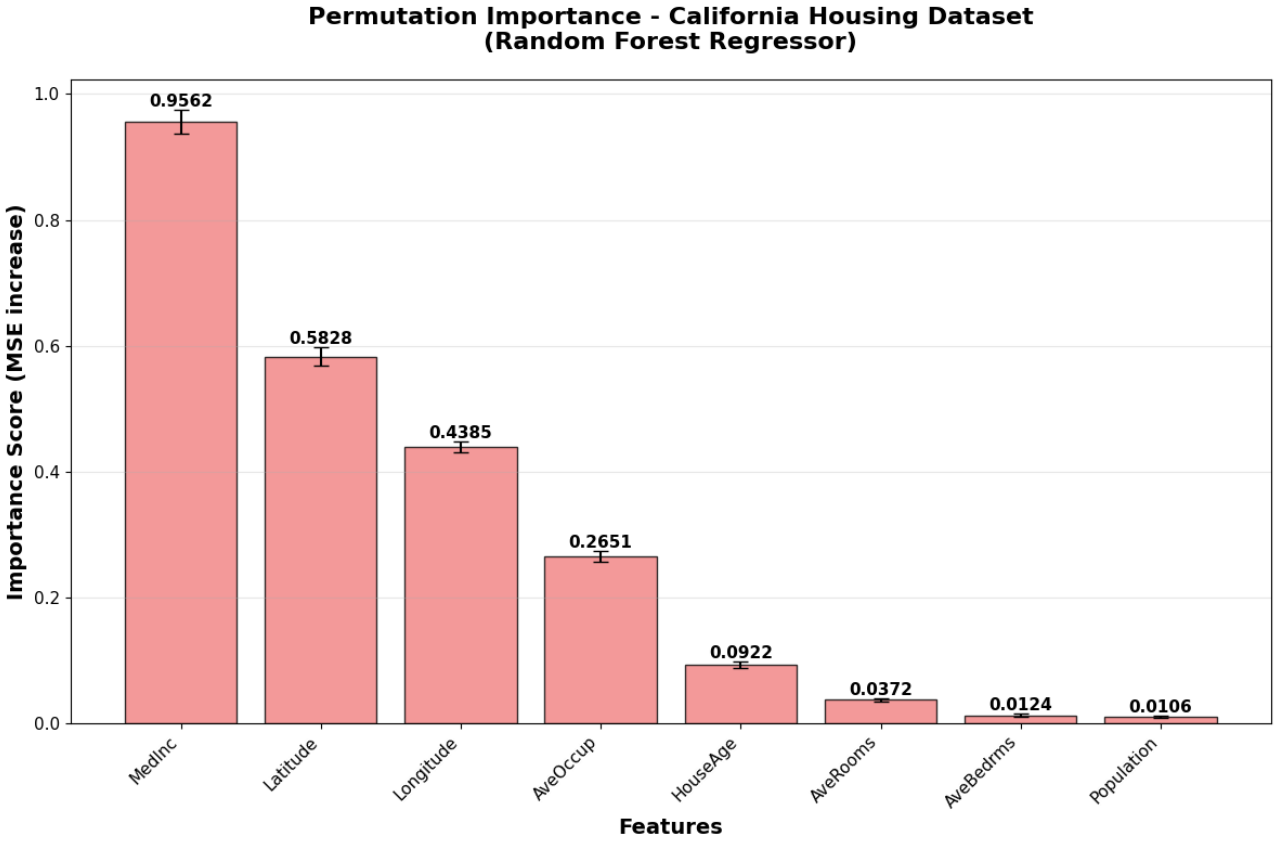
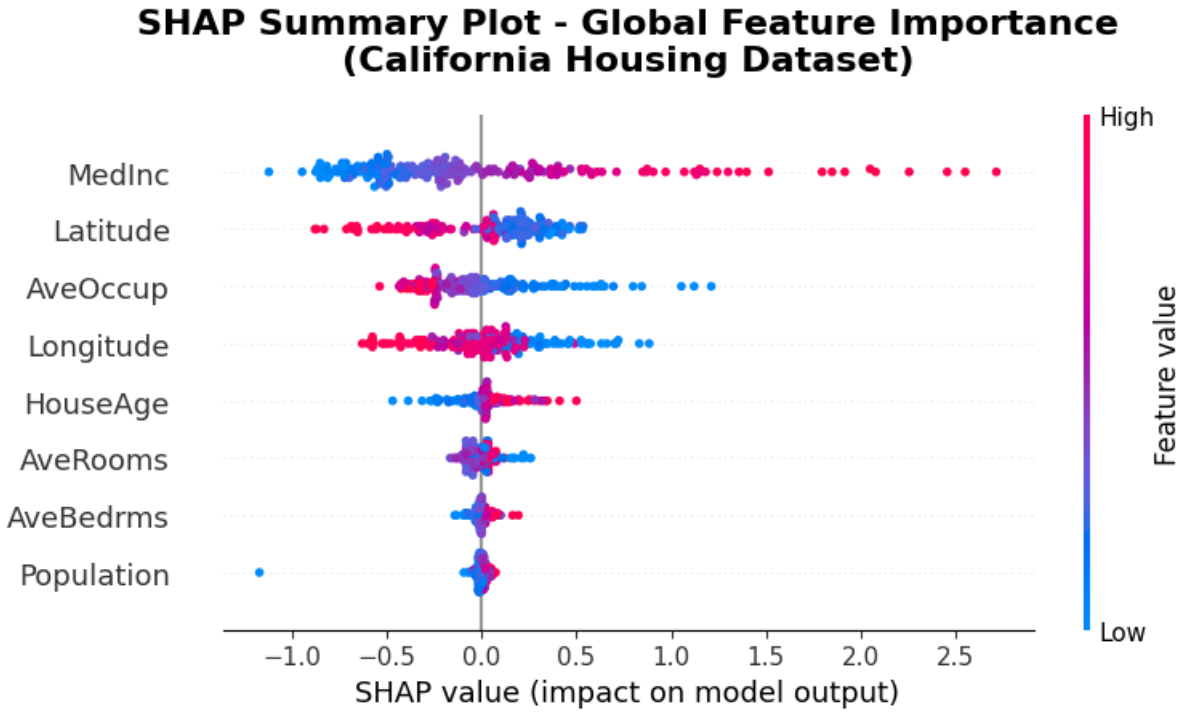
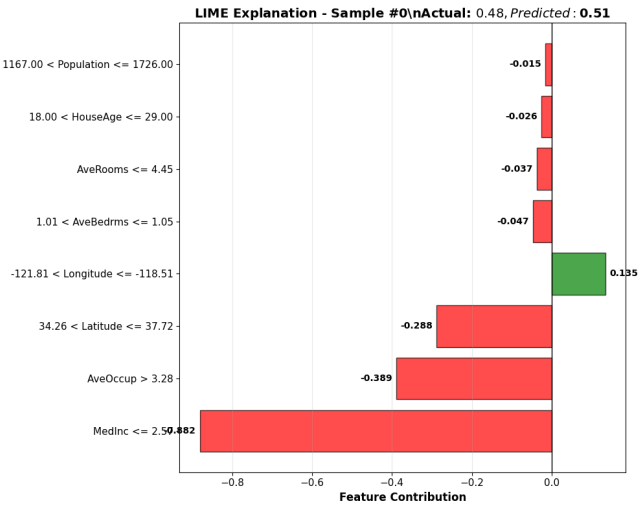
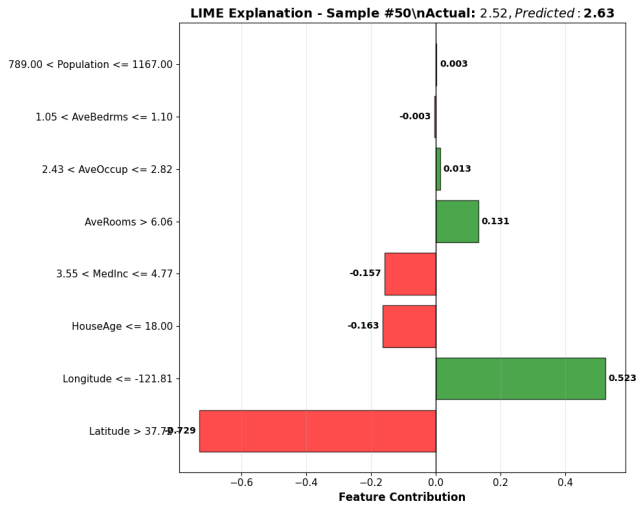
XAI ASSIGNMENT 4 :
Findings Report









