HouseCanary

The Essential Guide to

Image Recognition

Introduction

Evaluating property photographs is an integral part of the valuation process. Most of the time, this step is executed by people — employees who review property images to ensure the on-site inspector is correctly categorizing the right home and has accurately documented any condition issues that might need addressing, such as structural damage.

An average employee may need 10 seconds to scan a property photo, and if there are 30 photos for every home being evaluated and verified, it takes 5 minutes to review the images for just one home. Multiply this by hundreds or even thousands of properties, and you can see the inefficiencies begin to add up. The time and money it costs to use humans for image review continues to multiply when you consider that property images must be checked again and again at different stages in any given real estate transaction.

HouseCanary is training computers to execute these rote image recognition tasks at scale, finishing a full image review for a home in seconds instead of minutes.

What is Image Recognition?

Vision is a natural source of information for humans, but computers need to be programmed to recognize and understand what the data in a photo say about a property and how that information fits together to inform a property's condition.

Every image of a home contains information about that property that humans don't necessarily capture in their categorization fields. Some of this data might include the quality of the home, the material used to build the home, the features of the surrounding land and neighborhood (such as a power plant down the road or a river in the front yard), and many additional pieces of information that aren't always included in human documentation.

How it Works

HouseCanary's image recognition process involves three basic steps:

1

Image Scene Classification

The computer decides if it's looking at a kitchen or a bathroom, a bedroom or a living room.

2

Image Condition Assessment

HouseCanary's algorithms evaluate if the photos represent a house in excellent condition, or one in need of some TLC.

3

Property Condition Classification

Individual photo assessments are combined to create an overall property condition evaluation.

1

Image Scene Classification

We take the digital image and examine it as a whole, feeding it forward through a convolutional neural network (CNN).

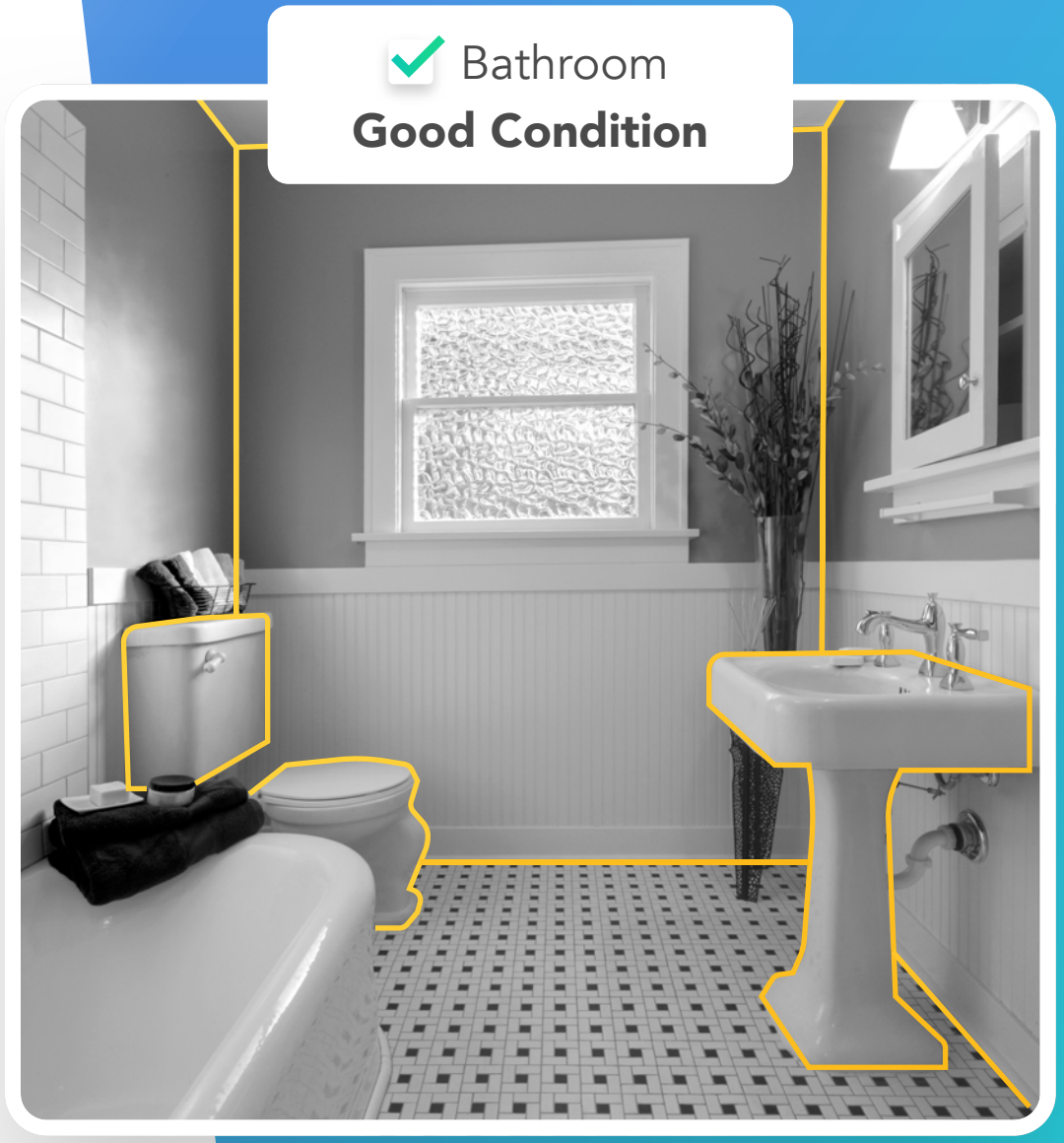
The neural network then outputs the probabilities that the image belongs to a certain scene class, such as a kitchen, bathroom, exterior, or another type of scene class. In other words, our tool identifies which type of room in the home has been captured in the image.

