Optimizing Revisits

The Path to Success

Washington, D.C. Team

December 4, 2017

Meet the Washington D.C. Team

Sunil Narasimhan

IT, Marketing, Business Analytics, and Global Commerce

Joby George

IT, Marketing, and Business Analytics

Simran Khanal

IT, Marketing, and Business Analytics

Lauren Fogel

IT, Marketing, and Business Analytics

Adib Choudhury

Finance

Adopting a retargeting strategy will create **$3.9-4.3M** in net revenue

Based on analytics insight, we recommend an omnichannel marketing strategy with minor UX changes.

Our Process


1
Understanding RentPath
2
Predictive & Descriptive Analytics
3
Cost/Benefit & Recommendations
4
Next Steps

Understanding RentPath

1

RentPath connects people with their new homes

- **Mission:** RentPath helps people navigate the rental journey by providing a delightful, stress-free experience so that **all** renters find and enjoy their ideal home

- Four websites for accomplishing this mission:

rent.com™

Apartment guide®

Rentals.com

lovely

Our analysis focuses on **Apartment Guide** - specialized in apartment rental market

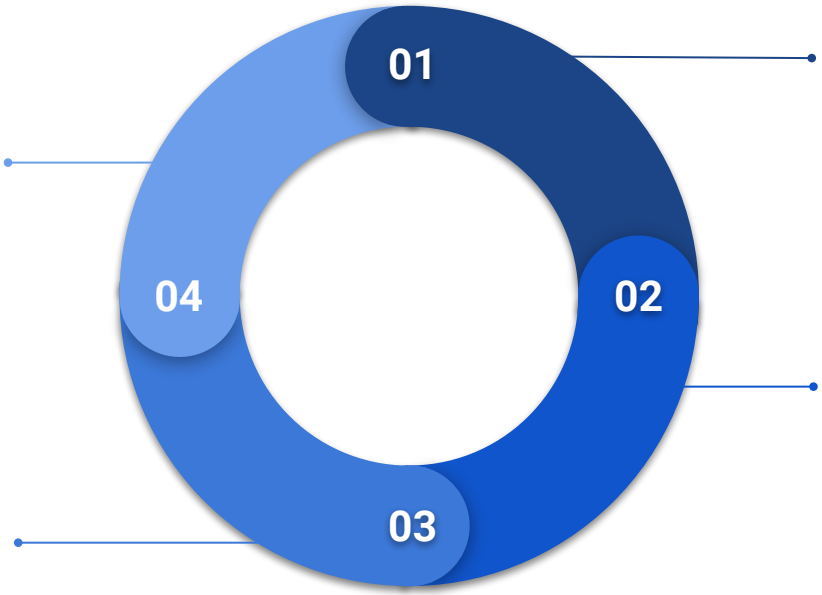
RentPath needs high-quality leads to satisfy customers

Managing customer expectations and needs

Apartment Guide monitors consumer leads generated for customers to keep them along the "Happiness Frontier"

Consumer revisits indicate leads

Consumers who return to the site indicate higher levels of engagement, translating to higher-quality leads. **How can we predict revisits and improve marketing efforts accordingly?**



Connecting consumers and customers

Apartment Guide *customers* list properties for *consumers* to browse to find a new home

Consumers generate leads

Consumers browse property listings and find ones they like, generating leads for customers

Problem: Predict revisits and boost leads with analytics

To help RentPath generate more leads and distribute them efficiently, we...

Three-pronged approach incorporates modeling and user experience improvements

1 Decision Tree

Advanced Decision Tree Model predicts revisits and drives **$4.1 million net benefit** for RentPath annually

2 Marketing

Omnichannel marketing approach shows promise in **targeting Android and mobile users** to increase revisits

3 UX Design

Small UX changes to Apartment Guide's website design allow for:

1) greater collection of demographic data
2) increased number of profile accounts
3) higher **revisit rates**

Predictive & Descriptive Analytics

2

Advanced DTM predicts revisits with 56% accuracy

Implement retargeting strategy that presents a **display ad** to consumers likely to revisit

