Adaptive Customization

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Abstract

This research aims to customize feature-based filtering menus and product displays offered by most online retailers. We learn customers’ preferences each time a feature is selected and customize the overall display.

Offline component: Estimates parameters of a probabilistic screening process used by latent customer segments

Online component: Uses Bayes’ theorem to dynamically compute probability of selecting one of the remaining features after each screening

Screening Process and Next-Click Prediction

Algorithm 1 Simulation of the screening process for one synthetic customer and the forecast of his/her segment membership and the selection of the next screening feature

1: $s^* = p(1, \ldots, S)$  
2: $r = 1$  
3: while $|C(\{s_1^*, \ldots, s_n^*\})| > 1$ do  
4: \hspace{1cm} Initiate feature counter  
5: \hspace{1cm} Screening Process  
6: \hspace{1cm} $p(s|s_1^*, \ldots, s_n^*) = \frac{p(s_1^*, \ldots, s_n^*, s)}{\sum_{s'} p(s' | s_1^*, \ldots, s_n^*)}$  
7: \hspace{1cm} Update probability  
8: end if  
9: $s^* = p(s|s_1^*, \ldots, s_n^*)$  
10: $s_i^* \sim p(s_i|s_1^*, \ldots, s_n^*)$  
11: $s_i^* = \{s_i^* \mid s_i^* = s_i^*\}$  
12: $H_i := \{s_i^* \mid s_i^* = s_i^*\}$  
13: $H_i := \{s_i^* \mid s_i^* = s_i^*\}$  
14: Increment feature counter  
15: end while  
16: Note: $(s_1^*, s_2^*) = \emptyset$

Attributes and Alternatives Display

After each screening, we compute probabilities of selecting each attribute and product and order the displayed products accordingly

Featuring an Attribute

Recommend a single alternative for each level of a featured attribute by calculation the expected revenue for each attribute.

Screen size maximizes revenues and all products featured should be $399$ iPad with a $64$ GB hard drive, $4$ GB RAM and $9$-hour battery.