Internet Advertising

UW CSE454
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Agenda

- Industry context
- Advertiser view
- Publisher view
- Audience view
- Testing/optimization

I know I’m wasting half of my ad budget. I just don’t know which half.

2009 Global Ad Spend

$458 Billion

The Great Divide

<table>
<thead>
<tr>
<th>Brand</th>
<th>Direct Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Emotions</td>
<td>• Transactions</td>
</tr>
<tr>
<td>• Indirect benefits</td>
<td>• Gross profits</td>
</tr>
<tr>
<td>• Banners, TV, stadiums</td>
<td>• Search, coupons, 1-800, radio, mail</td>
</tr>
</tbody>
</table>

Industry Structure
Conversion Funnel

- Ad Impressions
- Clicks
- Conversions
- Revenue

Monetizing Traffic

Traffic

- Search
- Paid Search
- Free Search
- Affiliates
- Display Ads
- Syndication
- Email
- Offline

LANDING PAGES

$ per Transaction

Conversion Rate

CTR

CR x CPA = RPV

Gross Margin

Share of Voice Costs $$$

Cost Per Action vs. Reach

Conversion Potential vs. Price

Search Rank

Relative Conversion/Traffic Potential

Cost per Click vs. Conversion Potential

Potential Cost per Click
**Real World Example**

- Impressions: 4.4M
- Clicks: 2078
- RegClicks: 69
- Registrations: 29
- CTR: 0.0469%
- CPC: $0.65
- eCPM: $0.31
- CPRegClick: $19.69
- CPReg: $46.76

- RefSrc on URL
- Drop cookie
- Pass RefSrc upon conversion
- Match with ad spend
- Calculate CPA

**Bid Management**

<table>
<thead>
<tr>
<th>Term</th>
<th>Clicks</th>
<th>CPC</th>
<th>CR</th>
<th>Leads</th>
<th>RegPrice</th>
<th>Revenue</th>
<th>Spend</th>
<th>GM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing School</td>
<td>5,000</td>
<td>$1.00</td>
<td>1</td>
<td>5%</td>
<td>$20.00</td>
<td>$7.50</td>
<td>$1,875</td>
<td>$5,000</td>
</tr>
<tr>
<td>Nursing Schools</td>
<td>5,000</td>
<td>$2.00</td>
<td>3</td>
<td>20%</td>
<td>$10.00</td>
<td>$30.00</td>
<td>$30,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Total</td>
<td>10,000</td>
<td>$1.50</td>
<td>2</td>
<td>12.5%</td>
<td>$25.00</td>
<td>$51.00</td>
<td>$31,875</td>
<td>$15,000</td>
</tr>
<tr>
<td>Optimized</td>
<td>8,000</td>
<td>$2.43</td>
<td>1</td>
<td>22%</td>
<td>$11.05</td>
<td>$30.00</td>
<td>$52,800</td>
<td>$19,440</td>
</tr>
</tbody>
</table>

**Bid Optimization**

- Find shape of the volume, CR, and price curves as f(pos)
- Linear programming to maximize goal (e.g. LTV, gross profit, volume)
- Challenges
  - Sample size
  - Price changes
  - Seasonality

**Industry Structure**

**Online Advertising Risks**

- Revenue Share
- Cost Per Action (CPA)
- Subscription / Sponsorship
- Cost Per Click (CPC)
- Cost Per Impression (CPM)
“Low-CPM” Innovation (circa 2001)

- CPC Marketplace Formation
- Advertiser Growth
  - Text-based ads
  - Self-serve ads
  - RPV optimization
  - Keyword suggestion
- Increased Bids
  - Max Bids
  - Keyword opacity
- Click Volume
  - Syndication
  - Text ad network
  - International
- Better Matches
  - Landing page analysis
  - Ad inhibition

RPV Optimization: Problems with Sort by CPC

<table>
<thead>
<tr>
<th>Example Term: “mba”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad Title</td>
</tr>
<tr>
<td>Univ. of Phoenix MBA</td>
</tr>
<tr>
<td>Univ. of Washington MBA</td>
</tr>
</tbody>
</table>

RPV Optimization

Sort by (CPC_Bid x CTR)