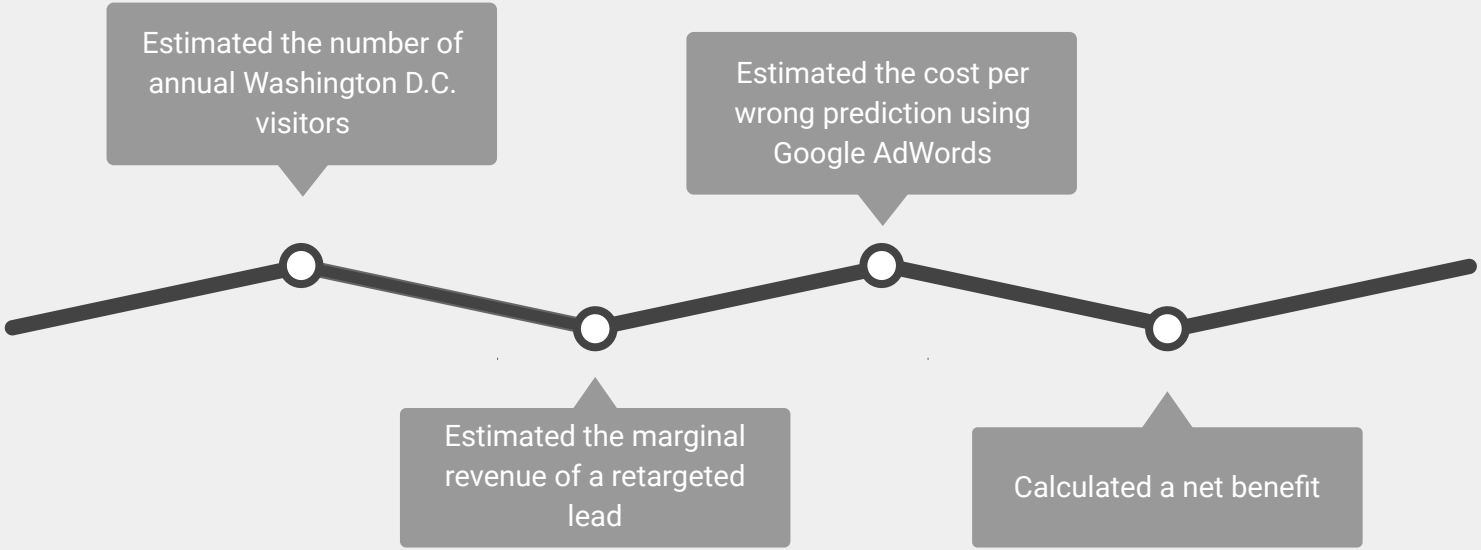
Lower accuracy, but higher Cost-Benefit figure makes **14-Feature Advanced DTM** most actionable model

Advanced Decision Tree Model with **56.39% accuracy**

RentPath can gain **$3.9-4.3M** by using the DTM

Our model projects a **$4.1M** net benefit for RentPath.

How did we get this number?



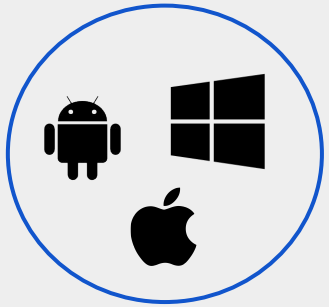
Decision tree model demonstrated best performance

Enables RentPath to look at predictive accuracy of individual attributes

Able to scale with low strain on computational resources

High class 1 accuracy and low variance gives this model strong reliability

Features and Features Cost Benefit



Operating System

Browser

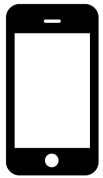
Device Type

$ 2.2 million increase in projected benefit when including these three attributes in our model

Android and mobile users dominated DC market

Search behavior is desktop dominated

54% of all sessions are done on a desktop



Leads are dominated by mobile devices

80% of leads are generated from a mobile device

Android users represent a smaller share of smartphone market yet **generated more leads**

iOS users **conduct more searches** than Android mobile users

Marketing Recommendations

3

Omnichannel marketing strategy will increase lead generation

Overlay demographic data for more robust analysis

Use Google Analytics or profile data to improve segmentation

Devise targeted Google AdWords strategy

Create AdWords campaigns targeting Android users and other underserved groups

Apply strategy to other online marketing channels

Use similar tactics for Facebook, Twitter, and Email

RentPath can target its marketing efforts to specific segments that have a **higher potential for lead generation.**

Clustering gives RentPath visibility into user behavior

Military Matt

Matt is an Android user who is in the military. He **tends to look at recommended properties** and is likely more sensitive to price, spending a long time researching apartments.

