

Maximizing ROI for Search Advertising Placement

BrainPad optimizes online search advertising across millions of keywords, in just 10 minutes.



BrainPad is an innovative company with leading expertise in analytics. Since its establishment in 2004, BrainPad has been supporting over 500 clients in improving their business. BrainPad's services include prediction / analysis services, system integration, and digital marketing services.

Industry: Advertising and Marketing

Location: Asia

Use Cases: Marketing Optimization

Website: www.brainpad.co.jp/english

Results

With Gurobi, Brain Pad optimizes online search advertising across millions of keywords—in only 10 minutes, compared to over an hour with another commercial solver.

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In this era of the advanced information society, corporations have a large amount of data, i.e. "big data". BrainPad Inc. extracts the necessary knowledge from this "big data" and offers solutions that utilize this knowledge for numerous operations. We offer solutions that utilize optimization technology, such as the automatic search advertising optimization tool L2MixerASP service, and other innovations developed in response to our clients' requests. Also, we have developed a comprehensive recommendation tool for the Rtoaster recommendation engine (kernel methods were used), offering comprehensive marketing solutions.

Analytics have become a critical issue, because the key to success in business is to make correct and efficient decisions

by determining which data is most important and the best methods to analyze it. Today, with the very wide use of the internet, analysis of online data has to be included. On many search engines and other sites, search advertising is frequently employed. Based on a search keyword, the most closely related advertisements are displayed on the site. For each of those search advertisements you are casually viewing, behind the scenes a flood of data analysis has instantaneously been performed. For advertisers, it is essential to maximize the ROI (cost-benefit performance) of search advertising. Optimization technology can be utilized as a core technology for efficient search advertising systems.

Automatic Search Advertising Optimization Tool: L2Mixer™

Automatic search advertising optimization tool L2Mixer™ employs Gurobi Optimizer as a mathematical optimization solver for its automatic search advertising optimization tool with intelligent features. In the largest cases, several hundred thousand to several million keywords are placed, but L2Mixer™ has found that automatic optimization of search advertising can greatly streamline the work and planning of placing advertisements.

Automatic placement by optimization calculations that utilize the API of Yahoo and Google dramatically diminishes operational work of advertisers' search advertising placements. L2Mixer's auto-bidding feature quickly calculates the best placement plan that maximizes the target value (numbers of conversion etc.) after meeting constraint conditions such as daily budget and CPC (Cost Per Click), and automatically submits bids for each medium (optimized bidding).

For example, in the case of a target setting such as "maximize the number of clicks with the limitation of a CPC below 200 yen" with 3 keywords, the



Manual method = "point" analysis

Keyword: scheduler				Keyword: teamwork				Keyword: web DB			
Rank	CPC	Number of clicks	Cost	Rank	CPC	Number of clicks	Cost	Rank	CPC	Number of clicks	Cost
1	240	50	12,000	1	1,000	150	150,000	1	300	27	8,100
2	230	35	8,050	2	800	130	104,000	2	250	25	6,250
3	220	30	6,600	3	700	120	84,000	3	200	20	4,000
4	200	15	3,000	4	600	80	48,000	4	150	15	2,250
5	180	14	2,520	5	500	70	35,000	5	120	10	1,200
6	150	13	1,950	6	400	60	24,000	6	100	8	800
7	100	10	1,000	7	300	50	15,000	7	90	6	540
8	50	5	250	8	200	30	6,000	8	80	5	400
9	30	3	90	9	170	20	3,400	9	50	2	100
10	9	1	9	10	100	5	500	10	9	1	9

Using L2Mixer = "plane" analysis

Keyword: scheduler				Keyword: teamwork				Keyword: web DB			
Rank	CPC	Number of clicks	Cost	Rank	CPC	Number of clicks	Cost	Rank	CPC	Number of clicks	Cost
1	240	50	12,500	1	1,000	150	150,000	1	300	27	8,100
2	230	35	8,050	2	800	130	104,000	2	250	25	6,250
3	220	30	6,600	3	700	120	84,000	3	200	20	4,000
4	200	15	3,000	4	600	80	48,000	4	150	15	2,250
5	180	14	2,520	5	500	70	35,000	5	120	10	1,200
6	150	13	1,950	6	400	60	24,000	6	100	8	800
7	100	10	1,000	7	300	50	15,000	7	90	6	540
8	50	5	250	8	200	30	6,000	8	80	5	400
9	30	3	90	9	170	20	3,400	9	50	2	100
10	9	1	9	10	100	5	500	10	9	1	9

