Conversion Rate Optimization Through Evolutionary Computation

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Conversion Rate Optimization (CRO)

- How to design effective web pages
  - Convert casual web browsers to paying customers
- “Holy grail” for the e-commerce industry
  - $72B spent in 2016 to drive traffic; Conversion rates 2-4%
  - CRO grown three-fold in 3 years
- → A real-world problem that people care about
State of the Art: Human Design

- CRO has develop into “Conversion Science”
  - A/B testing is the main tool
  - Companies provide tools: Optimizely, VWO, Adobe,…

→ CRO is a difficult problem
→ Significant human expertise exists
Evolving the web page designs (with GAs)
- Humans define the search space
- Candidates tested on real uses in real time
- EA discovers interactions that humans miss
- New cognitive science!

→ *What works is poorly understood*

→ *Opportunity for discovery*
Ascend Case Study

▶ A lead generation site for educational programs
  ▶ Already optimized by human experts
▶ Ascend found several solutions 38-46% better
  ▶ An “ugly widget generator”
  ▶ Improvement verified through customer A/B tests
▶ → A compelling arms-length evaluation
Human-Competitiveness Industrialized

<table>
<thead>
<tr>
<th>Industry</th>
<th># of Values</th>
<th># of Elements</th>
<th># of Combinations</th>
<th>Length of Test</th>
<th>CVR Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leading European Travel Site</td>
<td>18</td>
<td>9</td>
<td>512</td>
<td>8 weeks</td>
<td>43%</td>
</tr>
<tr>
<td>Digital Commerce Payments</td>
<td>20</td>
<td>9</td>
<td>1,152</td>
<td>3 weeks</td>
<td>9%</td>
</tr>
<tr>
<td>Intimacy Apparel Retailer</td>
<td>15</td>
<td>4</td>
<td>160</td>
<td>8 weeks</td>
<td>38%</td>
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<tr>
<td>Top AU Beauty Retailer</td>
<td>28</td>
<td>8</td>
<td>6,912</td>
<td>8 weeks</td>
<td>6%</td>
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<tr>
<td>Classic Car Reseller</td>
<td>30</td>
<td>8</td>
<td>28,800</td>
<td>3 weeks</td>
<td>434%</td>
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<tr>
<td>Leading Mobile Network</td>
<td>42</td>
<td>9</td>
<td>1,296,600</td>
<td>6 weeks</td>
<td>75%</td>
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<tr>
<td>Comparison Shopping</td>
<td>40</td>
<td>8</td>
<td>241,920</td>
<td>9 weeks</td>
<td>31%</td>
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<tr>
<td>Annuities</td>
<td>11</td>
<td>3</td>
<td>48</td>
<td>12 weeks</td>
<td>24%</td>
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<tr>
<td>Flower Retailer</td>
<td>16</td>
<td>8</td>
<td>256</td>
<td>8 weeks</td>
<td>35%</td>
</tr>
</tbody>
</table>

- Ascend solves a wide range of CRO problems
  - Different search space sizes
  - Different traffic volumes
  - Different industries

- A general, comprehensive method for CRO
(E) “A long-standing problem with increasingly better human solutions”
  ▶ Iterative A/B testing process
(F) “The result is an achievement in its field”
  ▶ Improves on best result of professional human experts
(G) “A problem of indisputable difficulty”
  ▶ An entire science/engineering field focused on it
1. Evolution solves an important real-world problem
   ▶ People pay to get evolution results
   ▶ → A new level of arms-length evaluation

2. It industrializes human-competitiveness
   ▶ Improves performance routinely, over and over again
   ▶ → A new level of human-competitive results

3. It empowers people to do better (instead of replacing them)
Conclusion

- CRO is a challenging problem that people care about
- EA beats human designs routinely
- → EA is transforming a whole field of science/engineering