A Smarter Natural Language for Virtual Agents

Mobile Voice Conference 2015

Kathy Brown
Chief Data Scientist and VP, Speech Sciences
April 20th
Make Natural Language real and impactful today

Effective
...through prediction

Efficient
...easier to deploy and scale
The Unichannel Virtual Agent

Virtual Agent

How May I Help You?

“My card isn’t working and I need help” -> Natural language

There are several reasons your card may not be working. Here are a few useful links:
• Report a Damaged Card
• Fraud notification
• Make a payment
• Travel Notification

Chat with an agent
Unichannel View
Omnichannel View

2 Hours Ago

9:30 am Jim logs into the website from his laptop
9:35 am Checks his account
Balance
9:36 am Clicks on available credit and sees $0
9:37 Clicks On Make Payment
9:40 Completes payment
9:41 Receives confirmation payment successful
9:42: Jim logs off the website
## The Omnichannel Virtual Agent

<table>
<thead>
<tr>
<th>Virtual Agent</th>
<th>Chat with an agent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hi Jim, How May I Help You?</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>“My card isn’t working and I need help” -&gt;</td>
<td></td>
</tr>
<tr>
<td>Omnichannel Natural language</td>
<td></td>
</tr>
<tr>
<td>Jim, your card isn’t working because the payment you just made is still pending. It takes 24-48 hours for a payment to clear. After it clears, you will be able to use your card.</td>
<td></td>
</tr>
<tr>
<td>To help, would you like me to send you an SMS when it clears?</td>
<td></td>
</tr>
</tbody>
</table>

9:30 am Jim logs into the website from his laptop
9:35 am Checks his account Balance
9:36 am Clicks on available credit and sees $0
9:37 Clicks On Make Payment
9:40 Completes payment
9:41 Receives confirmation payment successful
9:42: Jim logs off the website
Limitations of standard single channel NL architecture

30-40% failure rate in identifying actionable intent

Single channel NL hits a wall on containment rate improvements

Move beyond single channel to omnichannel predictive models
Sample NL intent distribution

Vague, agent, and out-of-domain intents are not *actionable* intents

- Vague Intents
- Agent Intents
- Out of Domain
- Specific Intents
Combining NL with prediction

- **Start**
  - Predict Intent
    - Single Dominant Intent
    - No Dominant Intent
  - Confirm Intent
    - Prediction Confirmed
    - Prediction Rejected
  - Open-Ended Question
  - Disambiguate Intent
  - Select Best Action

© 2015 24/7 CUSTOMER, INC.
NL Prediction Platform

Knowledge Base

Configuration Transformation

Text Translator

Feature Extraction

Classifier Technology

Score Normalization

Text Translator:
- TN 1
- TN 2
- TN 3

Feature Extraction:
- FE 1
- FE 2
- FE N

Classifier Technology:
- Classifier 1
- Classifier 2
- Classifier 3

Score Normalization:
- Raw
- SN 1

Recommendation:
1
2
N

Voice

MSE

Customer Text / Chat

ASR/SLM
# Fusing omnichannel data

## Interaction Data

<table>
<thead>
<tr>
<th>Online / VA</th>
<th>Speech</th>
<th>Mobile</th>
<th>Chats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Time</td>
<td>• Time</td>
<td>• Time</td>
<td>• Time</td>
</tr>
<tr>
<td>• IP Address</td>
<td>• ANI</td>
<td>• Device ID</td>
<td>• User ID</td>
</tr>
<tr>
<td>• Search</td>
<td>• DNIS</td>
<td>• Location</td>
<td></td>
</tr>
<tr>
<td>• Referrer</td>
<td>• Journey</td>
<td>• Journey</td>
<td></td>
</tr>
<tr>
<td>• Journey</td>
<td>• Dialogs</td>
<td>• Calendar</td>
<td></td>
</tr>
<tr>
<td>• Pages Viewed</td>
<td>• Recognition</td>
<td>• Screens Viewed</td>
<td></td>
</tr>
<tr>
<td>• Resolution</td>
<td>• Resolution</td>
<td>• Recognition</td>
<td></td>
</tr>
<tr>
<td>• Social Feedback</td>
<td>• Resolution</td>
<td>• Resolution</td>
<td></td>
</tr>
<tr>
<td>• User ID</td>
<td>• User ID</td>
<td>• User ID</td>
<td></td>
</tr>
</tbody>
</table>

## Behavior & Enterprise Data

<table>
<thead>
<tr>
<th>Customer Profile</th>
<th>Behavior History</th>
<th>CRM data</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Location</td>
<td>• Payment preferences</td>
<td>• Orders</td>
</tr>
<tr>
<td>• Tenure</td>
<td>• Mode preferences</td>
<td></td>
</tr>
<tr>
<td>• Demographics</td>
<td>• Segmentation</td>
<td></td>
</tr>
</tbody>
</table>
Agent: Hi my name is Brett, can I help you with your Sales Enquiry?

Customer: I am just looking at my mobile account and it's giving me an upgrade option...I didn't think I was eligible for an upgrade yet?

Agent: Are you considering any handset and the plan?
Vertical intent models

- Industry trained models
- Predict user intent along journey dimensions

- Scalable customization layers
- Reduce number of optimization cycles

• Off-the-shelf vertical models

• Learning

• Omni-channel

• Faster deployment

• Unified models applied across channels
Closing thoughts

NL needs to be:
• Effective and efficient -> leverage prediction and vertical models
• Strategic and core to engagement -> give it an omnichannel DNA
• Journey focused -> start with the customer’s view
Kathy Brown
Chief Data Scientist and VP, Speech Sciences
Kathy.Brown@247-inc.com