Using social networks to annotate corpora

Jon Chamberlain  
jchamb@essex.ac.uk

Massimo Poesio  
poesio@essex.ac.uk

Udo Kruschwitz  
udo@essex.ac.uk

www.phrasedetectives.com  
apps.facebook.com/phrasedetectives

7 October 2011  
Funded by EPSRC and RIF
OVERVIEW

The problem of resource creation for NLP

The AnaWiki project
   Human Computation
   Games with a Purpose
   Using Social Networks

The Phrase Detectives game
   How the game works
   Incentive structures
   Social network features

Conclusions
Future directions

apps.facebook.com/phrasedetectives
www.phrasedetectives.com
THE PROBLEM

Computers need lots of text documents to learn how humans use language

These documents need to be annotated so the meaning is clear
An example of the problem

“We put the elephant in the train’s boxcar. It is now ready to leave.”
An example of the problem

“We put the elephant in the train’s boxcar. It is now ready to leave.”
An example of the problem

“We put the elephant in the train’s boxcar. It is now ready to leave.”
THE SOLUTION

Get humans to annotate the text documents
But...

They need to be highly trained "experts"

They are expensive on the scale required

There are not many of them!
THE ANAWIKI PROJECT

• Address the bottleneck in creating large annotated text resources

• Investigate using Web volunteers to annotate text
  – Define criteria for motivating volunteers
  – Define criteria of volunteer evaluation

• Build on proposals to allow for ambiguity whilst still detecting errors

• Create a large, hand-annotated corpus
  – Created from balanced texts
  – Initially annotated with anaphoric information

  e.g. “This parrot is no more! He has ceased to be!”
  \{antecedent\} \{anaphor\}
1. HUMAN COMPUTATION

Harness the combined computational power of humans and computers to solve large-scale problems

e.g. “wisdom of the crowds”
2. GAMES WITH A PURPOSE

Use human computation in an entertaining setting to solve computationally difficult tasks

e.g. ESP game: creating tags for images
3. USING SOCIAL NETWORKS

Use existing social networks to encourage recruitment and gameplay.

e.g. Farmville, The Sims, etc
PHRASE DETECTIVES GAME

Simple and friendly game interface

Easy to learn and quick to play

Used by large numbers of non-expert volunteers

Text is pre-processed to identify “markable” phrases

Integrated within the Facebook site

Data compatible with previous Phrase Detectives game

Original game released Aug 2008

Facebook version released Feb 2011

apps.facebook.com/phrasedetectives

www.phrasedetectives.com
SCORING IN THE GAME

Scoring designed to reward **quality** as well as **quantity**

How do you reward good decisions?

- **Comparative scoring**
  - The player’s decision is compared to a known answer.

- **Collaborative scoring**
  - Many games use partner matching for scoring
    - i.e. if you put in the same answer as your game partner you both score points
  - Phrase Detectives uses group collaboration for scoring
    - i.e. if your answer agrees with other players then you all score more points
INCENTIVE STRUCTURES

• Personal
  Participation is the reward

• Social
  Participation improves position amongst peers (players)

• Financial
  Participation is rewarded with money
USING SOCIAL INCENTIVES

- 100 million people are playing social games
- 24 million people playing social games regularly, mostly on Facebook.
- Why Facebook?

  Online game platforms that players use (PopCap)
  - Facebook 83%
  - MySpace 24%
  - Bebo 7%
  - Friendster 5%

- Average social gamer is “a 43-year-old woman”
IMPLEMENTATION

• Creating a page in Facebook
  – Your code and database hosted on your server
  – Your site sits within a window of the Facebook site
  – User must give your site permission to access different levels of their information
  – Powerful ability to query user information

• Proprietary code e.g. FBML or PHP SDK

• Protocol changes frequently (twice in 2011)

• Suitable for short term projects e.g surveys
FACEBOOK GAME FEATURES

- Faster gameplay
- Well defined level requirements

Jon Chamberlain
Bookworm (level 5)

<table>
<thead>
<tr>
<th>You have:</th>
<th>For next level:</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP 6403</td>
<td>7500 PP</td>
</tr>
<tr>
<td>Books 285</td>
<td>30 Books</td>
</tr>
<tr>
<td>Facebook 6</td>
<td>5 Facebook</td>
</tr>
<tr>
<td>Hearts 96%</td>
<td>70% Hearts</td>
</tr>
<tr>
<td>Mail 5</td>
<td>5 Mail</td>
</tr>
</tbody>
</table>
FACEBOOK GAME FEATURES

• Players score more points for agreeing with friends
  – All friends playing the game are shown

• New leaderboards
  – Highest level players
  – Highest rated players
  – Most friends playing the game

• Players must regularly complete a training document
  – Answers are compared to expert annotations
FACEBOOK GAME FEATURES

- Players are required to post about the game on their wall
  - 57% of players start to play a game from a friend recommendation

<table>
<thead>
<tr>
<th>When and what players post to their wall</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>When a document is finished</td>
<td>29%</td>
</tr>
<tr>
<td>About the document being worked on</td>
<td>22%</td>
</tr>
<tr>
<td>When they go up a level</td>
<td>14%</td>
</tr>
<tr>
<td>Send friends invitations to the game</td>
<td>14%</td>
</tr>
<tr>
<td>When their rating is updated</td>
<td>12%</td>
</tr>
<tr>
<td>Show monthly leaderboard position</td>
<td>7%</td>
</tr>
<tr>
<td>Show all time leaderboard position</td>
<td>1%</td>
</tr>
</tbody>
</table>
INITIAL FACEBOOK GAME FINDINGS

• 400 players in 8 months
  – Compared to 700 players in 8 months after the release of the first game

• 63% of players are female
  – Previous study from PopCap games found 55% of social gamers are female.

• Male players have a higher average rating
  – 79% (from 55) compared to 76% (from 108)
CORPUS

• Over 1.2 million words in the live game

• Sources of text include:
  – Fiction e.g. Project Gutenberg
  – Non-fiction e.g. Wikipedia
  – Non-traditional e.g. ENRON Corpus (emails)
  – Dialogue e.g. Film and TV scripts
  – Existing corpora e.g. GNOME and ARRAU

• Over 1.9 million annotations and validations from 4700 players

• 359 complete documents
QUALITY OF DATA

• Ongoing analysis of completed documents
  – A selection of completed documents were also annotated by experts

• How does the top answer from the game (produced by human computation) compare to an expert annotator?

• Can ambiguity in human language be extracted from the noisy data?

• Is there a difference between the data generated from the 2 interfaces?
Web collaboration and human computation can be used to address large scale problems.

Web-based “games with a purpose” are a good way to entertain and motivate users.

Social networks provide an ideal platform for encouraging recruitment and participation.

Phrase Detectives has accumulated large quantities of high quality annotations but we need more!
THE FUTURE

Continue selecting and processing the corpus text (aiming for 100M words) including Italian, German, French and Spanish texts.

Develop new tasks to create a community of users who can self-manage the game.

Ultimately, show that anaphora resolution algorithms perform better when trained on the data.

Play the game at:
apps.facebook.com/phrasedetectives
www.phrasedetectives.com