Job Opportunities through Entertainment: Virally Spread Speech-Based Services for Low-Literate Users

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Our Team...
Our Long Term Vision

Speech-based information access for low-literate people in underdeveloped countries

Examples of information services:
- speech-based Craig's List
- speech-based citizen journalism
- speech-based message boards/blogs
- health, agriculture, jobs, education,…
- …
How can we reach the low-literate?

Speech over simple phones is a viable way to reach low-literate people in underdeveloped countries.
Problem 1: User Training

Even simple IVR systems are often a challenge for the low-literate

**Speech Interfaces usually require user training**

e.g. Healthline (Sherwani et al 2009), Avaaj Otalo (Patel et al 2010)

**Explicit training is not a scalable solution**

**Solution: Incentivize people to train themselves**

“Where there's a will there's a way…” [Smyth et al 2010]

“Entertainment turns UI Barriers into mere speed bumps”
Problem 2: How to Mass Disseminate?

How to advertise / communicate to masses who don’t read?

Solution: Viral Spread
Goal of this work

Develop *Viral Entertainment* as a vehicle for disseminating *Development* related telephone based services

1. **Introduce** and **popularize** speech interfaces
2. Use Entertainment as a **Viral Conduit** for delivering **core development services**
3. Setup an **Experimental Testbed** for testing speech interface choices
4. Provide **Entertainment**
Polly is a telephone-based, voice-based application which allows users to make a short recording of their voice, modify it and send the modified version to friends.
This brief video depicts a typical user interaction with Polly

USER INTERFACE

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First Information Service: Job Audio-Browser

1. Scan Pakistani newspapers for jobs for low-skilled workers

   Ref: paperpk.com

2. Record these ads

3. Invite Polly’s users to audio-browse them
2012 – Large Scale Deployment

• Launched on May 09, 2012:
  • Gave the phone number to 5 low-literate people
• After 141 days (mid-September 2012):
  • 495,000 calls
  • 85,000 users
  • Spreading to 1,000 new people daily
  • 27,000 people used the job search service
  • listened 279,000 times to job ads
  • and forwarded them 22,000 times to their friends.
2012 – Large Scale Deployment

Graph showing the number of daily calls and users from May to September.
Enthusiasm is Lost Quickly:

But a few people continue long term
User Demographics

Determined by listening to a sample of recordings:

Gender

- Male: 87%
- Female: 11%
- Unclear: 2%

Languages

- Punjabi: 64%
- Urdu: 21%
- Pashto: 13%
- Others/Mixed: 2%
User Demographics
Determined from 207 survey calls

Socio-Economic Status

- Low SES (No Education): 24%
- Low SES (up to 5 years of Education): 21%
- Low-mid SES (up to 10 years of Education): 33%
- Mid SES (up to 12 years of Education): 13%
- High SES (up to 16 years of Education): 9%
Randomized Controlled Trials

Very convenient RCT setup!
  - Hundreds of new users join every day

- So far we have been paying all airtime charges using “missed call” mechanism
- **Goal:** Reduce our airtime charges while maintaining system spread among the poor
- **Question:** How will various quotas affect user behavior?

Is Polly compelling enough for people to spend their own money on it, at least sometimes?
Randomized Controlled Trials

- Introduced a caller-paid line
  - Calls picked up, caller pays airtime
- Impose various quotas ($Q_x$) on the number of toll-free calls ($x$) per day (for each user).
- When quota exceeded, direct caller to caller-paid line
  - Q7
  - Q3
  - Q2
  - Q1
RCT: Effect of Daily Quota of 7 Calls

![Graph showing the effect of daily quota of 7 calls on users who exceeded the quota. The graph compares the average number of daily calls among users in a Quota Group (red) and a Control Group (black) over 10 days post first encounter with Polly. The graph indicates a decline in the average number of calls over time for both groups, with the Quota Group showing a more pronounced decline after the quota is reached.]
Caller-paid Line

Number of Caller-paid Calls

Date


Q7 Q3 Q2 Q1

Intro  Goals  Polly  Analysis  Plans

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Current Work

• Launching Polly in another Pakistani location as a caller-paid-only service

• Launching Polly in India with better mechanisms of populating Job Ads and tracking employment outcomes

• Porting Polly to open source telephony platforms like FreeSwitch
Current Status

As of April 22, 2013:

- 349 days
- 630,080 calls
- 163,787 users
- 33,682 people used the job search service
- listened 384,836 times to job ads
- and forwarded them 33,484 times to their friends.

For more recent stats please visit:

www.cs.cmu.edu/~Polly
And also a handful of calls from:
- India
- Belgium
- Oman
- Saudi Arabia
- UAE
Summary

1. Can such a system scale up to millions of calls?
   – Yes!

2. Core development-related service: Job audio-browsing
   – Good uptake (many started calling specifically for this service!)

3. Can it be made cost effective?
   – No conclusive answer yet:
     – audio ads, content sponsors, carrier revenue sharing

4. Polly as an experimental testbed:
   – Used mostly by uneducated young men (some mid- and high-SES)
   – Interest declines within ~4 days, for most*
   – Most users very sensitive to airtime cost

5. Large dataset of social interaction, currently being analyzed
   – Let us know if you want to work on it!

Thank you!

Contact us: www.cs.cmu.edu/~Polly