Unsung Challenges of Building and Deploying Language Technologies for Low Resource Language Communities


Microsoft Research India
Discussion Areas

- Information Exchange
  - Access
  - Generation
- Interface
- Deployment and Impact
Information Exchange
Access of Information

Making existing information accessible to people:

- Must know: Disaster/Banks
- Should know: Rights/Duties/Health
- Can know: Agriculture/Financial Management
- Want to know: Forms of Entertainment
Access of Information

Making more information digitally available to more people:

- Make effective translation tools

Making NLP models more accessible to low resource languages:

- Difficulty in adopting NLP tools to low resource languages
- Use of Machine Translation tools
Generation of Information

Making non-tangible information accessible to people:

- Digitization of Documents
- Crowd-sourcing
Interface
Issues with Text-based Interface

- Thies et.al., 2015 reports that text-based interfaces are:
  - Redundant for illiterate users,
  - Severely error-prone for novice, literate users.
- Several languages don’t have unique keyboard/fonts, some lack script overall (Boyera, 2007).
Alternate Modalities - Speech

- CGNet-Swara (Mudliar et al., 2013)
  - Phone-based IVR System
  - Citizen-run journalism portal for educating illiterate users
Alternate Modalities - Speech

- Avaaj Otalo (Patel et al., 2010)
  - Simple Phone Call System
  - Browse or ask questions on agricultural topics
Alternate Modalities - Speech

- Spoken Web (Kumar et al., 2010)
  - Voice interface application
  - Enables creation of voice sites analogous to websites
  - Voice sites accessible through application
Alternate Modalities - Voice+Graphic Based

- VideoKheti (Cuendet et al., 2013)
  - Multi-modal mobile interface with large buttons, graphics, voice input
  - Provides agricultural videos in desired dialect
Alternate Modalities - Voice+Graphic Based

- Bolo
  - Speech-based reading tutor application
  - Helps improve reading skills for children

![Google Bolo Logo](image)

![Bolo App Screenshot](image)
Challenges to Voice Interfaces

● Difficult to build robust ASR systems for these languages due to:
  ○ Lack of data
  ○ Dialect variations

● Qiao et al., 2010 attempts to solve this via SALAAM ASR:
  ○ Cross-lingual phoneme mapping between high-to-low resource language
  ○ Limited vocabulary, but cost-effective
Deployment and Impact
Learn2Earn

1. Missed Call to IVR Number
2. Listen to audio tutorial
3. Answer Questions
4. Top-up
5. Referral Bonus

The caller
Learn2Earn

- Tech-enabled Information dissemination system
- Deployment
  - Originally centred on informing farmers about their rights (Indian Forest Rights Act)
  - Advertisement seeding on existing IVR channel
  - Financial incentives to use platform, invite friends
- Impact
  - Platform spread from initial 17 users to over 17,000
Mobile Vaani

1. Speak
   Users speak and listen to contributions over our intelligent IVR platform

2. Moderate + Share
   Content moderated locally and centrally, then published on IVR, web

3. Connect to stakeholders
   Inputs connected to government (local + other), NGO partners, social enterprise partners
Mobile Vaani

- Voice-based medium for digital communication, information sharing
- Deployment
  - First employees recruited did not originate but worked closely with community
  - Informed end-users about design and use of technology
  - Re-launch involved compensation plans for trained volunteers
- Impact
  - Initial success followed by lack of growth due to unrealistic expectations in minds of users.
  - Re-launch resulted in better use and adaptation.
  - Gained popularity during teachers’ strike in Jharkhand
CGNet Swara

- Citizen-run journalism portal for educating illiterate users

Deployment:
- ~50 workshops
- Trained >2000 members of various communities
- Outreach activities: financial incentives provided

Impact:
- Incentives empowered users to deliver the technology to desired areas
- Outreach activities increased spread of awareness via word-of-mouth
Conclusion
● NLP research breaks down communication and information barriers
● Increased investment needed for enabling low-resource communities with language technologies
● Hope that increased exposure to problem sparks more discussion and effort in this area