



UNIVERSITAT DE  
BARCELONA



## Master on Foundations of Data Science



# Recommender Systems

Bias?

# When Recommendations Systems Go **BAD**?

Talk by **Evan Estola** at Machine Learning Conference 2016

# Data Science Impact lives

Adds you see

Apps you download

Friend's Activity/Facebook Feed

News you're exposed to

Movies you see

Admittance into a collage

Job openings you find/get

If you can get a loan

# THE WALL STREET JOURNAL.

Home World U.S. Politics Economy Business Tech Markets Opinion Arts Life



► Meet Silicon  
Valley's Hometown  
Bank



► Tencent Aims for  
Overseas  
Mobile-Game  
Domination



Google Ventures  
Dials Down Seed  
Deals, Urges Mature  
Startups to Go Public



► Te  
Crowd  
All It's  
Be

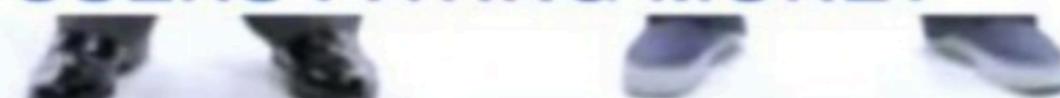
TECH

## On Orbitz, Mac Users Steered to Pricier Hotels





**ORBITZ PRICES  
ARE MAC USERS PAYING MORE?**



Google searches involving black-sounding names are more likely to serve up ads suggestive of a criminal record than white-sounding names, says computer scientist

Ad related to latanya sweeney ⓘ

[Latanya Sweeney Truth](#)

[www.instantcheckmate.com/](http://www.instantcheckmate.com/)

Looking for Latanya Sweeney? Check Latanya Sweeney's Arrests.

Ads by Google

[Latanya Sweeney, Arrested?](#)

1) Enter Name and State. 2) Access Full Background Checks Instantly.

[www.instantcheckmate.com/](http://www.instantcheckmate.com/)

[Latanya Sweeney](#)

Public Records Found For: Latanya Sweeney. View Now.

[www.publicrecords.com/](http://www.publicrecords.com/)

[La Tanya](#)

Search for La Tanya Look Up Fast Results now!

[www.ask.com/La+Tanya](http://www.ask.com/La+Tanya)

"Have you ever been arrested? Imagine the question not appearing in the solitude of your thoughts as you read this paper, but appearing explicitly whenever someone queries your name in a search engine."

So begins Latanya Sweeney at Harvard University in a compelling paper arguing that racial discrimination plagues online ad delivery.

Many people will have experience Googling friends, colleagues and relatives to find out about their online presence – the websites on which they appear, their pictures, hobbies and so on.

Sweeney's interest is in the ads that appear alongside these results. When she entered her name in Google an ad appeared with the wording:

"Latanya Sweeney, Arrested? 1) Enter name and state 2) Access full background. Checks instantly. [www.instantcheckmate.com](http://www.instantcheckmate.com)"

This is suggestive wording. It suggests that Latanya Sweeney has a criminal record the details of which can be accessed by clicking on the ad. But after hitting the link and paying the necessary subscription fee, Sweeney says she found no record of arrest.

What's interesting about this is that Sweeney's first name is also suggestive—that she is black. The question Sweeney asks is whether a similar search with a name suggestive of a white racial profile also serves up ads mentioning arrest records.

"Black-sounding" names 25% more likely to be served ad suggesting criminal record

# Ethics

We have to accept that Machine Learning can seem creepy, how do we prevent it from becoming immoral?

We have an **ethical obligation** on to not teach machines to be prejudiced

# RecSys for meetup events

- If dealing with **Content Based** Recommendations which features should be include?

# Women Who Code NYC

[Inicio](#) [Miembros](#) [Patrocinadores](#) [Fotos](#) [Discusiones](#) [Más](#)

[¡Únete a nosotros!](#)



## Nueva York, NY

Fundado 12 de mar 2014

Badass Female Coders 4.718

Evaluaciones 55

Meetups futuros 12

Meetups pasados 116

Nuestro calendario

En todo el mundo 66



### Organizadores:

Women Who Code, Alaina Percival, Barbara



### Mission:

Women Who Code is a global nonprofit organization dedicated to inspiring women to excel in technology careers by creating a global, connected community of women in technology. The organization tripled in 2013 and has grown to be one of the largest communities of women engineers in the world.

### Empowerment:

Women Who code is a professional community for women in tech. We provide an avenue for women to pursue a career in technology, help them gain new skills and hone existing skills for professional advancement, and foster environments where networking and mentorship are valued.

