How realtor.com® uses Data to Elevate Consumer and Customer Experiences

Luke Glass, EVP
Gaku Tobinobu, Sr. Data Scientist

4/24/2018
What problem are we going to solve?
Agents have to log into multiple systems to run their business.
Consumer expectations are high and REALTORS® must step up to meet them.
Know price range & more
Know neighborhood

80%
65% Expect a response in under an hour
Data is useless if it is in multiple systems
1. Agents have to log into multiple systems
2. Agents must meet increasing consumer expectations
3. Data is useless if it is in multiple systems
Our Research Findings

What do real estate professionals want?

Capture *more leads*

Communicate *faster with leads*

Close *more deals*

... All in *one easy-to-use system!*
The **realsuite®** Solution

The answer to an unmet need in the market...

respond • connect • transact
respond

New Lead from realtor.com®
Claire is inquiring about 2947 Hill St, Austin, TX $425,000.

Your automatic reply has been sent.
Hi Claire, I got your inquiry on realtor.com®. When can I give you a call to discuss 2947 Hill St? Thanks, Agent Jess
Consumer Communication Preferences vs Agent Contact

Source: Realsuite Consumer Survey, Sept 2017
connect
70% of respondents said they received a personalized response which led to a higher overall satisfaction and a greater likelihood of using the agent\textsuperscript{4}.

14% Among those who received a message they perceived to be automated, only 14% said they were likely to use that agent\textsuperscript{4}.

\textsuperscript{4} Source realtor.com® Lead Quality Research, Consumer Insights, Sept 2017
transact
Transparency
Consumers except instant gratification

73% buyers would like an online system to track the offer-to-close process\(^5\)

50% of consumers feel the process is not transparent enough\(^5\)

\(^5\)Source Realsuite Consumer Survey, Sept 2017
1) Beta User Feedback Helping to Shape the Product
2) Soft Launch at Recent Franchise Shows – First Users Live!
3) GTM Launch Phased into Sales Channels Soon
Realtor.com owner tests the ‘holy grail’ of agent software

Move Inc. combines the best of its top platforms into one master system

BY TEKE WIGGIN | SEP 18

Future-Proof: Navigate Threats, Seize Opportunities at ICNY 2018 | Jan 22-26 at the Marriott Marquis, Times Square, New York

Take FiveStreet’s lead-follow up, mix it with Top Producer’s CRM and add Reesio’s transaction management. What do you get? One system to rule them all, and a big real estate tech experiment from realtor.com parent company
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4/16/2018
What is Deep Learning?

Neural Networks with many layers

Multi-layered Perceptron vs VGG16 (Oxford)

Source: Multi-Layered Perceptron, https://github.com/ledell/sldm4-h2o/blob/master/sldm4-deeplearning-h2o.Rmd
What is Deep Learning

Neural Networks with many layers

Sources:
- http://knowyourmeme.com/memes/we-need-to-go-deeper
- Inception, https://github.com/tensorflow/models/tree/master/research/inception
How did it come about?

Neural Nets have come a long way in the last 5 years
Image Classification

Better than human performance on ImageNet


2015 - 3.57%
2016 - 2.99%
Image Classification
Image Classification

Part of LDP property features:

Property Features

- Bedrooms
  - Number of Bedrooms: 3
- Bathrooms
  - Number of Full Bathrooms: 2
- Kitchen and Dining
  - Countertop - Granite
  - Dishwasher
  - Garbage Disposal
  - Microwave
  - Oven Range - Built-In
  - Gas
  - No Formal Dining Room
- Exterior and Lot Features
  - Back Yard
  - Fenced
  - Low Maintenance
  - Sprinklers - Auto
  - Lot Acres: 0.0487
  - View of Greenbelt
  - View of Mountains
  - View of Neighborhood

Find out more about this property. Contact Agent
Image Classification Transfer Learning

Hotdog! Not hotdog!

Image Classification Transfer Learning

Applying knowledge gained in one problem to different but related task

Source: https://www.csie.ntu.edu.tw/~yvchen/f105-adl/doc/161103_ConvolutionalNN.pdf
Image Clickthrough Prediction
Setup

- Deep Learning Model for image quality scoring
- Generated a model to map features of images to CTR
- Goal: feed the model an image, get back an accurate CTR
Setup

- Find listings that appeared in the top 5 positions of SRP
- How many impressions and clicks did each listing get in this context?
- What was the click-through rate (CTR)? (clicks/impression)
- Can we predict the click-through rate from the SRP photos alone?
Image Classification vs. CTR Prediction

**Image Classification Architecture**

- Extracting Image features for differentiating image types:
  - Outdoor vs indoor?
  - Counter vs bed vs bath

- Convolutional Layers

- Image Tag Prediction

  - Kitchen
  - Bedroom
  - Bathroom
  - Exterior
  - ...

**Image CTR Prediction Architecture**

- Extracting image features that make it more “attractive”:
  - Natural light
  - Object fully captured
  - etc

- Convolutional Layers

- CTR Score Prediction

- Graph showing CTR score over a range of values.
Transfer Learning Again

1. Train Classification Model

Image Classification Architecture

- Convolutional Layers
- Image Tag Prediction

- Kitchen
- Bedroom
- Bathroom
- Exterior
- ...

2. Transfer Learning

3. Train CTR Model

Image CTR Prediction Architecture

- Convolutional Layers
- CTR Score Prediction

Train Classification Model
Train CTR Model
Results

Images with predicted high CTR:

Images with predicted low CTR:
Results

Images with high predicted CTR:

Images with low predicted CTR:
Results

Better image of the same listing

Images shown on Search Results
Conclusions

• 2018 is the year of deep learning adaption in industry
• At realtor.com®, deep learning is used for improving user experience
• Transfer learning is the key to leverage deep learning
• Creative applications of deep learning opens up new opportunities for innovative product
Thank you