Using survival analysis for marketing attribution (with a big data case study)

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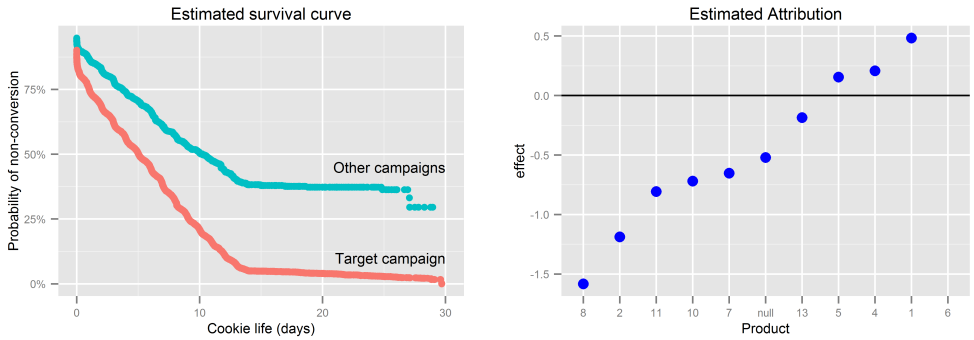
A central question in advertising is how to measure the effectiveness of different ad campaigns. In online advertising, including social media, it is possible to create thousands of different variations on an ad, and serve millions of impressions to targeted audiences each day.

Rather too often, digital advertisers use the **last click attribution model** to evaluate the success of campaigns. In other words, when a user clicks on an ad impression, only the very last event is deemed as signficant. This is convenient but doesn't help in making good marketing decisions.

Survival analysis is widely used in the modeling of living organisms and time to failure of components, but Chandler-Pepelnjak (2010) proposed to use survival analysis for marketing attribution analysis. The insight is that each event in a clickstream (the series of impressions and clicks) gives an indication of whether the clickstream is still alive. Only at the final click (or impression), when the user converts to purchase, does the clickstream "die". These effects can be estimated with the Cox proportional hazards model, using the function `coxph()` in package **survival**. This allows the estimation of time effects, the effects of clicks, media format and other factors.

We illustrate this approach using a small dataset of impression and click data of 750K events, representing 135K purchase events, mainly arising from advertising on Facebook and other social media.

In conclusion, we provide a big data case study, showing how Upstream used Revolution Analytics to process 50 million survival models each day.



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