Online learning

Shipping service website where user comes, specifies origin and destination, you offer to ship their package for some asking price, and users sometimes choose to use your shipping service ($y = 1$), sometimes not ($y = 0$).

Features x capture properties of user, of origin/destination and asking price. We want to learn $p(y = 1|x; \theta)$ to optimize price.

price

logistic regression

Repeat forever {

Get (x, y) corresponding to user. $(x^{(i)}, y^{(i)})$

Update θ using (x, y):

$$\theta_j := \theta_j - \alpha (h_\theta(x) - y) \cdot x_j \qquad (j = 0, \ldots, n)$$

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Can adapt to changing user preference.

Other online learning example:

Product search (learning to search)

User searches for "Android phone 1080p camera"

Have 100 phones in store. Will return 10 results.

→ $x =$ features of phone, how many words in user query match name of phone, how many words in query match description of phone, etc.

→ $y = 1$ if user clicks on link. $y = 0$ otherwise.

→ Learn $p(y = 1|x; \theta)$. predicted CTR

→ Use to show user the 10 phones they're most likely to click on.

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Other examples: Choosing special offers to show user; customized selection of news articles; product recommendation; …

(x, y)