KEY

INSIGHTS: Comparing PI, SHAP, and LIME (5-10 bullet points)

- Consistent Top Feature: MedInc (Median Income) is ranked #1 by both Permutation Importance and SHAP, confirming it's the most influential feature for house value prediction across all methods

- Geographic Factors: Latitude and Longitude consistently rank in top 4 across global methods (PI & SHAP), indicating location is crucial for California housing prices, but LIME shows location effects vary locally

- Feature Ranking Stability: PI and SHAP show similar global rankings (MedInc, Lat/Long, AveOccup), suggesting robust feature importance identification, while LIME provides instance-specific variations

- Magnitude Differences: Permutation Importance shows larger magnitude differences between features compared to SHAP, indicating PI may be more sensitive to feature contributions than SHAP's balanced approach

- Local vs Global: LIME reveals that feature importance varies significantly at the instance level - features that are globally important (like MedInc) may have different local impacts depending on the specific house characteristics

- Method Complementarity: PI identifies which features matter most globally, SHAP shows both global patterns and directional effects, while LIME explains how these features specifically affect individual predictions

- Occupancy Patterns: AveOccup (Average Occupancy) ranks consistently high across methods, suggesting household density is a key predictor that traditional real estate metrics might underemphasize

- Feature Interactions: SHAP's summary plot reveals that high MedInc always increases house value, while geographic features show varied directional effects, which LIME confirms at the local level

- Explanation Granularity: All three methods agree on the most important features but provide different levels of detail - from PI's global ranking to SHAP's directional insights to LIME's instance-specific explanations