Android Alex

Alex is an Android user who is not price sensitive. He is likely single and works as a consultant. Always busy, he tends to trust and **look at the recommended properties.**

Mac Mandy

Mandy has a macOS Desktop which is great for all the research she conducts looking for apartments during long session times. She tends to **convert on high value properties in Arlington or Washington.**

Windows Will

Will owns a Windows Desktop and comes from a variety of backgrounds. He **tends to be interested in property values of median value.**

New UX design establishes demographic data

Apartment guide

Find Apartments | Blog | Get Our App | Next Steps | Advertise Your Property | My Places | Register | Log In

Hi! Welcome to Apartment Guide. Select the profile that best matches your background to get started.

X

I'm a recent college graduate or young professional looking for a new place to live.

We are a new couple searching for a place to call home.

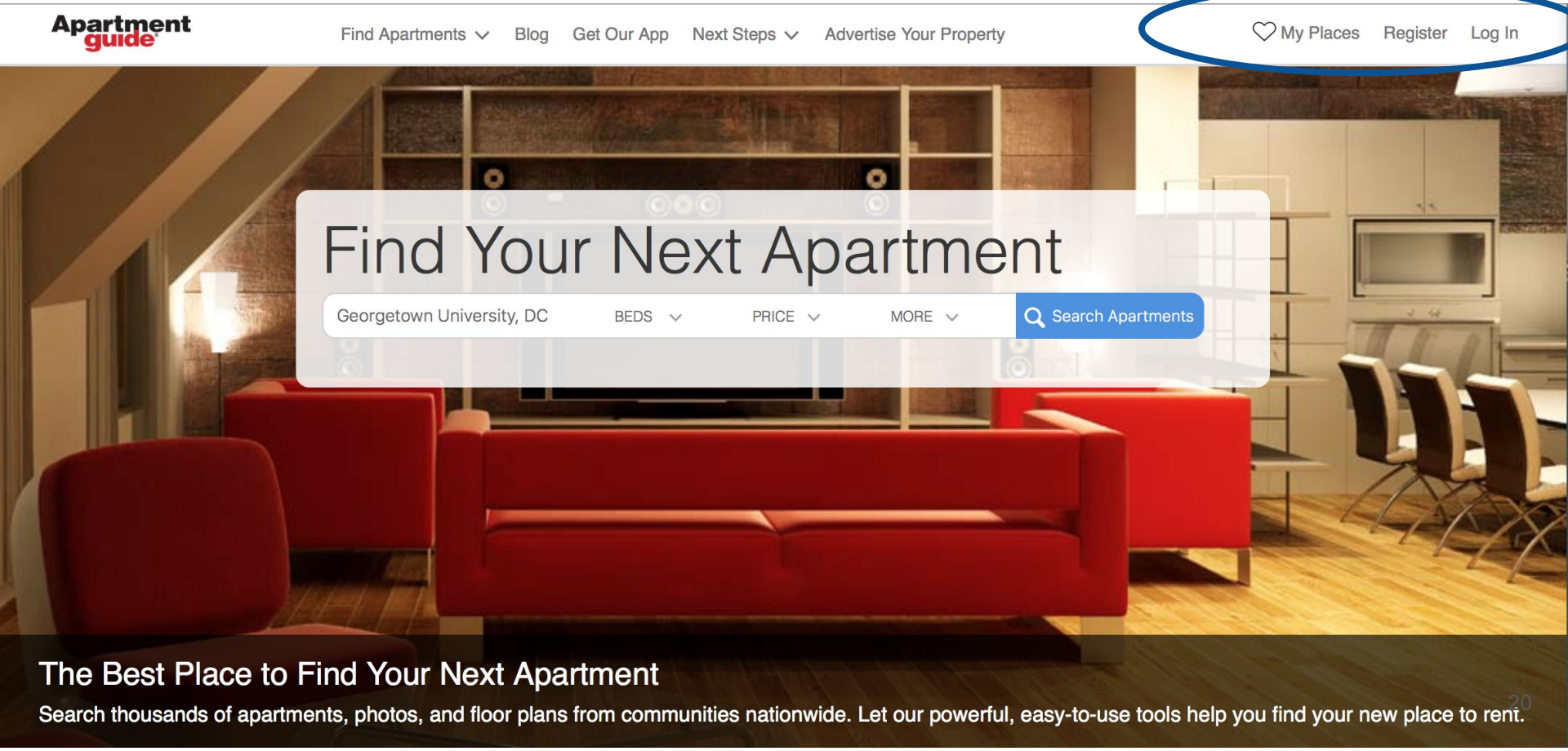
I'm looking to downsize but still want to be part of a neighborhood.

