Test headlines on News Media by Multi-Armed Bandit

Case Study of Multi-Armed Bandit to raise CTR of Articles

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ABSTRACT

Headlines and thumbnails are important for media to engage users and show more articles. Reading more articles encourages users to keep the subscription and drives more impressions of advertisements.

Nikkei is the world's largest financial newspaper, with a daily circulation of around 3 million. There is a digital version service [1] available, and the subscription system with "Nikkei ID"[2] enables us to grasp the attribute information of users.

Nikkei.com's homepage has 36.3 million page views per month, this is over 13.7% of total page views of the whole website [3].

Nikkei's newsroom provides headlines, thumbnails, and description for each article on the homepage. It's hard to know what kind of headlines and thumbnails encourage users to click before publishing articles.

To address this problem, Nikkei prepared 1)a tracking system for impressions and clickthrough for all articles on homepage, 2)editing function to set another headline, thumbnail, and description as a test on CMS, 3) algorithm to execute the test to change the headline, thumbnail, and description for each sessions for users.

The algorithm used at Nikkei is an Upper Confidence Bound (UCB) bandit, therefore headline A which has lower CTR at an early time sometimes wins after raising CTR over headline B.

Nikkei provides criteria to judge when the test should be finished and show the "confidence score" for editorials to stop the test and use the better headline, thumbnail, and description.

A confidence score is based on Cumulative Distribution Function (CDF) because it's better if the number is bigger and it's easy to understand for Editorials.

The condition to stop tests is 1) Confidence score is over 97.5%, 2) total impression is over 100,000, 3) over 2 hours.

In some cases, 3 times higher CTR was obtained, and in other cases, there was almost no difference.

Feature	Description
Tacking System	To track impressions and clickthrough of all articles on homepage
Editing Function	To set another headline, thumbnail, and description
	To execute tests
Algorithm	UCB bandit
Condition to stop	Confidence score (CDF) is over 97.5%
	Total impression is over 100,000
	Over 2 hours

Figure 1: The overview of system to provide test by Multi Armed Bandit

KEYWORDS

Multi-Armed Bandit, UCB, CTR, Editorial tech

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