



Carousel for web advertising

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CAROUSEL



Carousel for ad recommendation

Table of Contents

How Carousel works	3
Carousel on Lycos	4
Carousel vs. benchmarks	7
Why choose Carousel?	7
What you need to use it	8



How Carousel works

Carousel handles a collection of ads and a collection of slots and at any given time chooses which ad is to be delivered into which slot.

Said in this way it sounds very simplistic, but this is really the core problem an ad recommender has to solve. You also have to handle campaigns, advertisers, sites, publishers, user profiles, ask and bid offers, and these are important tasks. But all this stuff is not very useful if you are not really dealing with the main issue: finding the best ad for that slot at that moment. The optimization algorithm is the very source of your advertising revenue, be you an advertiser, a publisher or a network.

This being the basic task, you have a lot of ways of dealing with it. Carousel is founded on a proprietary technology which mixes three methods:

1. *Contextual targeting*: deliver the ad best suited to the content of the page containing the slot.
2. *Behavioral targeting*: deliver the ad best suited to the user viewing the page.
3. *Online auction*: deliver the ad which promises the greatest economic revenue.

Combining these different methods is a respectable achievement on its own. Yet, it is not the whole story. Carousel adds a fourth ingredient to the recipe:

4. *Real-time learning*: track ad performance and jump on the leading horse.

Real-time learning is the wildcard in Carousel's hand. Its ad delivery policy changes very quickly, say each minute. Carousel performs both *forecasting* and *tracking* simultaneously. Forecasting means formulating hypotheses about the most promising ads (because they contain the right keywords, or fit well with the user profile, or offer a large bid). Tracking means checking hypotheses against the reality of economic performances (how many clicks, conversions and money an ad has really gained). This is simply the scientific method: *exploration* of new hypotheses, *exploitation* of the successful ones, ceaseless *learning*.

Relying on forecasting is cheap and risky, relying on tracking is dependable and expensive, wisely balancing them is challenging and is the key. Carousel's algorithms performs this balancing act.

This is the core of Carousel: a wide range of recommendation methods steered by a learning machine. In a dynamic environment like online ad campaigns, pre-cooked



methods are not satisfactory: real-time learning is the right way to effectively unearth opportunities emerging (and vanishing) from a varied world of users encountering a confusing plethora of ads.

Carousel on Lycos

Carousel has already run on *tripod.lycos* in order to optimize a collection of campaigns. Its performance has lived up to its promises perfectly. It has been able to quickly discover the best performing ads and ad formats on different pages, remaining able to quickly change its mind when an emerging ad overcomes a declining leader. After a few days, Carousel's performance was 99.8% of the performance of the best ad.

In other words, if at the beginning of the campaign you had chosen the best performing ad and then you had delivered that and only that ad, you would have achieved in practice the same outcome (i.e. revenue generated by clicks). That is to say, Carousel was almost perfectly equivalent to a wizard crystal ball magically anticipating the campaign lifecycle. At a certain moment, Carousel was performing *better* than the best ad. This is a no nonsense statement: if during the race you have many changes of leadership, you can extract more value from the whole campaign than from a single ad, even if it is the best one. Indeed, Carousel can track the current leader during each phase and its performance is incredibly close to the average performance of the leaders, while no leader maintains such a performance level along its lifecycle.

The enclosed figure shows a single moment of the campaign, just as an example. It is worth noting that here Carousel is handling a page with two ads of different formats (square at the bottom of the page, rectangular in the pop-up). Here Carousel is choosing the best ad 1) for each format, 2) on that page, 3) at that time of the day. We cannot write "4) for that user" simply because user profiles are not available.



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Impressum
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Figura 1 An example of how Carousel worked on the *tripod.lycos* home page

