### Background

**Complaints** exist for everything. **Ex)** Smart Phone

- **Accessories are too expensive.**
- **Not be able to change the battery.**

Can’t use as mobile wallet. Useless for me as I use electronic money a lot. It made me want to change other phone.

Too easy to break screen. I have so many friends who have item A which screen is broken.

Only few recommender systems focus on complaints.

### Our Approach

1. Classify complaints by items
   i. Extract nouns by each complaint that belongs to same item
   ii. Generate vectors from reviews

2. Extract positive words from reviews
   i. Generate vectors of good and bad reviews by each items
   ii. Calculate vectors by subtracting bad from good

3. Match items of complaints and reviews
   Calculate similarity between complaints and reviews

4. Recommend items to users

### Evaluation

**Dataset**

I. Complaints (Fumankaitori Centre-)
   - 4 items (itemA, itemB, itemC, and itemD)
   - All items are categorized as smartphone
   - 200 Complaint data

II. Reviews (Amazon)
   - 7 items (item1 to item7)
   - All Items are categorized as smartphones except Item6 and item7
   - 350 Review data

**Similarity calculation between complaints and reviews**

<table>
<thead>
<tr>
<th>Complaints</th>
<th>ItemA</th>
<th>ItemB</th>
<th>ItemC</th>
<th>ItemD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item1</td>
<td>0.28</td>
<td>0.20</td>
<td>0.18</td>
<td>0.10</td>
</tr>
<tr>
<td>Item2</td>
<td>0.63</td>
<td>0.25</td>
<td>0.33</td>
<td>0.12</td>
</tr>
<tr>
<td>Item3</td>
<td>0.46</td>
<td>0.17</td>
<td>0.40</td>
<td>0.20</td>
</tr>
<tr>
<td>Item4</td>
<td>0.46</td>
<td>0.16</td>
<td>0.60</td>
<td>0.05</td>
</tr>
<tr>
<td>Item5</td>
<td>0.60</td>
<td>0.27</td>
<td>0.43</td>
<td>0.06</td>
</tr>
<tr>
<td>Item6</td>
<td>0.53</td>
<td>0.17</td>
<td>0.21</td>
<td>0.04</td>
</tr>
<tr>
<td>Item7</td>
<td>0.23</td>
<td>0.06</td>
<td>0.03</td>
<td>0.02</td>
</tr>
</tbody>
</table>

**Result**

- High similarity were found after normalization
- It has high similarity with different category

### Proposed Method

**Recommend items which solve problems of complaints**

<table>
<thead>
<tr>
<th>Item</th>
<th>Accessories are too much expensive.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ItemB</td>
<td>Can’t use as mobile wallet. Useless for me as I use electronic money a lot. It made me want to change other phone.</td>
</tr>
<tr>
<td>ItemC</td>
<td>Not be able to change the battery.</td>
</tr>
<tr>
<td>ItemD</td>
<td>Too easy to break screen. I have so many friends who have item A which screen is broken.</td>
</tr>
</tbody>
</table>

### Future Work

- Propose a new extraction methods
- Validate complaints data with many items
- Extracting feature words with other part of speech
- Recommending items from all kinds of dissatisfaction

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**謝辞** 本研究では、株式会社Insight Techが国立情報学研究所の協力により研究目的で提供している「不満調査データセット」を利用した。