Didn't match one of these profiles? Create your own by logging in!

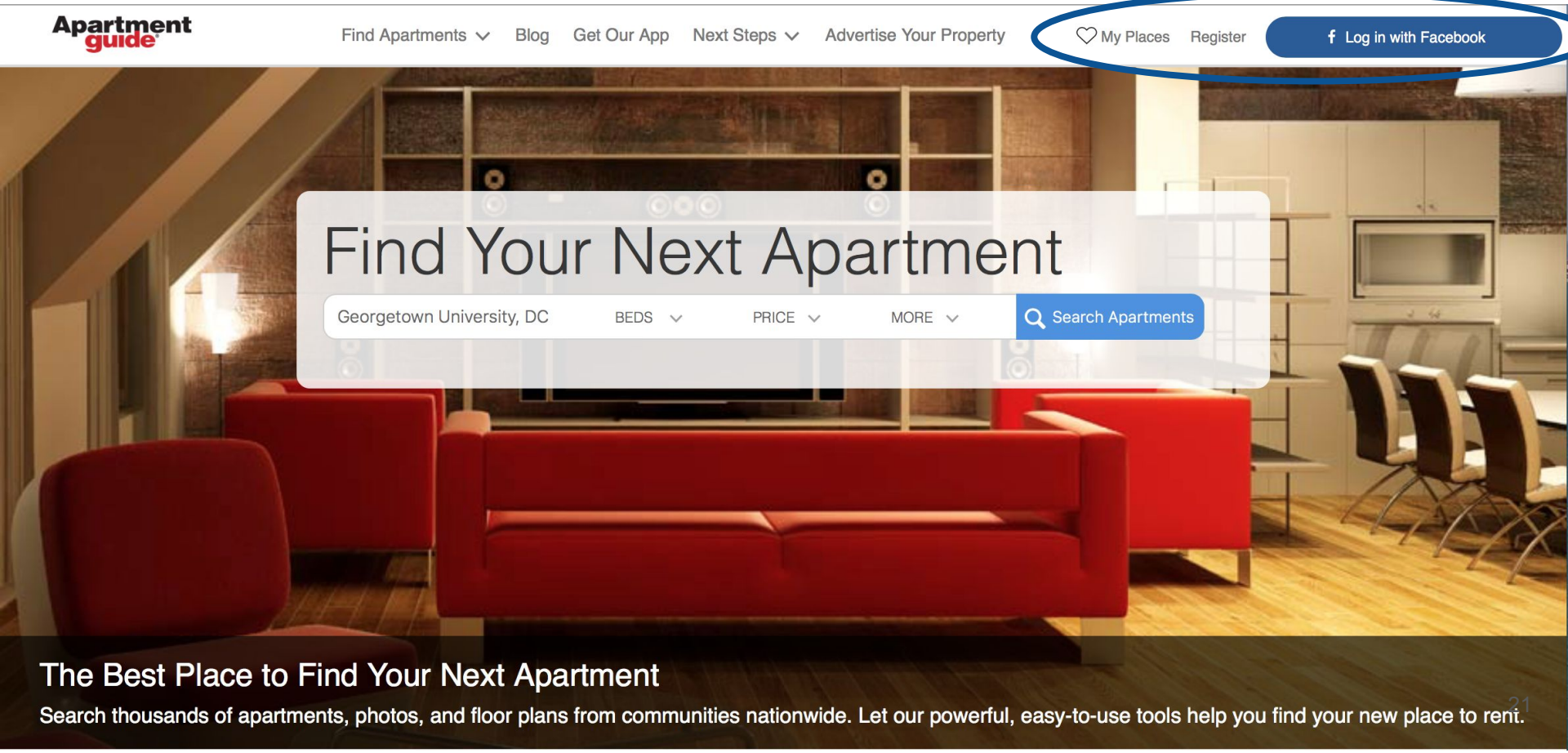
The Best Place to Find Your Next Apartment

Search thousands of apartments, photos, and floor plans from communities nationwide. Let our powerful, easy-to-use tools help you find your new place to rent.