2

Image Condition Assessment

Now that the image recognition tool has more information about type of room shown in the image, it can assess the condition of the room that will help it sort and categorize each specific image and, ultimately, the entire property. An image condition classification is a numeric description of the image that can be used by the tool to evaluate a home's overall condition.

After our tool assesses the condition of the room, it generates a probability that the room fits one of our condition ranks: bad, subpar, OK, good, very good, awesome, or under construction. A higher probability threshold for a given image means it is more likely that the home's actual condition fits our tool's assessment.

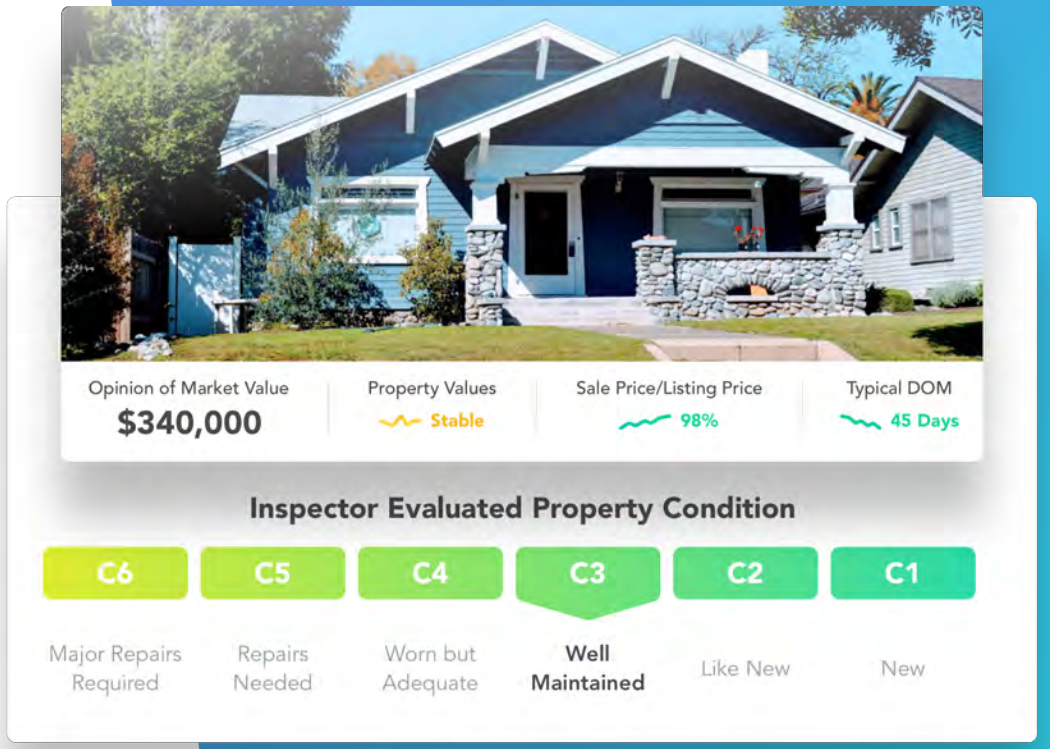


3

Property Condition Classification

Our image recognition tool generates an overall property condition classification that categorizes the property according to a function of the condition of the collection of images that represent the given subject property. When the tool has created image classifications for each of a property's images, it can then determine an overall score for the property's condition.

We use a weighted sum to determine the likelihood that our tool has correctly identified a property's condition. For example, if condition is rated on a continuous score from -2 to +2, we give each photo a number ranking, then calculate the total condition sum in the property classification step. Some images (such as photos of the kitchen and exterior) will have a greater effect on the final sum than others and are weighted appropriately.



What's Next

Improve and Refine

After a new piece of technology is built, the biggest improvements happen not by leaps and bounds, but incrementally as we continue to perfect and hone the product little by little.

By producing this image recognition tool for real estate valuations, HouseCanary is at the cutting edge of technology innovation — and we expect our tool to improve step by step as we work out how to deal with any anomalies, add new features, and refine our image recognition software's performance over time.

About HouseCanary

Founded in 2013, HouseCanary is a real estate technology company providing the most accurate home valuations to drive smarter decisions across the real estate ecosystem. Clients include some of the largest financial institutions including the top five buyers of residential whole loans on Wall Street, three of the largest Wall Street investment firms and four of the top five single family rental companies.

HouseCanary can be found at **www.housecanary.com**

Learn more about HouseCanary's image recognition software. Contact us today at:
www.housecanary.com/contact-sales

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