Pay-per-Question: Towards Targeted Q&A with Payments

Steve Jan, Chun Wang, Qing Zhang, Gang Wang
Online Question & Answer Services

• Web search engines
  – But they can not give users the customized answers

• Online Q&A Service
  – Quora: 1M questions / month

Are they good enough?
Scenario 1

• I got a traffic ticket the other day

Q: What are the tips to fight this ticket on court?

Ask friends
Post it online
Ask lawyers

They may not understand the law
Should I trust them?
Too expensive
Too slow
Scenario 2

- I feel mildly sick the other day

Q: What were causing my headache and nausea?

- Ask friends
  - They may not understand medic

- Post it online

- Ask doctors
  - Should I trust them?
  - Too expensive
  - Too slow
Another Option

- I can directly ask some experts:
  - **Convenient**: use my smart-phone
  - **Trustworthy**: certified domain experts
  - **Targeted**: ask experts who I can trust
  - **Cheaper**: cheaper than making a real appointment

Targeted Q&A apps are for the rescue!
Targeted Q&A Apps

- Social network: connect users to **certified** experts
- Targeted: ask a question to a specific user
- Pay a small amount of money to ask questions
- Very popular

### Launched in 2016

- **May**
- **June**
- **July**

- **Fenda**
- **Campfire**
- **Whale**
- **Yam**

- **2,000,000 USD revenue**
- **10,000,000 registered users**
- **500,000 paid questions**
How Fenda Works

What were causing my headache and nausea?

Pay 10 USD

Give answer via audio

14 cents USD to Listen

$7 cents

$7 cents

10% Income

10% Income

Final Profit: Received – Paid = 70 - 17 = 53 USD

Fenda has a unique monetary incentive model!

Price $10/Q

Verified
This Study

• Research questions
  – How does monetary incentive affect Q&A?
  – Are there any manipulative behavior from users?
  – How does the pricing strategy affect users’ engagement?

• Data driven analysis
  – Collect over 200K paid questions from two websites
    o Fenda (China), Whale (US)
Outline

• Introduction

• User behavior in targeted Q&A apps
  – Role of experts
  – Impact of monetary incentive

• Manipulative behavior

• Pricing strategy
Datasets

<table>
<thead>
<tr>
<th>Dataset</th>
<th>#Questions</th>
<th>Time</th>
<th>Coverage</th>
<th>#Users</th>
<th>#Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenda</td>
<td>212,000</td>
<td>05/16 – 07/16</td>
<td>30%</td>
<td>88,540</td>
<td>4,370</td>
</tr>
<tr>
<td>Whale</td>
<td>9,200</td>
<td>09/16 – 03/17</td>
<td>-</td>
<td>1,419</td>
<td>118</td>
</tr>
</tbody>
</table>

- Collect Fenda and Whale datasets
- Using open API with slow speed
- Using data set of Whale as a comparison
- Coverage is around 30%
- Experts are verified manually by websites
- People can also ask questions to the normal users

Role of Experts

Experts: 5% of total users, contribute 95% of revenue and answer 82% of questions.

Experts are extremely important. How does targeted Q&A service retain the experts, who generate revenue and answer 82% of questions?
Motivations on Q&A Service

• Answerers are motivated to answer their questions by
  – Intrinsic reward (e.g. helping people)
  – Social reward (e.g. respect from others)
  – Extrinsic reward (e.g. money)
• Targeted Q&A service primary use extrinsic reward
• Existing research suggested extrinsic reward\(^1\) may leads to
  – Less response delay

Are they true on Fenda and Whale?

Short Response Time?

- **Fenda & Whale**
  - Short response time
  - But not shorter than Yahoo answers
- **Yahoo answers**: large number of potential answerers
- **Fenda & Whale**: target one specific answerer

Targeted Q&A service are faster than most of crowdsourcing service
High Answer Quality?

- High answer quality: Other people are also interested; Willing to pay for the answers
- 56% of answers: Have at least one listener
- Among these listened answers, 71% can make profits for askers (listening income > question fee)
- Good question: good chance for making profits

Majority of targeted Q&A service questions are high quality
Outline

• Introduction
• User behavior in targeted Q&A apps
  • Manipulative behavior
    – Bounty Hunters
    – Collaborative Users
• Pricing strategy
Manipulative Behavior

• Bounty hunters: users ask lots of questions for $

• Several types of experts to ask questions to:

  - **Type 1 Experts**
    - Few listeners
    - High price
    - High chance
    - Not earning

  - **Type 2 Experts**
    - Many listeners
    - High price
    - No guarantee
    - Earning

  - **Type 3 Experts**
    - Many listeners
    - Low price
    - High chance
    - Earning

Bounty hunter
Manipulative Behavior

- Bounty hunters: users ask lots of questions for $.
- Several types of experts to ask questions to:

<table>
<thead>
<tr>
<th>This outlier</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asked 1300 questions</td>
<td>Asked 2.5 questions</td>
</tr>
<tr>
<td>Earned around $200</td>
<td>Can not earn ($-1.95)</td>
</tr>
</tbody>
</table>

Act as spam to experts
Manipulative Behavior 2

- Collaborative users: Answerer and asker work together exclusively

- Expensive questions increase perception of popularity
- Cheap questions ask questions to draw attentions

Other askers
Manipulative Behavior 2

- Collaborative users: Answerer and asker work

User-1 answered 435 questions.
User-2 asked User-1 307 questions.
Together earn $950

Fake perception of popularity

# of Answered questions
Outline

• Introduction
• User behavior in targeted Q&A apps
• Manipulative behavior
• Pricing strategy
  – How do users set their price of questions?
  – How does the pricing strategy affect their income and engagement?
Dynamic Pricing

• Answerers can adjust their price dynamically

• Examples:

  Too many askers

  Too few askers

  Without change

• How many common pricing strategies are there?
Pricing Strategy

- Cluster pricing history into groups
- Construct 9 features based on the pricing history
- For example: Top 3 features based on Chi-square

<table>
<thead>
<tr>
<th>id</th>
<th>Feature Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Price Change Frequency</td>
<td># of price change / # answers</td>
</tr>
<tr>
<td>2</td>
<td>Price Up Frequency</td>
<td># price up / # answers</td>
</tr>
<tr>
<td>3</td>
<td>Price Down Frequency</td>
<td># price down / # answers</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Applied hierarchical clustering algorithm on these features

User 1: [2/3, 1/3, 1/3, ...]
Three Different Strategies

- Got 3 groups (strategies) with highest modularity

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequently price up and down</td>
<td>Mostly price up</td>
<td>Rarely price up and down</td>
</tr>
<tr>
<td>Active users</td>
<td>Inactive users</td>
<td>Celebrities</td>
</tr>
</tbody>
</table>

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Fenda is a known payments system Fenda (China) and Whalo (US) dataset of 220K questions affect user behavior, this model requires to per query price to make revenue.
Conclusion

• Targeted Q&A service
  – Short response time
  – High answer and question quality
  – Some manipulative behavior

• Future Q&A work
  – Crowdsourcing v.s. Targeted
  – Add more dataset
Thank You
Reference