### Key Initiatives:

Free technical study groups

Events featuring influential tech industry experts and investors

Hack events

Career and leadership development

Current and aspiring coders are welcome.

Bring your laptop and a friend!

Support Women Who Code:

StraightDistanceFeature(-0.0311f),  
ChapterZipScore(0.0250f),  
RsvpCountFeature(0.0207f),  
AgeUnmatchFeature(-1.5876f),  
GenderUnmatchFeature(-3.0459f),  
StateMatchFeature(0.4931f),  
CountryMatchFeature(0.5735f),  
FacebookFriendsFeature(1.9617f),  
SecondDegreeFacebookFriendsFeature(0.1594f),  
ApproxAgeUnmatchFeature(-0.2986f),  
SensitiveUnmatchFeature(-0.1937f),  
KeywordTopicScoreFeatureNoSuppressed(4.2432f),  
TopicScoreBucketFeatureNoSuppressed(1.4469f,0.257f,10f),  
TopicScoreBucketFeatureSuppressed(0.2595f,0.099f,10f),  
ExtendedTopicsBucketFeatureNoSuppressed(1.6203f,1.091f,10f),  
ChapterRelatedTopicsBucketFeatureNoSuppressed(0.1702f,0.252f,0.641f),  
ChapterRelatedTopicsBucketFeatureNoSuppressed(0.4983f,0.641f,10f),  
DoneChapterTopicsFeatureNoSuppressed(3.3367f)

# What is a good/bad feature?

## Feature Engineering and Interactions?

- Join! You're interested in Tech || Meetup is about Tech
- Don't Join Group is intended only for Woman || You are a Man
- Don't Join! Group is mostly Men || You are a Woman
- Don't Join! Meetup is about tech || You are a Woman

Recommender Systems  
**should not**  
create stereotypes

# One Solution: Ensemble Models

- Ensemble: Combine output of several classifiers for increased accuracy
- If you have features that are useful but you're worried about interactions (and your model does it automatically) use ensemble modeling to restrict the features to separate models.

# One Solution: Ensemble Models

Data:  
\*Interests  
Searches  
Friends  
Location



Model1 Prediction

Data:  
\*Gender  
Friends  
Location



Model2 Prediction

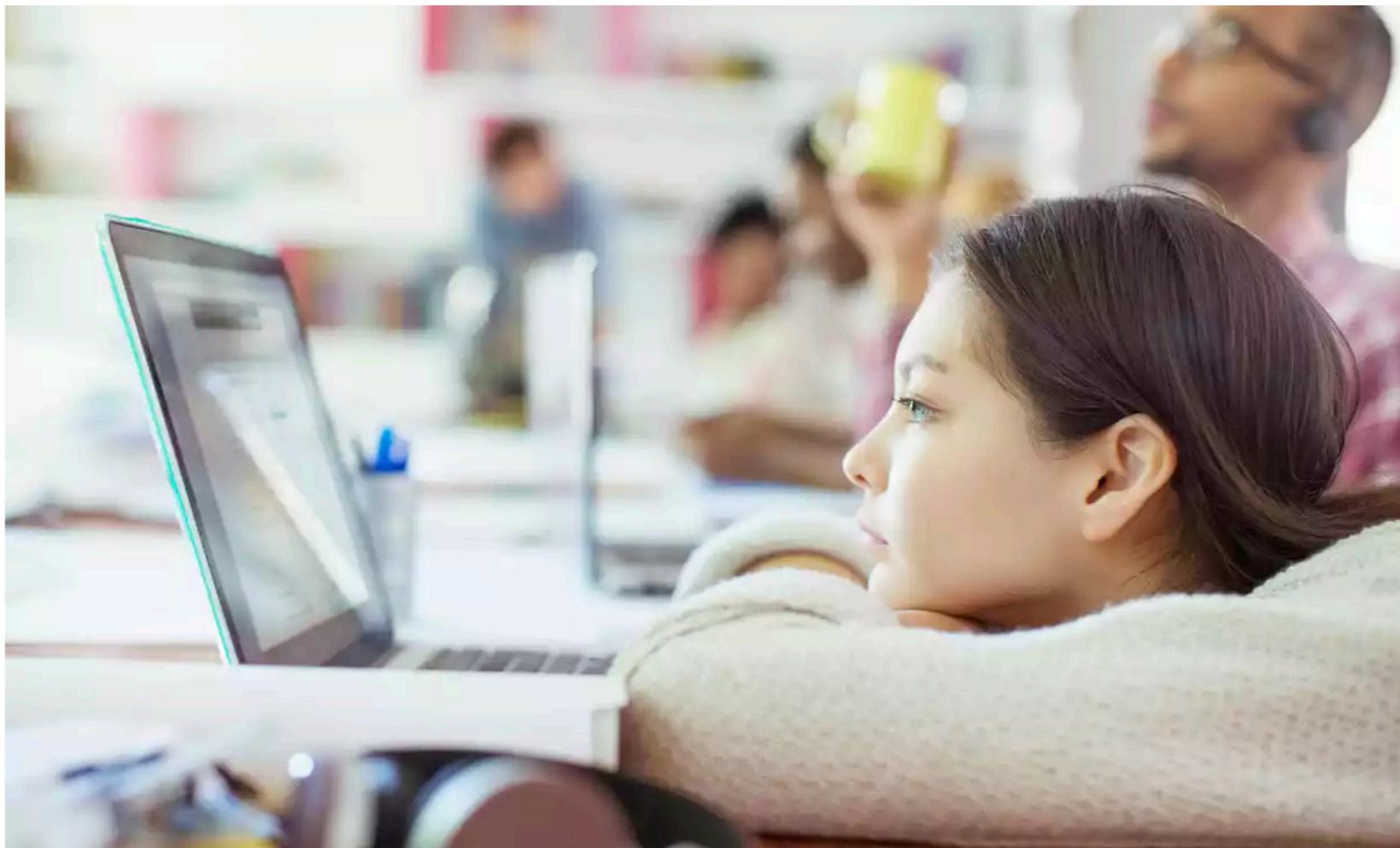
Data:  
Model1 Prediction  
Model2 Prediction



