

You are working for a healthcare analytics company, HealthAnalytics Inc., tasked with building a linear regression model to predict the medical insurance costs for individuals based on their attributes. You have been provided with a dataset containing information about several individuals, including their age, sex, BMI (Body Mass Index), number of children, smoking status, region, and medical insurance charges.

Your tasks:

1. **Data Preprocessing:** Clean and preprocess the dataset, including handling missing values (if any) and encoding categorical variables like 'sex', 'smoker', and 'region'.
2. **Linear Regression Model:** Build a linear regression model to predict medical insurance costs (charges) based on the available features (age, sex, BMI, children, smoker, region).
3. **Model Evaluation:**
  - Split the dataset into training and testing sets.
  - Train the linear regression model on the training set.
  - Calculate and display the following evaluation metrics:
    - Mean Absolute Error (MAE)
    - Mean Squared Error (MSE)
    - Root Mean Squared Error (RMSE)
    - R-squared (R<sup>2</sup>) score
    - Adjusted R-squared score
    - Residual Sum of Squares (RSS)
    - Explained Variance Score
4. **Feature Importance:** Determine which features have the most significant impact on predicting medical insurance costs using the trained linear regression model.
5. **Visualization:** Create a scatterplot that shows the actual insurance charges vs. predicted insurance charges to visualize the model's performance.
6. **Recommendation:** Provide insights and recommendations based on your model's performance. For example, what factors contribute most to higher medical insurance costs? How can individuals reduce their insurance costs?

Present your findings and visualizations clearly to the HealthAnalytics Inc. team to help them better understand the factors influencing medical insurance costs.