Detecting price and search discrimination on the Internet

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Customers buy the same product for different prices
We may not be aware that this could happen on the Internet as well
Price difference does not necessary equal price discrimination
Price discrimination

practice of pricing identical goods to different people based on the highest price they are willing to pay (reservation price)
Why study price discrimination?
Privacy, Economics, and Price Discrimination on the Internet
[Extended Abstract]

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Abstract. The rapid erosion of privacy poses numerous puzzles. Why is it occurring, and why do people care about it? This paper proposes an explanation for many of these puzzles in terms of the increasing importance of price discrimination. Privacy appears to be declining largely in order to facilitate differential pricing, which offers greater social and economic gains than auctions or shopping agents. The thesis of this paper is that what really motivates commercial organizations (even though they often do not realize it clearly themselves) is the growing incentive to price discriminate, coupled
Market sizes

$71B

$934B*

* according to Goldman Sachs, by 2013
Search Discrimination

202 Hotels found in San Francisco, 181 available. Showing 1 – 20

Villa Florence Hotel ★★★★★
Union Square, San Francisco, CA • Show map
This California boutique hotel, half a block from Union Square, features Italian-design influences in the heart of San Francisco. There are 4 people looking at this hotel. More
Latest booking: 1 hour ago

Double Room
Save 46% ¥ 200 ft² Only 2 left
Price ¥ 186.40

Very good, 8.1
Score from 659 reviews

Book now

Queen Anne ★★★★★
San Francisco, CA • Show map
This historic, Victorian boutique hotel is in downtown San Francisco, 1 mile from Union Square. There is 1 person looking at this hotel. More
Latest booking: 8 hours ago

Standard King or Queen Room
Breakfast included ¥ 300 ft² Only 2 left
Price ¥ 275.00

Deluxe King Room
Breakfast included ¥ 300 ft² Only 2 left
Price ¥ 275.00

Deluxe King Room with Fireplace
Breakfast included ¥ 300 ft² Last chance! Only 1 left
Price ¥ 275.00

> 3 more room types

202 Hotels found in San Francisco, 181 available. Showing 1 – 20

The Fairmont San Francisco ★★★★★
Nob Hill, San Francisco, CA • Show map
Featuring a full-service spa and 2 unique dining experiences, this historic downtown San Francisco hotel is a 10-minute walk from the closest cable car stop. Concierge services are provided daily. There is 1 person looking at this hotel. More
Latest booking: 24 minutes ago

Queen Room
FREE cancellation
¥ 275 ft² Only 5 left
Price ¥ 359.00

King Room with City View
FREE cancellation
¥ 275 ft² Available
Price ¥ 389.00

Queen Room with Two Queen Beds and City View
Save 34% FREE cancellation
¥ 275 ft² Available
Price ¥ 429.00

Deluxe Queen Room with Two Queen Beds with City View
Save 34% FREE cancellation
¥ 275 ft² Available
Price ¥ 499.00

Signature King Room with Bay View
FREE cancellation
¥ 275 ft² Available
Price ¥ 539.00

Signature Room With Two Queen Beds with Bay View
FREE cancellation
¥ 275 ft² Available
Price ¥ 579.00

King Suite with Parlor - Main Building
FREE cancellation
¥ 275 ft² Available
Price ¥ 609.00

King Suite with Bay View - Tower Building
FREE cancellation
¥ 275 ft² Available
Price ¥ 759.00

Standard Room
Save 37% FREE cancellation
¥ 275 ft² Only 5 left
Price ¥ 329.00

> 6 more room types

Taj Campton Place ★★★★★
Union Square, San Francisco, CA • Show map
Just steps from Union Square, this historic yet modernized hotel features classic

Excellent, 8.8
Score from 92 reviews

Book now
Search Discrimination

- e.g. Bobble: filter bubble due to search personalization @ GTech
Economic implications
On Orbitz, Mac Users Steered to Pricier Hotels

By DANA MATTIOLI

Orbitz Worldwide Inc. [OWW +2.35%] has found that people who use Apple Inc.'s [AAPL -1.17%] Mac computers spend as much as 30% more a night on hotels, so the online travel agency is starting to show them different, and sometimes costlier, travel options than Windows.
How do we do it and what did we find?
Information vector: system

No PD, no SD
Information vector: location
Information vector: location

- 6 Locations: NY, LA, DE, SP, SK, BR
- Everything same except IP address
- NTP synchronized
- NO discrimination.. except..
Kindle e-books

Difference: 21% to 166%
Steam

Mean difference: 20%
Staples
Information vector: personal information

Does your PI/interests, inferred via browsing information, cause PD?
We created two online personas

Affluent

Budget conscious
Personas based: Affluent

i) Visit sites that classify you as ‘affluent’ via AudienceScience

- ROLEX

ii) Enable tracking for 2 weeks on 200 sites with 65 products
What do we see?

- **Price discrimination: NO discrimination**
- **Search: Some discrimination**
Personas: Search Discrimination (cheaptickets)

Mean difference ~ 15%
How would you do it?

- Too much infrastructure needed
- Use ad-networks?
- Idea: Use origin/referer
- Coming from a price aggregator site can out you as price sensitive
nextag -> shoplet

Mean difference ~ 26%
Can be due to special contracts
Disclaimers/Limitations

- Preliminary study, 200 online vendors, 65 product categories
- Fine scale temporal variations
- We take measurements multiple times
- Assume information vectors in isolation will trigger PD
- Underestimating PD
Summary

- Price discrimination is important tool to price
- Developed a methodology to uncover PD
- Initial results
- Tool for price comparison, available for beta testing

http://pdexperiment.cba.upc.edu