

Module 12: Display Advertising Data

Inputs: Predicted Click-Thru-Rates

“hotel near MIT”				
Hotel	Ad Position			
	1	2	3	4
Kendall	0.097	0.061	0.030	0.020
Marriott	0.048	0.034	0.017	0.007
Sonesta	0.065	0.040	0.020	0.008
Marlowe	0.086	0.054	0.027	0.011

“MIT hotel”				
Hotel	Ad Position			
	1	2	3	4
Kendall	0.097	0.061	0.030	0.012
Marriott	0.054	0.034	0.017	0.007
Sonesta	0.076	0.047	0.024	0.009
Marlowe	0.086	0.054	0.027	0.011

“Cambridge hotel”				
Hotel	Ad Position			
	1	2	3	4
Kendall	0.081	0.051	0.025	0.010
Marriott	0.070	0.044	0.022	0.009
Sonesta	0.086	0.054	0.027	0.011
Marlowe	0.108	0.067	0.034	0.013

Inputs: Bids, Budgets, and Queries

Bids per advertiser and per query

Hotel	“hotel near MIT”	“MIT hotel”	“Cambridge hotel”
Kendall	\$8	\$12	\$1
Marriott	\$25	\$15	\$25
Sonesta	\$15	\$1	\$15
Marlowe	\$15	\$20	\$10

Daily budget

Hotel	Budget
Kendall	\$10
Marriott	\$50
Sonesta	\$20
Marlowe	\$30

Number of queries per day

	“hotel near MIT”	“MIT hotel”	“Cambridge hotel”
queries	15	20	25

- We can compute the quality score for each bidder-query pair:

$$\text{Quality Score} = \text{Bid} * \text{Click-Through Rate (CTR)} * 1000$$

Price-Per-Click (PPC) table

Price Per Click table

Bidder	“hotel near MIT”	“MIT hotel”	“Cambridge hotel”
Kendall	\$0.01	\$8.36	\$0.01
Marriott	\$20.32	\$1.42	\$18.43
Sonesta	\$11.94	\$0.01	\$12.56
Marlowe	\$13.96	\$13.54	\$0.76

- PPC represents the amount the advertiser pays to the platform each time a user clicks on their ad
 - PPC is a cost from the advertiser’s perspective—and thus plays a role in ensuring that each advertiser does not exceed its budget
 - PPC is a revenue from platform’s perspective—and thus plays a role in determining the optimal ad to display for each query

Price-Per-Click, Budgets, Queries

Price Per Click

Bidder	“hotel near MIT”	“MIT hotel”	“Cambridge hotel”	Budget
Kendall	\$0.01	\$8.36	\$0.01	\$10
Marriott	\$20.32	\$1.42	\$18.43	\$50
Sonesta	\$11.94	\$0.01	\$12.56	\$20
Marlowe	\$13.96	\$13.54	\$0.76	\$30

	“hotel near MIT”	“MIT hotel”	“Cambridge hotel”
queries	15	20	25