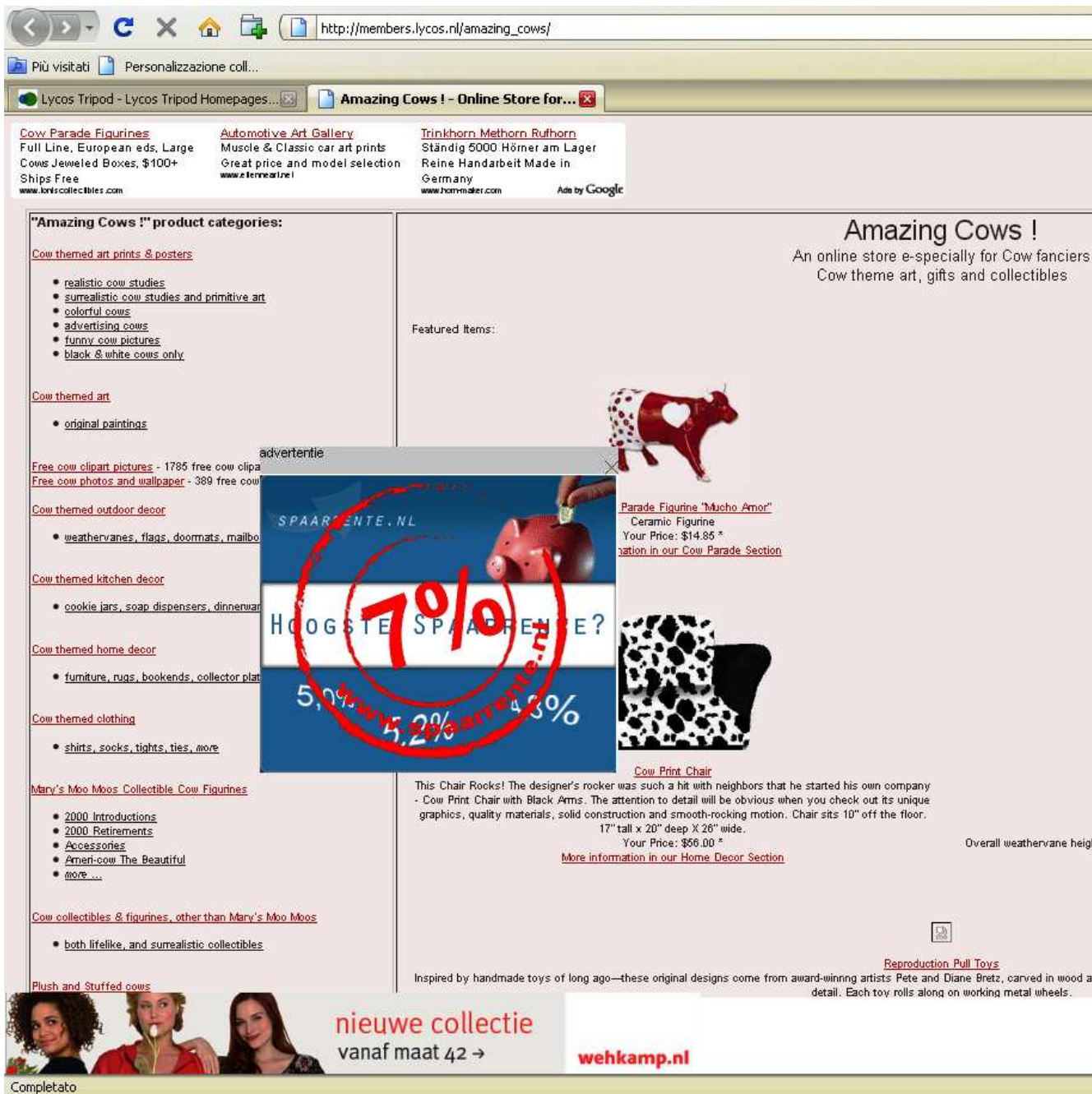


Figura 2 An example of how Carousel worked on an internal page of *tripod.lycos*



Carousel vs. benchmarks

Each product has to be proven in the field, in real environments. Yet, no single real life problem can try each feature of a recommendation technology. You also need systematic laboratory tests against benchmarks in a large range of situations on a large collection of simulated data. Carousel was tried against a lot of algorithms reported by scientific literature (Noesis was originally an academic spin-off, and therefore well-informed on this). Tests confirm that Carousel's technology outperforms all proposed algorithms, to the best of our knowledge.

Why choose Carousel?

Carousel provides many premium features:

- It optimizes ad selection better than any algorithm available in scientific literature.
- It optimizes many metrics: clickthrough, conversion rate, revenue, everything you are able to measure. It manages bids, budgets, goals and other economic concepts.
- It can perform contextual and behavioral targeting, but it also works well without them.
- It can be used as an ad server on its own as well as a web service for your ad server.
- It is very simple to put to work (nothing to install).
- It is extremely quick (thousands of requests per second).
- It is also available in the content recommendation version, so you can have the two services with a single provider. It handles both free texts (like news) and tagged contents (like news, blog posts and video streams).



What you need to use it

Carousel can be used in different ways. Two main options are available: you can use Carousel as a web service available for your ad server, or as an ad server on its own. The first way was chosen for *La Repubblica* (a leading Italian newspaper) for the news recommendation version of Carousel and is interesting to those already having a legacy ad server. Carousel exchanges messages with your ad server very frequently, say every minute, updating recommendations. Then your server handles the traffic without involving Carousel at all. With this scheme, the speed of your service is unchanged, almost as if you were not using Carousel.

The second way, using Carousel as an ad server on its own, is the traditional one. You put a script provided by us on every page you want to include in the recommendation service. When the page is downloaded by a reader, it calls Carousel and gets the link to the ad to be delivered. If the reader clicks on a recommended ad, the script calls Carousel and records the click. Carousel handles the traffic while you assess the process with a real-time report web page, if you like.

This second approach is simple and quick, because you do not need to develop software. The first one, using Carousel as a web service, is a bit more complex, but allows you to functionally integrate Carousel with third-party products, which can be a priority for you, for example due to confidentiality reasons.

In practice, using Carousel as ad server is perfectly satisfactory for normal requirements. You could start in this way in a first phase, and afterwards decide if and when to move toward an integration with another platform. We have found this flexible choice to be particularly appealing to publishers.



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