Beat Google’s bidder using ML

Dolead RD team
Arnaud Fouchet
Paid search basics
Paid search basics

BTS à Distance | Reconnus par l'Etat | enaco.fr
www.enaco.fr
Un PC tablette Acer offert pour toute inscription à une formation. Accessible 24h/24.

Bts Nrc par Correspondance | Reconnu par l'État, Niveau 3
www.formations.io/Bts-Nrc/Correspondance
Bts Immobilier Distance • Formation Bts a Distance • Bts Expert Comptable • Bts Agent Immobilier

Préparer un BTS et obtenir un bac + 2 - CNED
www.cned.fr/etudiant/bts
CNED - Formation à distance : préparer un BTS. 21 spécialités, dont : notariat, diététique, MUC, tourisme, ESIF, comptabilité, service à la personne, etc.
BTS diététique • BTS communication • BTS notariat • BTS tourisme

BTS à Distance : découvrez les formations - Diplomeo
https://diplomeo.com • BTS > BTS à distance
Chaque année, de plus en plus d'étudiants décident de s'inscrire en BTS à distance. Que penser de ces formations qui permettent de remédier à la distance et ...
Paid search basics

Google search for "bts a distance"
Paid search basics

Google search for "bts a distance"

Click on the search result for "BTS à Distance | Reconnus par l'Etat | enaco.fr"

Visit the landing page for "Bts Nrc par Correspondance | Reconnu par l'État, Niveau 3"
Paid search basics

Google search for "bts a distance"

Environ 28 700 000 résultats (0,45 secondes)

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Click
Visit Landing page

Subscription (victory)
Not interested (defeat)
Paid search basics

Typed: “BTS a distance”

Impression

Will he click?

Click

Will he subscribe?

Subscription

New user
Paid search basics

Typed: “BTS a distance”

Impression

Will he click?

Click

Will he subscribe?

Subscription

New user

100$ question: how much should I pay the ad?
Paid search basics

Typed: “BTS a distance”

New user

Impression

Will he click ?

Click

Subscription

Will he subscribe ?

100$ question : how much should I pay the ad ?
Paid search basics

Typed: “BTS a distance”

Impression

Google’s problem

Will he click?

Click

Will he subscribe?

Subscription

New user

10$ question: how much should I pay the click?
Paid search basics

How much should I pay the click?

1. Find revenue by click
Paid search basics

How much should I pay the click?

1. Find revenue by click

2. Pay less than that
Paid search basics

How much should I pay the click?

1. Find revenue by click
   (using Machine learning: search query $\rightarrow$ revenue by click)

2. Pay less than that
Paid search basics

Typed: “BTS a distance”

Impression

Google’s problem

Will he click?

Click

Google’s bidder

Will he subscribe?

Subscription

New user

10$ question: how much should I pay the click?
Paid search basics

1$ for 2 questions:
Do I accept giving Google all power?
Can we do better?
Paid search basics

Typed: “BTS a distance”

1$ for 2 questions:
Do I accept giving Google all power?
Can we do better?

Google’s problem

Impression

Will he click?

Click

Will he convert?

Conversion

New user
CPA: Cost Per Acquisition
(Cost of a conversion)
Basic ML steps

- Identify learnable outcome (revenue by click)
- Transform input (user's search query) into features (X)
- Identify relevant loss function
- Try and optimize models
Our ML research

Log loss par rapport à Model

Log loss

0.332

0.331

0.33

0.329

0.328

0.327

Model

Decision tree
Random Forest
Boosted trees
Consensus
Neural Networks
Transfer + NN
Consensus 2
Stacked Models
Our ML research

Log loss par rapport à Model

- Decision tree
- Random Forest
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- Stacked Models

Log loss
Our ML research

Log loss par rapport à Model

Model

Log loss

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- Stacked Models

Log loss
Consensus

RF + GBDT + Log Reg + ...

DOLEAD @ Py.Paris - NOV 2018
WWW.DOLEAD.COM
Our ML research

Log loss par rapport à Model

<table>
<thead>
<tr>
<th>Model</th>
<th>Log loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision tree</td>
<td>0.332</td>
</tr>
<tr>
<td>Random Forest</td>
<td>0.331</td>
</tr>
<tr>
<td>Boosted trees</td>
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Neural networks
Paid search basics

Typed: “BTS a distance”

Impression

Will he click?

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Conversion

New user

10$ question: how much should I pay the click?
Our ML research

Log loss par rapport à Model

Model

Log loss

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Log loss
Paid search basics

10$ question: how much should I pay the click?
Our ML research

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Our ML research
Consensus

RF + GBDT + NN + ... = Better
Consensus

RF + GBDT + NN + ... = Better

Weighted Consensus

a x RF + b x GBDT + c x NN + ...
Consensus

\[ RF + GBDT + NN + \ldots = \text{Better} \]

Weighted Consensus

\[ a \times RF + b \times GBDT + c \times NN + \ldots \]

Learned model

\[ f(RF, GBDT, NN, \ldots) \]
Stacked models

Learning problem on (x', y)
Stacked models

$x \xrightarrow{\text{Stacked models}} x'$

Learning problem on $(x', y)$

$\rightarrow \text{data leakage problem}$
Stacked models

Learning problem on \((x', y)\)

→ data leakage problem
Measure Stacked Models Perf

Campaign 1
- Train
  - RF
  - GBDT
  - NN
  - ...
- Test

Predictions

Campaign 2
- Train
  - RF
  - GBDT
  - NN
  - ...
- Test

Predictions
Measure Stacked Models Perf

Test !
Our ML research

Log loss par rapport à Model

Model

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Log loss
Bidder comparison: context

A/B test

Experiment 1: 50% bids Google

Experiment 2: 50% bids Dolead
Bidder comparison: context

A/B test
50 campaigns
4 weeks
Goal: maximize conversions while respecting target CPA

Experiment 1: 50% bids Google

Experiment 2: 50% bids Dolead
Bidder comparison: % Below target CPA

Raw results:
- Google 33%
- Dolead 63%

Distribution
Bidder comparison: Conversions & CPA

Conversions:
In 67% of campaigns, Google had more convs

Distribution
Bidder comparison: Conversions & CPA

Conversions:
In 67% of campaigns, Google had more conversions.

CPA:
In 83% of campaigns, Dolead was cheaper.

Distribution

\[
\frac{\text{Convs(Google)}}{\text{Convs(Dolead)}}
\]

\[
\frac{\text{CPA(Google)}}{\text{CPA(Dolead)}}
\]
Bidder comparison: Conversions & CPA

Conversions:
In **67%** of campaigns, **Google** had more convs

Distribution
Google’s margin: 9.8K

CPA:
In **83%** of campaigns, Dolead was cheaper

Distribution
Dolead’s margin: 13.3K (~+35%)
Thanks for your attention!