

An Analysis of the Profitability of Pacing Heuristics in Real-Time Online Advertising

Marc Heise, Nadia Abou Nabout, Bernd Skiera

Real-time advertising (RTA) is considered as a revolution for online display advertising because it enables advertisers to buy single impressions at individual prices in real-time auctions, instead of bulk-buying impressions at fixed prices via pre-negotiated contracts. The ability to change the bid at any point in time allows advertisers to allocate the campaign budget considering the time of the day and, thus, the profitability of the respective time slot (intra-day optimization). But inconsistencies in historical campaign data and the lack of skills in data analytics lead to advertisers' perception that intra-day optimization is too costly and difficult. Instead, advertisers use so-called even pacing heuristics (EP) that aim at spending the campaign budget evenly throughout a day, by increasing bids when the campaign is underspending, which usually happens at night when traffic is low. Yet, advertising effectiveness (e.g., click rates) tends to be low at night. Thus, EP bids higher for less profitable impressions. Moreover, campaign budgets that are higher than what a profit-maximizing advertiser without budget constraint would spend (optimal profit) force EP to submit too high bids in comparison to the optimal bid. This article analyzes how much EP's profit deviates from the optimal profit. The authors propose a new method for profit-maximizing pacing (PMP) that accounts for the advertiser's budget constraint but sets bids, which reflect differences in advertising effectiveness over time. Using a simulation study and four empirical data sets, the authors find that EP's profit deviates from the optimal profit by -23% to -89%. Interestingly, too high budgets only yield to high deviations from the optimal profit for EP, not for PMP.

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Marc Heise and Prof. Dr. Bernd Skiera, Faculty of Business and Economics, Department of Marketing, Goethe University Frankfurt, Theodor-Adorno-Platz 4, 60323 Frankfurt am Main, Germany, phone: +49 69 798 34649, fax: +49 69 798 35001, mheise@wiwi.uni-frankfurt.de, skiera@skiera.de.

Prof. Dr. Nadia Abou Nabout, Department of Marketing, Institute for Interactive Marketing & Social Media, Vienna University of Economics and Business (WU), Welthandelsplatz 1, 1020 Vienna, Austria, phone: +43 1 31 336 4900, fax: +43 1 31 336 90 4900, nadia.abounabout@wu.ac.at.