Learning from Multi-User Activity Trails for B2B Ad Targeting

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B2B products

- Business-to-business (B2B) versus business-to-consumer (B2C)
- Same advertiser can have B2B and B2C products
Online buying behavior: B2C

consumer journey

purchase funnel stages

unaware
aware
consider
intent
buy

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Online buying behavior: B2C

- unaware
- aware
- consider
- intent
- buy

visiting websites, forums, tech blogs

online purchase

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Online buying behavior: B2C

- unaware
- aware
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- visiting websites, forums, tech blogs
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Online buying behavior: B2C vs. B2B

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Conversion (purchase) prediction

- Conversion prediction is crucial for ad targeting
- Will conversion prediction suffer from multi-user activities for B2B purchase?
Conversion (purchase) prediction

- Conversion prediction is crucial for ad targeting
- Will conversion prediction suffer from multi-user activities for B2B purchase?

Assumptions
- No declared profiles!
- Online activity trails available

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Conversion (purchase) prediction

- Conversion prediction is crucial for ad targeting
- Will conversion prediction suffer from multi-user activities for B2B purchase?

**user 1 trail:**
act1, act2, search WiFi offers, act3, act4, purchase

**user 2 trail:**
act2, act4, search WiFi offers, act5, act6

**user 3 trail:**
act1, act3, act5, purchase

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Conversion (purchase) prediction

- Conversion prediction is crucial for ad targeting
- Will conversion prediction suffer from multi-user activities for B2B purchase?

Model can relate “search WiFi offers” to purchase

- user 1 trail:
  act1, act2, search WiFi offers, act3, act4, purchase

Model cannot relate “search WiFi offers” to purchase

- user 2 trail:
  act2, act4, search WiFi offers, act5, act6
- user 3 trail:
  act1, act3, act5, purchase

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Conversion (purchase) prediction

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- Will conversion prediction suffer from multi-user activities for B2B purchase?

Intuition: augmenting user trails may help!

Model can relate “search WiFi offers” to purchase

user 1 trail: act1, act2, search WiFi offers, act3, act4, purchase

user 2 trail: act2, act4, search WiFi offers, act5, act6

user 3 trail: act1, act3, act5, purchase

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Trail augmentation: relevant users and acts

user 2 trail:
act2, act4, search WiFi offers, act5, act6

user 3 trail:
act1, act3, act5, ... purchase

Consider users in the same cluster/household
Trail augmentation: relevant users and acts

user 2 trail:
act2, act4, **search WiFi offers**, act5, act6

user 3 trail:
act1, act3, act5, ... **purchase**

relevant act (advertiser specific)
Trail augmentation: relevant users and acts

user 2 trail:
act2, act4, search WiFi offers, act5, act6

user 3 trail:
act1, act3, act5, … purchase
Trail augmentation: relevant users and acts

**user 2 trail:**
act2, act4, search WiFi offers, act5, act6

**user 3 trail:**
act1, act3, act5, … purchase

**relevant act**

**relevant user**

**augmented user 3 trail:**
act1, act3, act5, [act2, act4, search WiFi offers, act5, act6], … purchase

Model can relate “search WiFi offers” to purchase!

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Proposed approach

users in an org (commercial IP, household ID)

relevant acts seed list

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Proposed approach

users in an org (commercial IP, household ID)

relevant acts seed list

Identify relevant users

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Proposed approach

users in an org (commercial IP, household ID)

relevant acts seed list

identify relevant users

augment user trails in cluster by relevant users’ trails + use in conv. model

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Relevant acts seed list

- Start with high “conversion rate” activities + manual review (e.g., visiting advertiser website)
- Iteratively expand seed list using \texttt{activity2vec} embeddings
Activity2vec based expansion

\[ \text{activity2vec} = \text{word2vec} \text{ style training with activity trails} \]

**user i trail:** act1, act3, act5, … act10, act1, act2

**session = sentence**

**act = word**

**user trail = document**
Activity2vec based expansion

activity2vec = word2vec style training with activity trails

user i trail: act1, act3, act5, … act10, act1, act2

session = sentence
eact = word

user trail = document

neighbor based iterative seed expansion
Results

![Graph showing AUC lift in % over seed list iterations]

- Initial seed list vs. no augmentation
- Noise in expanded seed list

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Results

<table>
<thead>
<tr>
<th>Seed list iteration</th>
<th>AUC lift</th>
<th>#activities lift</th>
<th># relevant users per converter cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_{initial}$</td>
<td>7.96%</td>
<td>-</td>
<td>1.241</td>
</tr>
<tr>
<td>$S_1$</td>
<td>7.98%</td>
<td>5.24%</td>
<td>1.278</td>
</tr>
<tr>
<td>$S_2$</td>
<td>8.80%</td>
<td>6.07%</td>
<td>1.283</td>
</tr>
<tr>
<td>$S_3$</td>
<td>8.44%</td>
<td>7.54%</td>
<td>1.297</td>
</tr>
<tr>
<td>$S_4$</td>
<td>8.29%</td>
<td>10.85%</td>
<td>1.317</td>
</tr>
<tr>
<td>$S_5$</td>
<td>8.27%</td>
<td>12.87%</td>
<td>1.325</td>
</tr>
</tbody>
</table>

**initial seed list vs. no augmentation**

noise in expanded seed list
Summary

- Trail augmentation helps!
- Seed list useful for targeting, insights!
- Uniform influence assumption
Summary

❖ Trail augmentation helps!
❖ Seed list useful for targeting, insights!
❖ Uniform influence assumption
❖ Questions?