Do we get different prices as individuals?

No, the (assumed) dates were different. By specifying the dates, both prices matched.
What is an algorithm?

• An algorithm is a **proven procedure to solve a mathematical problem.**
  • Or, given two cities A and B, and a street map, find the shortest path from A to B.
  • E.g., given the products and their popularity find the best prices according to some price model.

• Algorithms from machine learning try to find rules and patterns in heap of data
Recommendation systems

• Quite primitive algorithms to find patterns in consumer behavior.

• In the main setting, we have some product and some human behavior.

• Now, an algorithm can be used to:
  • Find products that illicit common human behavior.
  • Find humans that behave similar with respect to the product.

• Grouping of products and categorization of humans
How does it work?

• Just one method:
  • For each good, count the number of pairs of humans with the same, wanted behavior (e.g., people who liked movie A and movie B)
  • Compare to expected value in a well-defined statistical model (e.g., reduce by expectation if both movies are bestsellers)

• The actual intelligence is in the human behavior.

• The machine just identifies the pattern.
A powerful method: AB-Testing

• With costs for personalized websites, personalized discounts, personalized prices, personalized memberships... going to zero,

• .... and people categorized into groups of similar people,

• ... and products categorized into groups of similar products,

• .... AB-testing is achievable:
  • Put people from one category randomly in one of two groups (treatment and control group)
  • Treat differently (show different prices, different advertisement, different information, ....)
  • Measure the effect on the wanted human behavior.

Any human behavior of interest:
Ratings, Streaming behavior, Carts, Check outs, Click behavior
Example

Google checked whether to use 10 or 30 results on the first page¹.

- A difference in milliseconds in computing time.
- Users were significantly less likely to use Google when it took longer to load the page.

¹ https://www.cnet.com/news/were-all-guinea-pigs-in-googles-search-experiment/
For other examples, see here (unverified) https://www.designforfounders.com/ab-testing-examples/
AB-Testing at Trivago

As posted by Nidhal Satouri https://nidhalios.github.io/AB-Testing-Trivago-post/
Can personal pricing be achieved?

• Definition:
  • A price that is individually tailored to each user, based on their history with the site, their similarity to other users, and the similarity of the products they are interested in.

• YES.

• Do we see it now?

• It does not seem so.
  • Consumers react badly to this kind of pricing behavior.
Most seemingly personalized pricing is dynamic pricing

• Algorithms can also find regular dynamic patterns
  • Seasonal sales
  • Willingness to buy at different times of day

• Data warehouses know exactly the number of seats/rooms left;
  • This enables KONTINGENT based prices
  • These are not individual as each user will see the same price at the same time
There’s a continuum

- Same price for all customers at all times
- Dynamic pricing
- Slightly different products [price differentiation]
- Discounts for members
- Steering [Showing Products in a personalized order]
- Strong personalization of website [Extreme Steering]
- Personal prices [Price discrimination]
What to do?

• Control by black-box-methods with automated tools for discrimination
  • Steering (different orders of results)
  • Different layouts, additional labels, banners, ...
  • Different prices or discounts

• If there is some proof for discrimination, you need technicians to look 'under the hood'.

• It might be downright manipulation or come from the interactions of the users with the algorithm.

Lorena Jaume-Palasí, Law philosopher

Lorenz Matzat, Data journalist

Matthias Spielkamp, Journalist

Prof. Dr. K.A. Zweig