UX change to “Log In” button can increase revisits



UX Changes


Apartment guide
Find Apartments
Blog
Get Our App
Next Steps
Advertise Your Property
My Places
Register
Log in with Facebook
Find Your Next Apartment
Georgetown University, DC
BEDS
PRICE
MORE
Search Apartments
The Best Place to Find Your Next Apartment
Search thousands of apartments, photos, and floor plans from communities nationwide. Let our powerful, easy-to-use tools help you find your new place to rent.

Next Steps

4

Next steps will help RentPath drive net benefits within 2 years

Immediate

Short-term

Long-term

1

Heavily target Android users to develop more leads

Incorporate UX design changes to collect more demographic data

2

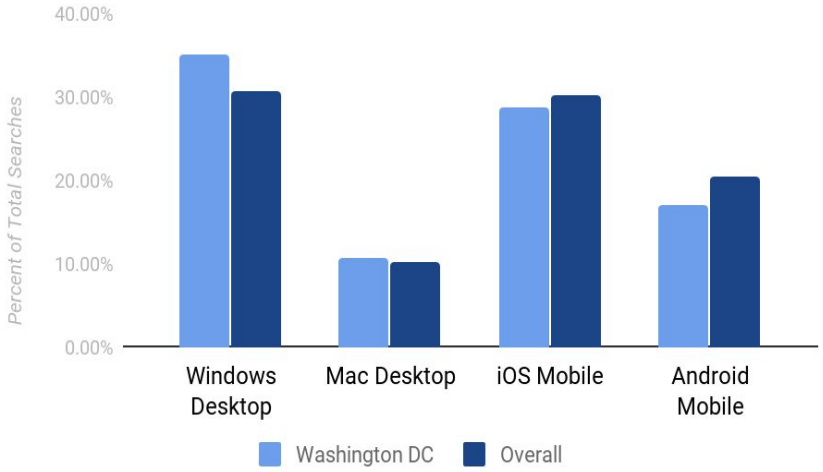
3

Utilize technology that allows for greater computational power to perform neural nets on a larger number of attributes