Keyword Opacity

<table>
<thead>
<tr>
<th></th>
<th>impr</th>
<th>CTR</th>
<th>Clicks</th>
<th>CPC</th>
<th>CR</th>
<th>leads</th>
<th>CPA</th>
<th>Spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing School</td>
<td>100,000</td>
<td>5%</td>
<td>5,000</td>
<td>$1.00</td>
<td>5%</td>
<td>250</td>
<td>$20.00</td>
<td>$5,000</td>
</tr>
<tr>
<td>Nursing Schools</td>
<td>10,000</td>
<td>50%</td>
<td>5,000</td>
<td>$2.00</td>
<td>20%</td>
<td>1,000</td>
<td>$10.00</td>
<td>$10,000</td>
</tr>
<tr>
<td>Total</td>
<td>110,000</td>
<td>9%</td>
<td>10,000</td>
<td>$1.50</td>
<td>12.5%</td>
<td>1,250</td>
<td>$12.00</td>
<td>$15,000</td>
</tr>
<tr>
<td>MatchDriver</td>
<td>110,000</td>
<td>9%</td>
<td>10,000</td>
<td>$2.00</td>
<td>12.5%</td>
<td>1,250</td>
<td>$16.00</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

Landing Page Analysis

What?? No “Christmas”

No “Christmas” here either!
**End Users**

**Don’t bug me**

Unless I like what you have to offer

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**Better Matching**

- Context detection
  - GPS, location
  - App vs. content
  - Info seeker vs. transactor
  - Calendars/schedules/events
  - Social networks/status
  - Twitter - now
  - Behavioral – esp. w/knowledge of specific site behaviors
- Contextual
- Privacy
  - Google “AOL search data”

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**Context?**

- Flowers
- Mentos gum
- Trial Prep
- Credit score
- Cosmetics
- Hampton Inns
- WeightWatchers
- Vacation Home Rentals
- Home Depot
- Web Hosting
- WebMD
- Colon Cleanse – Warning
- My Teeth Aren’t Yellow
- Classmates.com

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**Testing**

Conversion Rate

\[ \text{Gross Margin} = \text{CR} \times \text{CPA} \times \text{RPV} \]

**TESTING**
Testing

Sample Size, margin of error, confidence

\[ x = Z(z/\sqrt{100})^2(100-r) \]

\[ n = \frac{N \times x}{((N-1)E^2 + x)} \]

\[ E = \sqrt{\frac{(N \cdot n) x}{n(N-1)}} \]

Sample Size Problems

- So many ideas, so little to sample...
  - Disproportionate advantage to scale
- Multivariate testing
  - Taguchi Method
    - Method for calculating signal-to-noise ratio of different parameters in an experimental design
    - Allows optimization with A/B test of each cross-product

A/B Split Test

Control: Existing System

Users interactions instrumented, analyzed & compared

Analyze at the end of the experiment

Treatment: Existing System with Feature X
We observed an immediate 30% increase in conversion rates.

### Fact Sheet Design

<table>
<thead>
<tr>
<th>Existing Schools (n=1,428)</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best</td>
<td>93.1%</td>
</tr>
<tr>
<td>Worst</td>
<td>0.1%</td>
</tr>
<tr>
<td>Average</td>
<td>13.6%</td>
</tr>
</tbody>
</table>

### Test

<table>
<thead>
<tr>
<th></th>
<th># Schools</th>
<th>CR Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional photos</td>
<td>1</td>
<td>30%</td>
</tr>
<tr>
<td>More K+ buttons</td>
<td>1</td>
<td>23%</td>
</tr>
<tr>
<td>Marketing voice, more programs listed</td>
<td>1</td>
<td>33%</td>
</tr>
<tr>
<td>Photos + Marketing voice, more programs</td>
<td>1</td>
<td>50%</td>
</tr>
</tbody>
</table>

### Opportunities

- Advertisers
  - Low-RPV
  - Minimize waste
  - 10x simplicity
- Publishers / Search Engines / Ad Networks
  - Scaling local, hyperlocal
  - Other value judgments than rank
    - Under-monetized sites
    - Audience prediction
    - Duplicate detection
  - Google’s path to lead gen
  - Advertiser behavioral tracking
Further Reading

- Sample size calculators
  - www.esurvey.com/samplesize.html
  - www.surveysystem.com/sscalc.htm

- Google Analytics – www.google.com/analytics
  - www.omniture.com/en/products/conversion/testandtarget

- Taguchi Method commercial products/whitepapers
  - www.vertster.com
  - www.omniture.com/en/products/conversion/testandtarget

- Online marketing sites
  - searchengineland.com
  - searchenginewatch.com
  - www.marketingsherpa.com
  - www.dmnews.com
  - www.imediaconnection.com
  - www.iab.net (industry group)