One of the most standard problems in machine learning is the housing price prediction problem. Given a list of characteristics about a house, it is possible to predict with high accuracy its list price. However, although the aesthetic appeal of a home is certainly a factor in the way it is priced, most existing models do not include a visual component. Our goal was to create an image-based machine learning algorithm to estimate the price of a home.

We gathered our input data, which consisted of images and house prices, from Zillow. Our dataset consisted of 3000 listings and the corresponding images from the city of Redding, CA. All images were padded to be 596 x 496 pixels. We fed the images into a convolutional neural network, written with Keras. To compress the image, the network includes three cycles of convolution, activation, and max pooling. We used the ReLu activation function. The resulting internal representation is flattened and fed into a fully connected layer, a dropout layer to prevent overfitting, and then another fully connected layer. The output layer has eight nodes, each of which corresponds to a price range. The ranges we chose to use were bounded at $100K, $200K, $350K, $550K, $800K, $1.1M, $1.45M, and $3M.

In order to train the neural net, 80% of the original training data was used, with 20% reserved for validation and testing. To prevent overfitting, additional transformed images were added to the training set. Based on the initial training set, the neural net performed with 30% accuracy. This is a significant improvement over the expected performance of 12.5% (based on randomly choosing one of the eight buckets). To improve performance, we then trained on a larger data set, and the neural net performed with 40% accuracy. In the future, we could include additional inputs, such as zip code, latitude and longitude. We could also try to add images of overhead and interior views of the house to further improve accuracy.