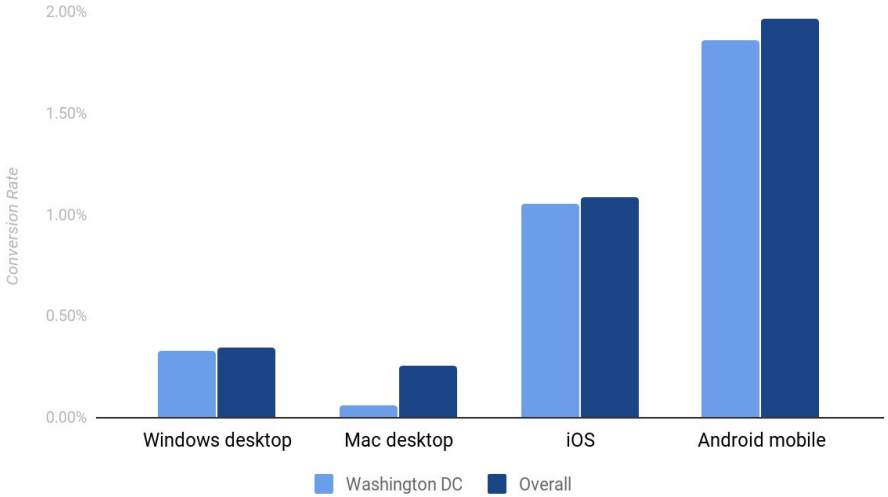
Questions

Appendix 1: Searches and Conversions by OS

Android lags behind other categories in total searches



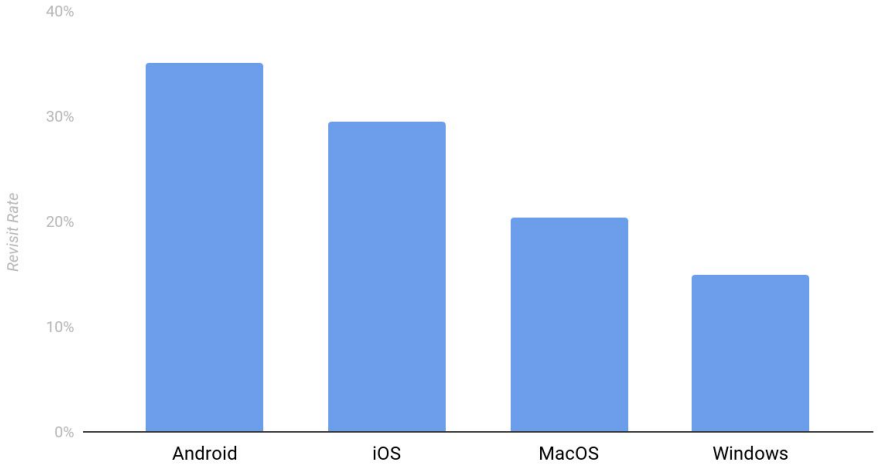
Android users convert more than all other OS categories



Appendix 2: AdWords Strategy for Android

- Analysis indicates Android users are an **untapped market**
- Google AdWords is a cost-effective solution to better target mobile and Android
- Display Ad Network can generate leads from Android
- Campaigns can promote Apartment Guide Android app on Google Play Store

Android leads all other OS types in revisit rate



Android users make up only **18%** of site visitors, but are the highest in revisit rate

Appendix 3: Top 20 features for predicting revisits

Chi Squared		Information Gain	
Feature	**Weight**	**Feature**	**Weight**
U_OS_D	1	U_OS_D	1
U_Screen_D	0.976	U_Screen_D	0.9671
U_ProfileKey_D	0.9203	U_ProfileKey_D	0.9092
U_Referrer_D	0.6858	U_Referrer_D	0.8307
U_OSV_D	0.6134	U_OSV_D	0.6184
U_Browser_D	0.4762	U_Browser_D	0.4802
U_ActionCt_pageview	0.1623	U_PageTime_pdp	0.2573
U_Exit_D	0.1408	U_PageCt_pdp	0.2278
U_PageCt_pdp	0.1295	U_ActionCt_lead_submission	0.2004
U_Landing_D	0.1182	U_ActionCt_pageview	0.2003
U_ActionCt_lead_submission	0.0975	U_SessionT	0.1662
U_ClickCt_ClickPropertyTitle	0.0952	U_ActionCt	0.1527
U_PageCt_home	0.0905	U_Exit_D	0.1514
U_ClickCt_CommFeat	0.0889	U_FloorPlanCt	0.1449
U_ClickCt_ClickSearchButton	0.0864	U_ClickCt_Amenities	0.1362
U_PageTime_pdp	0.0828	U_ClickCt_ClickPropertyTitle	0.1356
U_PhotoCt	0.0777	U_BrowserV_D	0.1336
U_ActionCt	0.075	U_Landing_D	0.1265
U_SessionT	0.0708	U_PropertyCt	0.1233
U_ClickCt_Amenities	0.058	U_RefCt	0.1154

Appendix 4: Dataset Overview

Table Name	Number of Instances	Number of attributes	Business Context
First Visits	100,000	230	All sorts of user interaction and referral data
Leads after First Visits	2,958	N/A	All users who generated leads after visit
Properties	6,310	220	Data on property listings, such as property types, contact, information, location and amenities
Visit Properties	221,908	N/A	List of all properties viewed during each visit

Appendix 5: Cost Benefit Explanations

In order to obtain an accurate potential benefit amount, we needed to extrapolate the benefit to the entire population of unique RentPath visitors. These were the calculations we made:

 # Monthly Unique RentPath visitors = 14.7 M

Proportion of Washington DC visitors in the sample dataset RentPath provided:
14,600 / 100,000 = 0.146

Adjusting the proportion of RentPathsearches are from D.C. to account for the fact New York was not in our data set, inflating D.C.'s relative size.

