Assignment 3

1. Implement a simple linear regression model using on California Housing dataset. After implementing the model, evaluate its performance using the R-squared metric and visualize the regression line with the dataset points.
2. Extend the linear regression model to a polynomial regression model with the same dataset. Experiment with different polynomial degrees (e.g., 2, 3, and 4) to analyze how the model complexity affects the fit. Evaluate each model's performance using the Mean Squared Error (MSE) metric and visualize the polynomial regression lines.
3. Explore different regularization strengths (λ) for both methods and observe the effect on the coefficients and model performance. Compare the results of Ridge and Lasso regression to a baseline multiple linear regression model without regularization in terms of coefficient values and performance metrics.
4. Try preprocessing and cleaning the dataset and repeat tasks 1-3 and record the differences in the results.

Feel free to use any library that you see fits.

Interview questions

1. **Scenario on Handling Multicollinearity**: Imagine you are working with a dataset intended to predict housing prices based on features like size, location, age of the property, and proximity to amenities. During your analysis, you discover significant multicollinearity between the size of the house and its age. Describe the steps you would take to address this issue. Which specific techniques or metrics would you use to confirm and mitigate multicollinearity to ensure the stability and interpretability of your model?
2. **Scenario on Model Evaluation Metrics**: You have developed a multiple linear regression model to forecast quarterly sales based on advertising spend, seasonal effects, and economic conditions. The model has an R-squared of 0.85, but your client is concerned about the reliability of predictions. Discuss how you would use MSE and RMSE in this scenario to evaluate model performance further. Explain the implications of these metrics and how they might influence your recommendations for model adjustments or client expectations.

*** Read and summarize Lesson 3