Final Prediction

# Women less likely to be shown ads for high-paid jobs on Google, study shows

**Automated testing and analysis of company's advertising system reveals male job seekers are shown far more adverts for high-paying executive jobs**



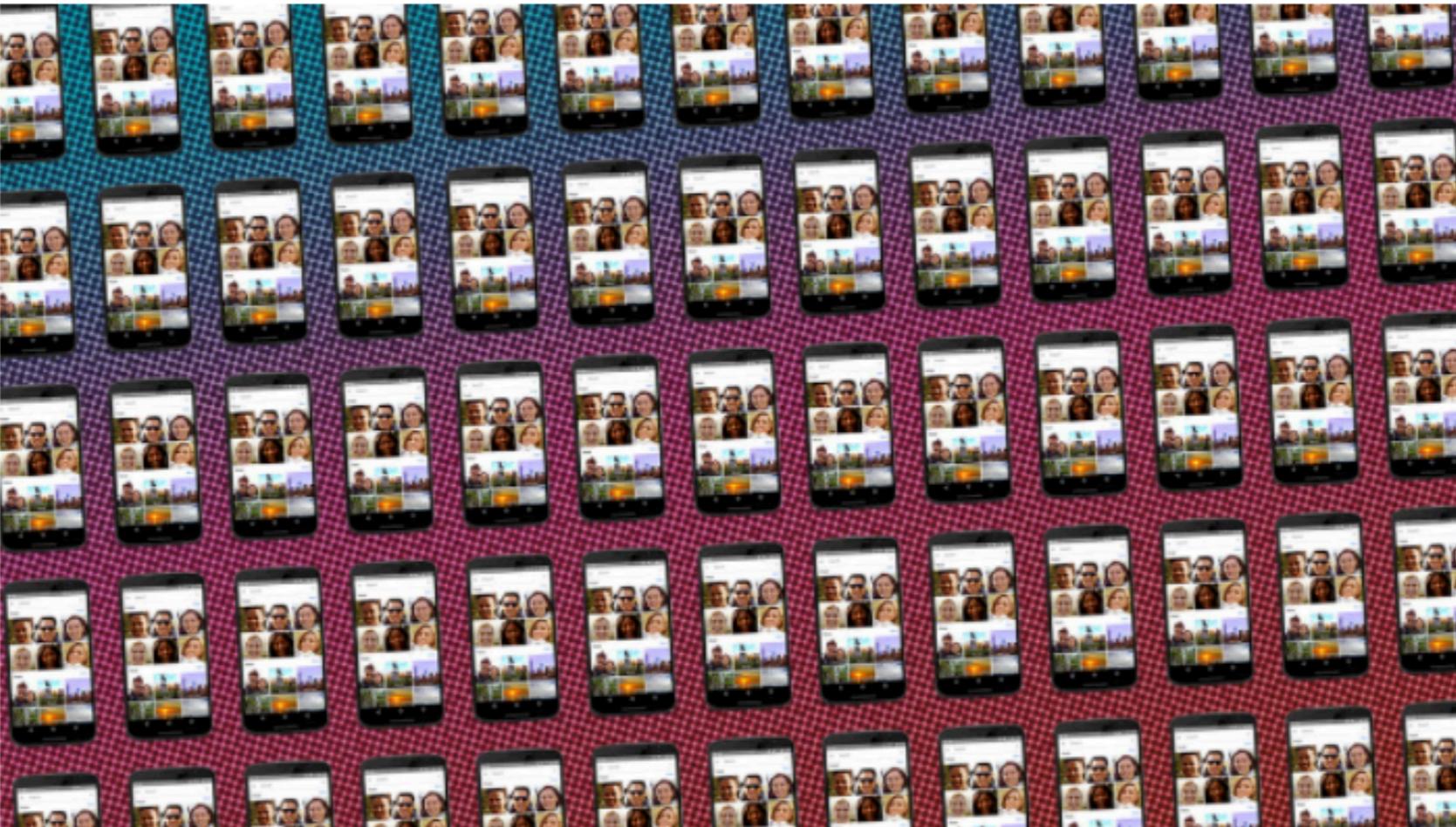
▲ One experiment showed that Google displayed adverts for a career coaching service for executive jobs 1,852 times to the male group and only 318 times to the female group. Photograph: Alamy

