ASSIGNMENT-3

Experiment 1 : add the details on feature selection in the following table

Feature selected	Reason for selection	Selected derivation function	Reason for selection this derivation
Feature 1 : Median Income²	To capture stronger relationship with house value	Squaring (x^2)	Housing prices usually increase non-linearly with income
Feature 2: Latitude × Longitude	To capture spatial effect	Interaction term	Combines geographical location into a non-linear feature
Feature 3 : log(Households)	To reduce skewness	Logarithmic	Normalizes skewed distribution, stabilizes variance

Run details

Run number	Most appropriate learning rate	½ MSE	R square	Does it converge	Number of iterations for convergence	Run specific comments
1	0.01	2.83e+09	0.5757	No	5000	Best result in Exp 1, close to reasonable fit

Experiment 2 :

Feature selected	Reason for selection	Selected derivation function	Reason for selection this derivation
Feature 1 : Population²	Capture non-linear effect of dense population	Squaring (x^2)	Larger populations may lower house values disproportionately
Feature 2: Median Income × Rooms	Captures wealth-to-space effect	Interaction term	Richer areas with more rooms tend to raise house values
Feature 3 : log(Population)	Stabilize skewness	Logarithmic	Normalizes heavy-tailed distribution

Run details

Run number	Most appropriate learning rate	½ MSE	R square	Does it converge	Number of iterations for convergence	Run specific comments
2	0.001	3.02e+09	0.5462	No	5000	Improved, but still non-convergent

Experiment 3 :

Feature selected	Reason for selection	Selected derivation function	Reason for selection this derivation
Feature 1 :Rooms per Household²	Captures crowding effect	Squaring (x^2)	Housing value may drop faster with crowding
Feature 2: Latitude²	Capture geographical non-linearity	Squaring (x^2)	Geography effect often quadratic
Feature 3 : log(Median Income)	Reduce skewness	Logarithmic	Income distribution is skewed, log smooths

Run details

Run number	Most appropriate learning rate	½ MSE	R square	Does it converge	Number of iterations for convergence	Run specific comments
3	0.01	2.82e+09	0.5765	No	5000	Best run overall, highest R^2 among all experiments