A larger number of patterns can be discerned by viewing it as a plane, so the best bidding combination can be found

Simple bidding method		Number of clicks	65
Bidding at CPC=200 yen per keyword		Cost	13,000 Yen
		CPC	200 Yen

Number of clicks increased

Optimized bidding for L2Mixer

Bidding with number of clicks maximized

Number of clicks

Cost

CPC

70

13,700 Yen

195.7 Yen

* CPC (Cost Per Click) = cost for one click * These numbers are samples

Figure 1. L2Mixer's optimized bidding.

number of click increases as indicated in Figure 1, improving CPC. So the best combination for bidding is found instantaneously from an enormous quantity and combination of patterns, automating keyword placement plans for search advertising which previously had to be handled by a person. L2Mixer™ can make operations more efficient and stable, without relying on the skill level of the person involved.

Employing Gurobi Optimizer

With the 1984 publication of the interior point method by Mr. N. Karmarkar of AT&T Bell Labs, optimization technology reached a turning point. In 1988, the International Symposium on Mathematical Programming (ISMP) was held in Tokyo, and many prominent researchers in optimization technology visited Japan. Since then, mathematical optimization programs have continued to make astonishing progress.

I've specialized in mathematics since my college years, and I've had an eye on the Gurobi Optimizer ever since it was introduced in Japan. For L2Mixer™, we were using other commercial mathematical optimization solutions until we adopted Gurobi Optimizer. The previous program couldn't process SOS restrictions (restrictions that can handle linear functions) at high speed, and it took over 1 hour to perform optimization calculations for millions of keywords.

In 2010, Gurobi Optimizer became available in Japan and we conducted an evaluation test. The optimization calculation was done within 10 minutes. Also, since L2Mixer™ is offered with ASP service, the included mathematical optimization solver is cheaper, and in order to offer better service a flexible licensing structure was essential. Gurobi

Optimizer was a satisfactory solver both in price and licensing structure. With Gurobi Optimizer, investments in hardware no longer greatly affect investments in software. Because of this, and with consideration for operational streamlining for L2Mixer™ end-users, we decided to switch to Gurobi Optimizer. BrainPad Inc. will continue to enhance its various services through a combination of analytics and optimization technology.

Gurobi Optimizer can solve MILP (mixed integer programming) problems faster than other programs, and even more speed is expected—specifically, algorithms for the advancement of hardware multi-core technology and the continuous adoption of the newest technology. Analysis of big data is becoming more and more important today, and it's inevitable that customers will continue to need us to analyze those vast amounts of data and immediately offer the best answer.

With Gurobi Optimizer offering such high performance, I'm certain that optimization technology will continue to be useful in many business situations.

About BrainPad Inc.

BrainPad Inc. was established in March 2004 and went public on the Market of High-Growth and Emerging Stocks ("Mothers") in September 2011. As a one-stop service business that can handle an enormous quantity of data for its client companies, we offer comprehensive solutions based on behaviour analysis, including consulting that uses the PDCA (Plan-Do-Check-Act) cycle in order to conduct the most appropriate campaigns.

Optimization technology is utilized in fields such as analytics, where, after

conducting a campaign, customer feedback is compiled in a database and analyzed with precision. In order to solve problems that current computing power can't solve, in the field of optimization we are now developing our own systems that can quickly calculate the best answer for customers by applying operations research (OR) and mathematical modelling to the marketing field.

There are a number of marketing problems that optimization technology can solve, and it's possible to dramatically improve ROI (cost-benefit performance) for various business areas by combining it with data mining. BrainPad's analysis and optimization service offers a comprehensive range of services that utilize optimization technology efficiently and are useful for a variety of business challenges.

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