Female job seekers are much less likely to be shown adverts on [Google](#) for highly paid jobs than men, researchers have found.

The team of researchers from Carnegie Mellon built an automated testing rig called AdFisher that pretended to be a series of male and female job seekers. Their 17,370 fake profiles only visited jobseeker sites and were shown 600,000 adverts which the team tracked and analysed.

Correlation or Causation?

# "Holy F\*\*K": When Facial Recognition Algorithms Go Wrong



[SCREENSHOT: VIA GOOGLE PHOTOS]



Google's new [Photos](#) service, which uses machine learning to automatically tag photos, made a huge miscalculation on Monday when it automatically tagged two African-Americans as "gorillas." Developers at Google immediately apologized for the gaffe and then worked to fix the app's database.



jackyalciné ez de nu blick penthe @jackyalcine

Replying to @jackyalcine

What kind of sample image data you collected that would result in this son?

Jun 29, 2015





Can machine learning help us find – and reduce – gender bias? Doctor/nurse via shutterstock.com

## Removing gender bias from algorithms

We can test how well the word relationships are identified by using analogy puzzles. Suppose I ask the system to complete the analogy “**He is to King as She is to X.**” If the system comes back with “Queen,” then we would say it is successful, because it returns the same answer a human would.

# Man is to Computer Programmer as Woman is to Homemaker? Debiasing Word Embeddings

Tolga Bolukbasi<sup>1</sup>, Kai-Wei Chang<sup>2</sup>, James Zou<sup>2</sup>, Venkatesh Saligrama<sup>1,2</sup>, Adam Kalai<sup>2</sup>

<sup>1</sup>Boston University, 8 Saint Mary's Street, Boston, MA

<sup>2</sup>Microsoft Research New England, 1 Memorial Drive, Cambridge, MA

tolgab@bu.edu, kw@kwchang.net, jamesyzou@gmail.com, srv@bu.edu, adam.kalai@microsoft.com

Our research group trained the system on Google News articles, and then asked it to complete a different analogy: “Man is to Computer Programmer as Woman is to X.” The answer came back: “**Homemaker.**”

Gender stereotype <i>she-he</i> analogies.		
sewing-carpentry	register-nurse-physician	housewife-shopkeeper
nurse-surgeon	interior designer-architect	softball-baseball
blond-burly	feminism-conservatism	cosmetics-pharmaceuticals
giggle-chuckle	vocalist-guitarist	petite-lanky
sassy-snappy	diva-superstar	charming-affable
volleyball-football	cupcakes-pizzas	hairdresser-barber
Gender appropriate <i>she-he</i> analogies.		
queen-king	sister-brother	mother-father
waitress-waiter	ovarian cancer-prostate cancer	convent-monastery

# Bias

- Obersvation bias or bias that comes from the imbalanced in data.
  - How to solved?

## A Fairness-aware Hybrid Recommender System

G Farnadi, P Kouki, SK Thompson, S Srinivasan, L Getoor  
arXiv preprint arXiv:1809.09030

2018