Adjusted proportion of Washington DC of the whole data = .115

Total monthly unique RentPath visitors looking in Washington DC:
*0.115 * 14,700,00 M = 1,690,500*

Total annual unique RentPath visitors looking in Washington DC:
*12 * 1,690,500= 20,286,000*

Appendix 5: Cost Benefit Explanations cont (1)

A key assumption we had to make was that the data provided in the somewhat mirrored RentPath's actual monthly visitor distribution.

From there, we needed to calculate the value of a lead and using that value, find the marginal benefit from a lead that was a result of a retargeted advertising.

We calculated the value of a lead for the to be **$6.35.** We determined this by calculating the median monthly rate for a Washington DC property and annualized this value. Next, we multiplied this by the real estate industry lead conversion of .05%.

*$1,058 monthly rate * 12 months * 0.05% real estate industry lead conversion = **$6.35***

Successful retargeting (true positive) results tends to increase website conversion by 70%[1]. However, since conversion in this case is more meaningful than an online purchase, we will take a conservative approach, assuming retargeted leads would be only 20% more likely to convert. The new value of a retargeted lead would be calculated as such:

Appendix 5: Cost Benefit Explanations cont (2)

*$1,058 monthly rate * 12 months * (1.2 *0.05%) retargeted lead conversion =* ***$7.62***

Therefore, the value of a successful retargeted ad would be the marginal increase in lead value or **1.27**, calculated as such:

7.94 retargeted lead value - 6.35 organic lead value = ***1.27 benefit of successful retarget***

Predicting a visitor is not searching while they were still searching would not cost Apartment Guide any money. We determined a false positive of ten display ads being served over one thousand impressions was 4 dollars.[3] From there the cost of a single false positive is
$.04.

Giving us the following cost-benefit matrix for our predictions

Appendix 6: Cost-Benefit Matrix

		Actual	
		Customer is still searching	Customer is not searching
Predicted	Customer is still searching	-1.27	0.04
	Customer is not searching	0	0

Appendix 7: Cost-Benefit Final Steps

With the cost-benefit matrix, we can compare our model's results using class recall to find our model's predicted revenue.

The boosted decision tree, which was our highest-performing model, had an average class 0 recall (formula below) of 52.45% and an average class 1 recall (formula below) of 68.58%.

Class 0 Recall formula:

$$\frac{\#\ of\ consumers\ correctly\ predicted\ to\ not\ revisit\ the\ website}{total\ number\ of\ consumers\ that\ did\ not\ revsit\ the\ webiste}$$

Class 1 Recall formula:

$$\frac{\#\ of\ consumers\ correctly\ predicted\ to\ revisit\ the\ website}{total\ number\ of\ consumers\ that\ revsited\ the\ webiste}$$

Appendix 7: Cost-Benefit Final Steps cont(1)

Based off the entire sample size, we found that **75**% of consumers would not revisit the site, where **25%** of the consumers were revisitors. Using these distributional statistics, we can find the predicted total number of consumers who would revisit by multiplying the percentage of consumers who would revisit by our annualized sample:

Predicted number of revisitors = *.25 (# of consumers who are likely to revisit) * 20,286,000 (annual) number of visitors = **5,071,500** predicted revisitors.*

Predicted number of non-revisitors = *20,286,000 – 5,071,500 = **15,214,500** predicted number of non-revisitors*

To find the projected net benefit of our model, we multiply our Class 1 Recall percentage by the number of predicted revisitors, giving us the revisitors our model will be able to retarget.

Consumers who will convert into revisitors after seeing an ad = 68.58% (Class 1 recall) * 5,071,500 = **3,478,034**

Appendix 7: Cost-Benefit Final Steps cont(2)

From there, we multiply this number by our projected value of a revisit, to get the projected revenue stream of implementing the retargeting strategy:

Projected revenue = 3,478,034 * 1.27 = **$4,417,103**

Projected cost, would therefore by the number of consumer who will not convert multiplied by (1-Class 0 Recall %) * cost per serving a consumer an ad.

Projected cost = 15,241,500 (number of consumers who will not revisit) * (1-52.45%) (1- Class 0 recall %) * .04 (cost of showing an advertisement to a consumer who is not likely to revisit) = **$289,893**

Therefore, our expected model net benefit is $4,417,103 - $289,893 **= $4,127,210**