

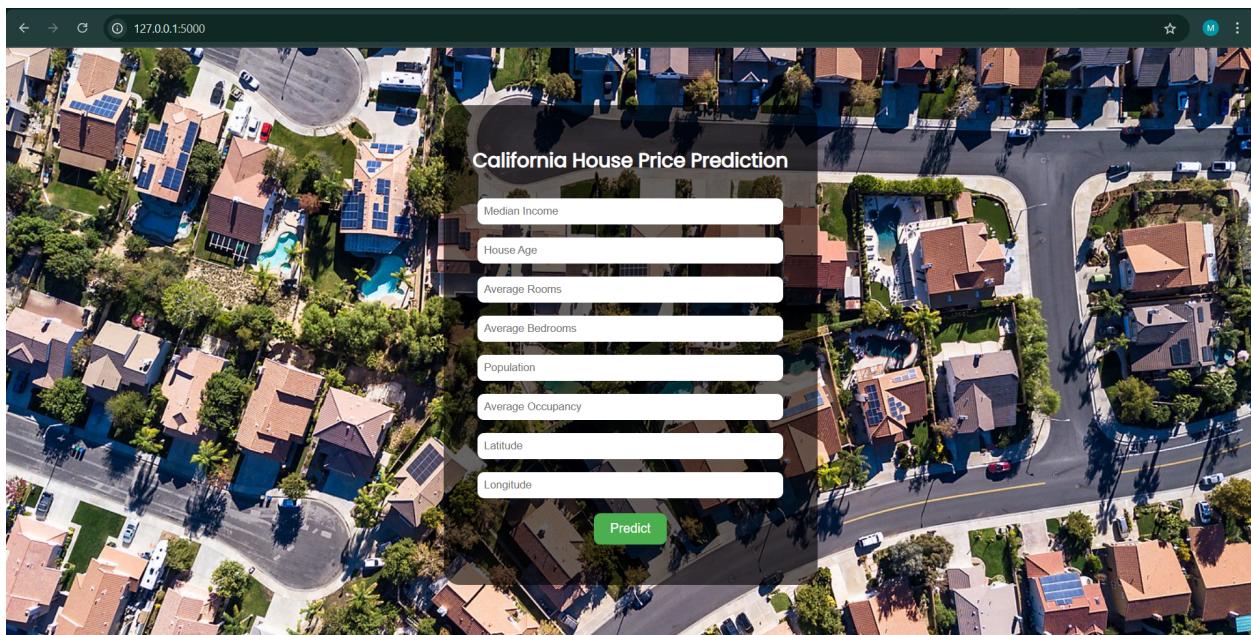
Machine Learning For Robotics

Assignment 3

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→ **Hugging Face:** https://huggingface.co/mahaqj/ml_assignment_3

→ **GitHub:** <https://github.com/mahaqj/Machine-Learning-Assignment-3>



→ **Dataset:** California Housing

Features:

1. MedInc: Median income of households in the block group (in tens of thousands of dollars)
2. HouseAge: Median age of the houses in the block group (in years)
3. AveRooms: Average number of rooms per household in the block group
4. AveBedrms: Average number of bedrooms per household in the block group
5. Population: Total population living in the block group

6. AveOccup: Average number of people per household (occupants per household)
7. Latitude: Geographical latitude of the block group's location
8. Longitude: Geographical longitude of the block group's location

Target: Median House Value (Price)

→ **Best Model:** Mini-Batch Linear Regression with L2 Penalty

→ **Models:**

Batch Gradient Descent

- Lasso (L1) with early stopping at epoch 11
→ MSE: $2.2929612834766822 \times 10^{20}$
- Ridge (L2) with early stopping at epoch 11
→ MSE: $2.3526438709398644 \times 10^{20}$

Stochastic Gradient Descent

- Lasso (L1) with early stopping at epoch 11
→ MSE: 0.5632244446481575
- Ridge (L2) with early stopping at epoch 11
→ MSE: 0.5610269553736424

Mini-Batch Gradient Descent

- Lasso (L1) with early stopping at epoch 16
→ MSE: 0.5402504792685122
- Ridge (L2) with early stopping at epoch 16
→ MSE: 0.5402139568057983

Polynomial Regression

- Lasso (L1) with early stopping at epoch 11
→ MSE: $1.5736724748583298 \times 10^{28}$
- Ridge (L2) with early stopping at epoch 11
→ MSE: $5.972698848626445 \times 10^{26}$