: [1.3734, 1.4125, 1.4552]
    - Polynomial Regression predicts a more noticeable upward trend, capturing potential non-linear patterns in the data.
3. **Decision Tree Regression Predictions**: [1.33, 1.33, 1.33]
    - Decision Tree Regression predicts a constant value for all three years, indicating that it might be overfitting to specific years in the training data without capturing future trends effectively.
4. **Random Forest Regression Predictions**: [1.3112, 1.3112, 1.3112]
    - Random Forest Regression also predicts constant values, showing that it averages across its trees, but still lacks capturing upward or downward trends.

## Conclusion:

- **Polynomial Regression** appears to provide the most dynamic predictions by capturing non-linear trends, making it suitable if we believe the $CO_2$ per capita trends may not be linear.
- **Linear Regression** provides decent predictions with a gradual increase, which might be more aligned if the trend is relatively steady without significant changes.
- **Decision Tree and Random Forest** tend to provide less varied predictions, possibly due to overfitting or averaging effects, making them less reliable for future trend predictions in this scenario.

**Best Model**: **Polynomial Regression** offers the most responsive and accurate reflection of potential future changes, making it the best choice if the underlying trend is expected to have non-linear growth.