The Use of Virtual Speech Agents in Healthcare

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Recent Focus

- Focused on human-human dialog
  - Natural speech
  - Noisy environments
  - Very little data available
  - Achieved 99% accuracy in clinical hospital environments
- Studies in Kaiser and UCSF
Fluential Technology Tracks

Speech Translation
Talking to People

Conversational Interfaces
Talking to Devices
Virtual Speech Agents

Overarching principle, common to all domains:

Listen
• (ASR)

Understand
• (NLU)

Act
• (Application)
Healthcare Specific Needs

Listen
- Capture patient data
- Anytime
- On any device

Understand
- Understand Medical terminology

Act
- Translate medical lingo into required EHR language
Virtual Speech Agent: Dialog Architecture

Listen: ASR engine

Understand: NLU Engine

Act: Domain-specific Application

Multi-Turn Interaction

Domain Knowledge

Interaction History
Virtual Speech Agent

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<th>Necessary Features for Success</th>
<th>Real-time responses</th>
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<td>Robust, Scalable</td>
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<td>Rapid Development</td>
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<td>Multi-turn, complex</td>
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<td>conversations</td>
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<td>Device independent</td>
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<td>Smart preference learning</td>
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Healthcare Design Considerations

(1) Usability:

“How do users know what to say?”

- Large percentage of medical professionals are familiar with speech (dictation)
- Repeated users
  - Can be trained overtime
  - Biased towards continuous dictation and speaking naturally
- Can use hints during initial sessions
(2) End-pointing

“When is the user speaking?”

- Three options:
  1. Push-to-talk, push-to-stop or hold-to-talk
  2. Wake-up phrases, earcons
  3. Continuous listening
(3) Optimizing Accuracy:

“How can accuracy be improved?”

1. Noise robust system
2. Noise cancelling microphones
3. Teach users the system’s capabilities
4. Alternative modality for input
Healthcare Design Considerations

(4) Graceful Error Recovery:

“How can misrecognitions be handled when they do occur?”

Use confirmations (oral/visual) for critical data like medicines and dosages
The oral feedback should augment the visual feedback and not just re-iterate it
Demonstration

Mobile Device: Data capture anywhere

Data Integration with health care IT system
Q & A

Thank you